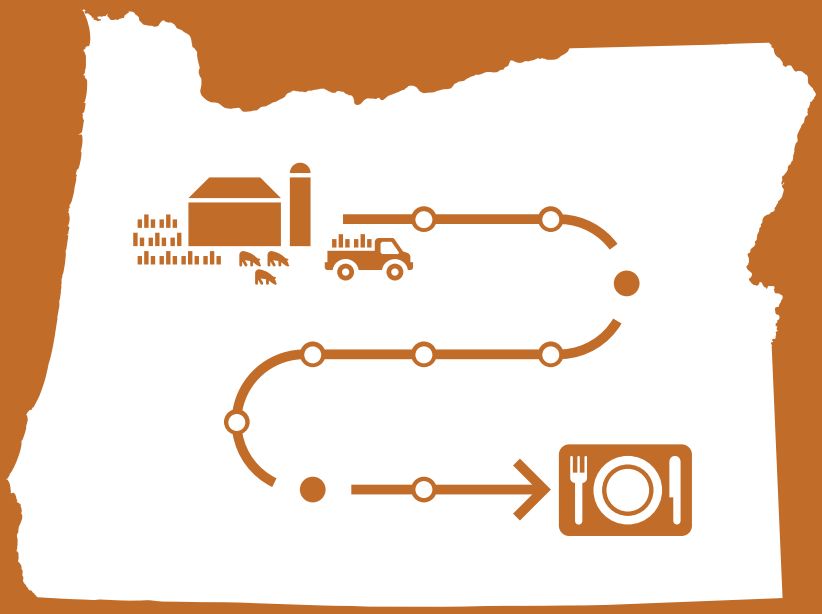

Oregon Food Infrastructure Gap Analysis

Where Could Investment Catalyze Regional Food System Growth and Development?

ecotrust

This research was made possible through a generous grant from Meyer Memorial Trust. We at Ecotrust appreciate the ongoing support and partnership of an organization so thoughtfully pursuing reliable prosperity for all Oregonians.

Meyer Memorial Trust

Meyer Memorial Trust's mission is to work with and invest in organizations, communities, ideas, and efforts that contribute to a flourishing and equitable Oregon by using a mix of strategic, proactive, and responsive investments, including grantmaking, loans, initiatives, commissioning research, supporting policy advocacy, and a range of community and nonprofit engagement strategies.

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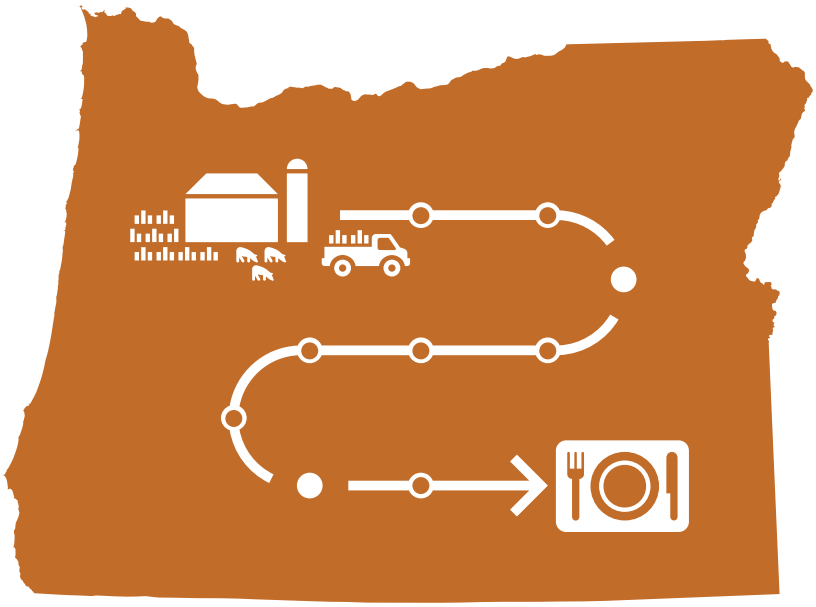
For more than twenty years, Ecotrust has converted $80 million in grants into more than $800 million in assets for local people, businesses, and organizations from Alaska to California. Ecotrust's many innovations include cofounding an environmental bank, starting the world's first ecosystem investment fund, creating programs in fisheries, forestry, food, farms, and social finance, and developing new tools to improve social, economic, and environmental decision-making. Ecotrust honors and supports the wisdom of Native and First Nation leadership in its work. Learn more at www.ecotrust.org



Oregon Food Infrastructure Gap Analysis

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By Ecotrust, with Matthew Buck
Funded by Meyer Memorial Trust

April 2015

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Executive Summary

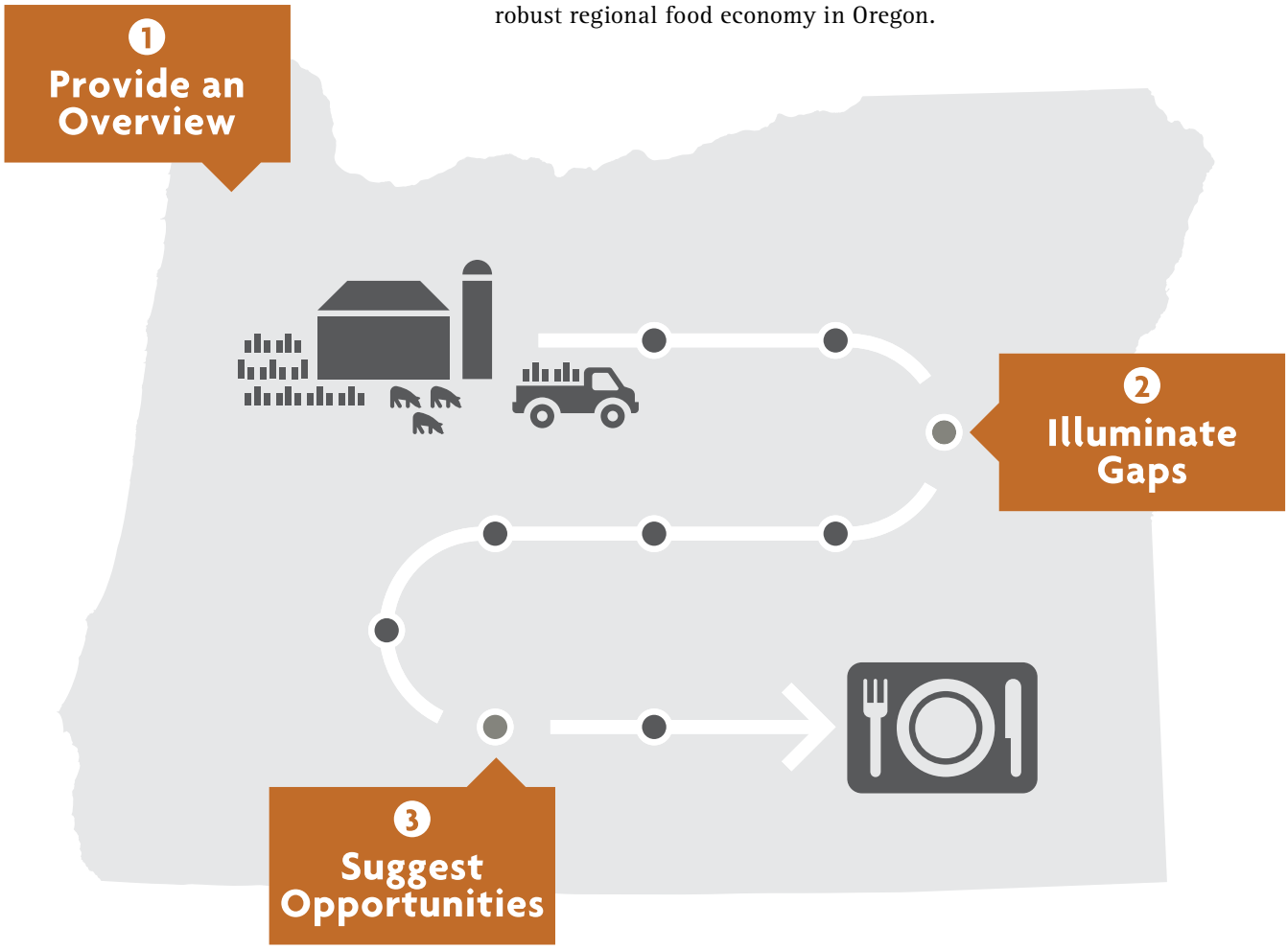
1.1. What Is the Issue?

This project was proposed by Ecotrust and funded by Meyer Memorial Trust to meet three objectives on behalf of impact investors, practitioners, and policymakers:

1. To provide an overview of key supply, demand, and infrastructure drivers affecting the development of Oregon's regional food system;

2. To illuminate aggregation, processing, and distribution infrastructure gaps inhibiting the flow of whole and minimally processed agricultural and food products from small and midscale Oregon producers to domestic wholesale food buyers, and;

3. To suggest opportunities for investment to advance the development of a robust regional food economy in Oregon.



Oregon Food Infrastructure Gap Analysis, 2015

1.2. What Did the Study Find?

At the highest level, the study confirmed that food aggregation, processing, and distribution infrastructure is not readily or affordably accessible by Oregon's small and midscale, differentiated farmers, ranchers, and artisans, and that this lack of access is inhibiting the growth and development of a robust regional food economy. However, the study also highlighted many other

interdependent factors related to the development of a strong regional food economy.

1.2.1 Supply

Oregon has robust, diverse, and thriving agricultural and food sectors, with almost $4.9 billion of total agricultural output generated in 2012,[1] and more than $11 billion spent on food in 2013.[2] Of the more than thirty-five thousand farms and ranches in Oregon, **nearly half** of the state's agricultural production is of nonfood products such as nursery stock, grass and other seed, wine grapes, and Christmas trees. This study focused on the twenty thousand to twenty-five thousand farms and ranches we estimate[3] are directly producing **food** for human consumption or forage for livestock. Forage was included because of its obvious value as an input into meat production, and because it emerged as a key area of opportunity for investment and attention.

Highlights from the Supply section of the report include:

- Primary **food production regions** across the state are illuminated, including maps and general descriptions of important differences in terrain and production viability.

- **Scale** of operation is discussed as a key variable in understanding both where gaps exist and what type of producers (farmers and ranchers) and processors (value-added and specialty producers, artisan and entrepreneurs, or operators of enabling infrastructure) would most efficiently metabolize investment or other support into desired outcomes.

- We found it impossible to define a **scale "sweet spot"** because the gross sales ranges differ significantly across product categories, geography, and, to some degree, market channel (e.g., one acre of blueberries sold primarily via the Portland Farmers' Market has the capacity to yield very different gross sales than one acre of pastureland for a cow/calf operator), and the fact that producers can and do participate in multiple categories.

- However, we explored the conceptual model described as "**Ag of the Middle**" and found it to be a useful construct in framing challenges and opportunities. In slightly abstracted terms, Ag of the Middle producers are those too small to compete in commodity markets, and too big to participate exclusively in direct to consumer channels such as farmers' markets; what we now describe as "**local values, wholesale volume**".

- The research indicates that for "Ag of the Middle" players to be financially viable, they must capture value based on **product differentiation**.

[1] "Oregon Cropland Data Layer," USDA, NASS, 2012.

[2] "Consumer Expenditure Survey, 2013." Bureau of Labor and Statistics,

[3] Note: Because farms and ranches grow multiple crops, including both food and nonfood, and/or different varieties of both food and forage, it is impossible to create a clearly delineated chart of producers by product type from available data.

Differentiation can be achieved based on multiple dimensions related to product attributes, production practices, business structure, geography, brand, or a combination thereof (e.g., local, certified organic, farmer co-op).

	Small	AOTM	Commodity
How big are they?	$	$$	$$$$$
Who are their customers?	Eaters	Restaurants Retailers Institutions Distributors	Processors Brokers Distributors
What's their region?	Local	Regional	Global
How diversified are they?	Very	Somewhat	Minimally
Where's the boss?	In the field	On-site	At HQ
Who owns the business?	Family	Family Co-op Partnership	Corporation
Who sets the price?	Producer	Negotiation (farmer/buyer together)	Market
Does the producer have an off-farm job?	Yes	No	No

Ag of the Middle* Framework (AOTM)

* "Ag of the Middle" is a conceptual framework, not a set of hard and fast rules.

See www.agofthemiddle.org for more.

1.2.2. Demand

The population of Oregon is estimated at 3.97 million residents,[4] 68 percent of whom live in the Willamette Valley,[5] mostly concentrated along the Interstate-5 corridor. Multnomah County, which includes Portland, is home to almost 20 percent of the state's citizens, or nearly 750,000 people, and is expected to expand rapidly in the next twenty years. It has a thriving $4.3

[4] US Census Bureau, 2014.

[5] Willamette Water, 2100, 2012.

billion food sector, and an international reputation as a hub of creative "farm-to-table" innovation.

Our research showed that:

- Demand for differentiated food is growing nationally, as evidenced by the rapid increase in **retail**, **restaurant,** and **manufactured food brands** promoting "local," "natural," or otherwise differentiated products and offerings. This trend is prominent in Oregon, particularly in urban areas.

- **Export** opportunities for Oregon-grown and -processed products, both in commodities and differentiated products, is significant and growing.

- **Anticipated scarcity** of long-term supply is motivating larger scale retailers, restaurateurs, and manufacturers to seek long-term contracts, or even purchase land directly, in order to secure supply.

- **Institutions** (e.g., schools, hospitals, colleges, correctional facilities) seem noticeably slower as a buyer segment (versus restaurants, retailers, and manufacturers) to respond to customer interest in differentiated products for a variety of reasons. Institutions may pose a unique opportunity to act as anchors for regional food economies. The study explores institutional demand and offers perspective on leveraging such facilities to equalize access to differentiated food by low-income and vulnerable populations.

- In the near term, demand is only demand at a **price.** If product differentiation is based on production practices that are less financially efficient, an economic analysis of the supply chain can help clarify where market value may be harvested to support the increased cost. We attempted one such analysis in the chicken supply chain as an illustrative example.

- Finally, Portland consumers generally do not have the same level of **discretionary income** as residents of markets like Seattle or San Francisco, and may be characterized as culturally more frugal. This is important in that it speaks to how quickly a nascent system, as yet dependent on affluent consumers paying higher prices, can grow.

1.2.3. Infrastructure

As originally conceived, "infrastructure" was defined as both the physical components of food aggregation, processing, and distribution (e.g., warehouses, equipment, trucks), as well as the network of relationships (e.g., producers, processors, butchers, brokers, distributors, chefs), required to move food from the farm or ranch (or ocean, river, or aquaculture facility, although seafood was beyond the scope of this study) to the point of consumption.

In actuality, infrastructure became the entry point into a much broader examination of the challenges and opportunities posed by the development of regional food systems. Highlights from the Infrastructure section of the report include:

- It can be helpful to think of infrastructure as "**first mile**" or "**last mile**" in order to focus on the set of activities that occur conceptually (and sometimes physically) closer to the initial producer (post-harvest handling, cooling and processing, seed cleaning and sorting, animal slaughter) separately from those more buyer-oriented (value-added processing, packaging and labeling, last-mile logistics and distribution).

- In commodity markets, producers are most often supplying **inputs** into a well-orchestrated supply chain optimized for efficiency. They are price-takers, and usually responsible for only one significant link in the supply chain.

- Ag of the Middle producers are often taking responsibility for multiple links or **entire supply ecosystems**, from production, processing, and packaging, to market development and sales, as well as distribution. They may be bringing **multiple products** to market in order to maximize revenue streams and/or to meet environmental objectives. They work to **negotiate pricing as partners** with their buyers, and hope to capture more of the final value of the product by managing the intermediate steps.

- Because of the fundamental differences in their market strategies, we found that **Ag of the Middle producers face significant infrastructure challenges** relative to commodity players. They often don't meet volume minimums, won't make exclusive contracts, or can't otherwise overcome barriers to entry to access existing infrastructure. Such producers, processors, artisans, and entrepreneurs must therefore spend significant time and energy to handle multiple pieces of the supply chain themselves (affixing labels, picking and packing orders, doing deliveries, etc.), or cobble together a constellation of suppliers, partners, or fellow producers to connect the dots.

    + **Last-mile warehousing and logistics** seems to be a particular overarching pain point, especially for rural producers. Many describe the difficulty coordinating the myriad details required to manage

multiple partners from afar, necessitating frequent trips to town and time spent while there coordinating operations rather than meeting with current and potential customers to grow their businesses.

- **Urban producers** and entrepreneurs face a similar bottleneck, in that self-distribution often requires energy and resources sufficient to stunt growth.

- Lack of access to **processing facilities** rose high on the list of overarching concerns, especially among beef and chicken producers, and among value-added producers seeking "right-sized" production space or co-packing.

- Beyond hard-asset infrastructure, few Ag of the Middle producers interviewed have experience with sales and marketing, and all seem to struggle with **market development**. As with operations, they are frequently cobbling together resources for at least a logo and product label, and perhaps some basic sales collateral and a website. They often simply go without brand and marketing strategy, consistent marketing communications, optimal sales outreach, or more robust strategic planning.

- Most factors of infrastructure are **unique to the product category** in which they operate. The beef category requires facilities for slaughter, cut and wrap, aging, and perhaps smoking, grinding, blast-freezing, or vacuum-packing. Vegetables on the other hand require washing, cooling, slicing, freezing or canning. Grains and seeds must be sorted, cleaned, hulled, milled, etc., and so on for each category. All have unique regulatory and food safety requirements as well.

- In order to understand the infrastructure challenges and opportunities at a more actionable level, we researched the markets for **six product categories** in Oregon: chicken, beef, pork, small grains, storage crops, and greens. Challenges and opportunities specific to each category are included in each of six separate chapters in the full report.

While it may seem counterintuitive given that humans have been farming in some form for ten thousand years, the differentiated regional food and agriculture sector characterized by Ag of the Middle production and values-based supply chains looks like an emerging market: **highly fragmented, lacking consistent data and information, and dependent on personal relationships**.

It has also been described as **highly collaborative and supported by local communities** (perhaps most notably in a January 2015 report to Congress on **Trends in US Local and Regional Food Systems** by the USDA Economic Research Service). This culture of collaboration is important because it has significant implications for the type of investments, capacity development, and support useful in growing the sector.

1.3. What are the Recommendations for Investment?

Pick a problem and go to work. This research confirmed that food infrastructure is not readily or affordably accessible by Oregon's Ag of the Middle producers, and that the lack of access is inhibiting the growth and development of a robust regional food economy. The issues are many and varied, so coordination of a wide variety of investment and initiatives will be required to change the overall situation. Clearly needed are models that fill gaps in scale-appropriate aggregation, processing and distribution infrastructure, whether by working with established industry players to create access for smaller producers, or by developing new infrastructure specifically suited to support a distributed, regional-scale system.

Look for clear differentiation. All of the categories we studied—beef, pork, chicken, grains, greens and storage crops—have well established existing players that have the capacity to shift production practices and compete on any number of differentiating attributes. As this report is getting submitted, Tyson has just announced that it will eliminate antibiotics important to human health by 2017. Local chicken producers will have a very difficult time

Bowery Bagels: Daily Deliveries

"I can make more bagels, but I can't deliver any more."

MICHAEL MADIGAN, FOUNDER & CEO, BOWERY BAGELS

competing against Tyson on price if mainstream consumers are content with its approach being "good enough". Opportunity for financial viability is likely better in niche categories, perhaps proteins such as lamb, goat, or buffalo, and niche produce like local adaptations of ethnic ingredients. Another alternative is to focus on products targeted at discerning customers who care, and are willing to pay for, storied product or a transparent supply chain that matches their values.

Invest in models that help Ag of the Middle producers get or appear bigger. As discussed in many of the individual product chapters, co-ops, collaborations, and alliances of many kinds hold potential for smaller scale Oregon producers and entrepreneurs to create leverage in domestic (and international) marketplaces. Because of the need for differentiation, regional brands can sometimes be problematic (producers may be better served to invest in their own brands), however shared use of processing facilities, storage capacity, distribution trucks, and other infrastructure can reduce costs for all. Co-marketing of complementary products can also help build sales and market share for like-minded producers and processors. Exploring potential partnerships or collaborations with existing players committed to regional food systems, like Organically Grown Company in the case of organic produce, or B-Line Sustainable Transport in the Portland market, seems a smart starting point.

Seek to understand root causes. The signal to noise ratio in regional food systems can be very high, given the degree of complexity and fragmentation. Understanding root causes will likely require examination of problems from multiple perspectives, as a great many proposed solutions address only symptomatic issues.

Explore interdependencies among sectors. The "food system" is a misnomer in many ways. The system is actually a collection of dozens of discrete industries, most of which do not cross over from one to another. Ag of the Middle producers and processors may offer opportunities to solve multiple problems at once because they tend to operate holistically.

We discovered an interesting chain of connections **between product categories** worthy of further exploration:

- Analysis shared in the infrastructure and beef chapters showed that adequate slaughter and processing facilities may not exist in the state to serve ranchers trying to develop their own value chain for **beef** (rather than participating in the commodity supply chain as a cow/calf operators).

- Like all other hard infrastructure, beef slaughter and processing require steady **throughput** of animals in order to be financially viable. Because differentiated product (e.g., antibiotic and hormone-free and/or grassfed) is likely to be seasonal, there is a significant processing crunch in the fall. A rancher may need to reserve a fall slaughter date more than a year in advance, but the equipment is underutilized during other parts of the year.

- **Pork** can be run in the same facilities and on the same equipment as beef, and can be raised year-round. Oregon ranchers don't produce anywhere near the amount of pork we consume in Oregon (only about 2% of our consumption is produced locally) because commodity pigs usually eat corn and soy, so the hog industry is located closer to those fields in the Midwest.

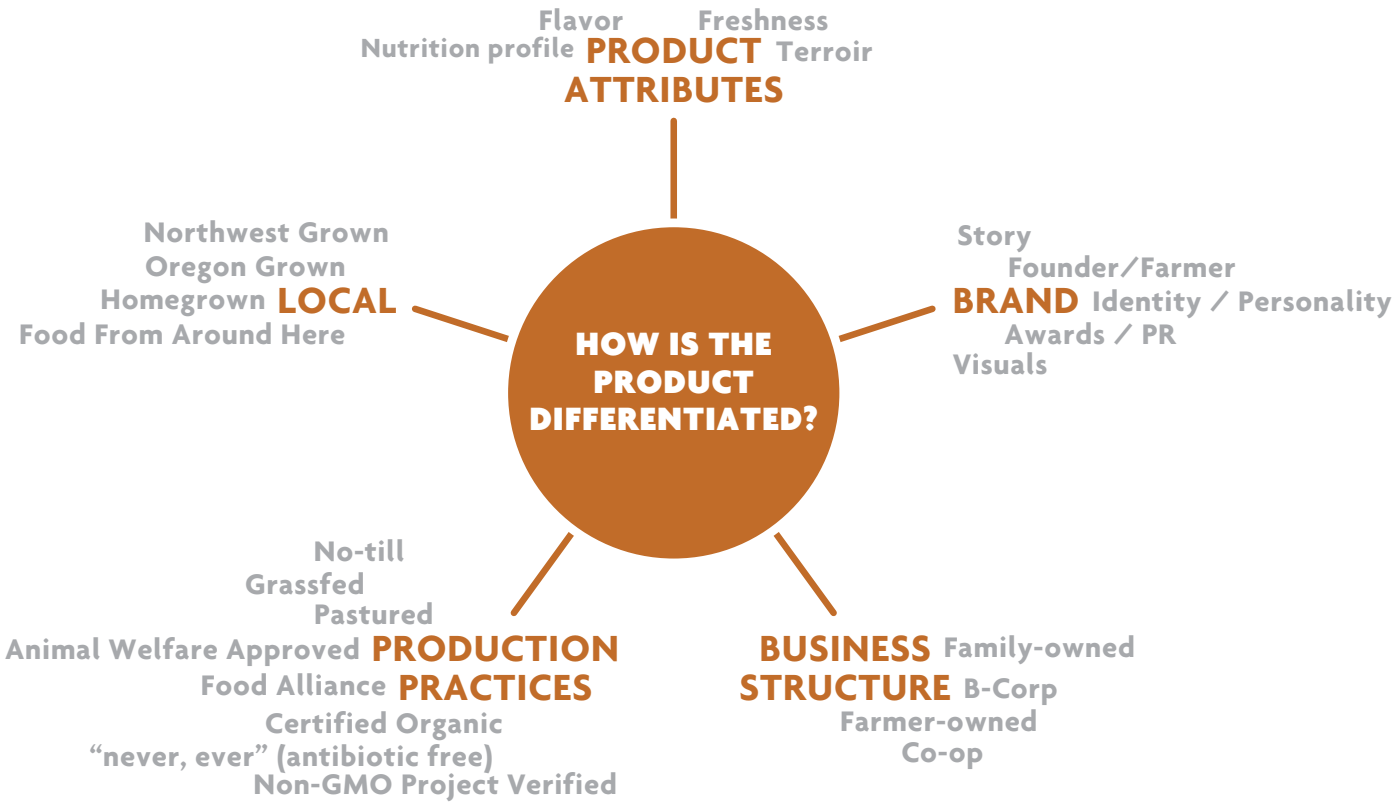
- Pigs are **omnivores** and can be raised on a wide variety of feed options.

- **Wheat** farmers need to rotate crops in their fields to build fertility, disrupt disease cycles, manage pests and weeds, and increase yields. What do they grow in rotation? Stuff pigs eat.

- It seems worth exploring whether a special "Northwest Blend" of pig feed could also help wheat farmers monetize their **rotational grains**, while creating better utilization and perhaps more convenient location of livestock slaughter and processing facilities. Waste, including spent grains from breweries and compost from institutional foodservice (provided no pork products or bones were included), could also theoretically be aggregated and re-distributed to pork producers for feed.

- If a regionally appropriate hog feed were developed in partnership with wheat farmers, it seems possible that the same could be done for chicken.

- Our **chicken** supply chain analysis suggests that in some cases up to 60% of the cost of raising a differentiated chicken is purchased feed (higher if the



feed is Certified Organic), so a less expensive option could have a significant impact on the economic viability of local chicken production.

Create space and structure for collaboration. The food system is complex and the challenges are significant. As an emerging sector, regional food system players have shown a penchant for **working together for mutual benefit**, but the process is inefficient. Workshops, meet and greets and "hackathons" are often too superficial to spur engagement that goes deep enough to wrestle through the complexities. Ag of the Middle producers and processors may benefit from structured "containers" that facilitate collaboration and co-working directly on their businesses over a longer period of time.

Clarify target beneficiaries. In order to facilitate effective coordination, we believe it is helpful to describe the primary beneficiary or outcome desired in as much detail as possible. If an investor is keenly interested in facilitating the success of rural producers, then it is helpful to describe to which scale, stage of business and/or primary market channel (e.g. small/midsize, new and beginning/Ag of the Middle, direct to consumer/wholesale) the investor is most drawn. It may be helpful to ask, is there a specific product category (e.g. diversified mixed vegetable, chicken, beef) or production practice (e.g. Certified Organic, antibiotic-free, grassfed) for which you see opportunity and want to solve problems?

Consider, for example, how this report has helped refine and channel the focus of Ecotrust's own Food & Farms program. Based on these research findings, we believe a **programmatic strategy centered on institutions** offers the best opportunity for us to help facilitate measurable impact on all three of the dimensions—financial, social and environmental—to which we're dedicated. While we strongly believe relief for those among us experiencing hunger is critical, we are of the mind that creating truly equitable access to nutrient-dense food can't happen without shifting the system itself.

We have therefore redoubled our commitment to helping institutional foodservice directors leverage their procurement dollars to build strong regional food systems, thus creating both local economic opportunity and equalized access to nutrient-dense foods. We have further narrowed our target to focus primarily on supporting public institutions that are serving significant proportions of vulnerable populations, however we understand that other institutions, such as corporate cafes and private event venues, are important secondary targets because they may help balance budget constraints and socialize new approaches among their professional peers. This clarity of focus has helped develop partnerships, notably with Healthcare Without Harm, the Oregon Department of Agriculture, Oregon Tilth, and Multnomah County, to develop a coordinated series of interventions all aimed at helping institutional foodservice directors overcome barriers to local sourcing. Our long-term ambition, together with those and additional partners, is to develop a network of regional foodservice directors that can function like an **institutional-scale CSA** (community supported agriculture). We expect that

this clarity of focus within the program will extend to Ecotrust's investment activities in the local food sector as well.

Consider the definition of "Local". In all cases it is helpful to describe relevant geographic filters, whether based on political boundaries, such as states or counties, naturally derived boundaries such as a watershed, "food shed" or bioregion, or a more abstract concept of geography such as "Salmon Nation" (which is Ecotrust's region of interest and runs along the west coast from Northern California, through British Columbia to Alaska, and across Oregon and Washington into Idaho and Montana as far as the salmon have historically run). When considering whether a model will scale across multiple geographies, it is useful to parse which components of the model are unique to the region in which it is being developed, and which would apply to all regions.

One note of caution regarding **geography as it relates to food**. It is generally confusing or misleading to describe target geography for regional food systems in terms of mileage (as with constructs like the "100 Mile Diet"). Appropriate distance traveled is highly dependent on product category, location, season, and availability of enabling infrastructure. A conscientious eater in the Pacific Northwest may go no further than her backyard for a ripe tomato in late summer, but always need to buy avocados grown hundreds of miles away. Pigs may be raised by a producer within the county, but have to be trucked across the state for slaughter and processing, and then be trucked back to arrive in the local grocer's meat case. Organic produce distributor Organically Grown Company is guided by the principle "go as far as necessary and no farther" to allow the necessary flexibility for seasonally appropriate sourcing; such a notion may be worth adapting to your context.

Adopt a collaborative mindset. As noted earlier in this report, collaboration has become a hallmark of regional food system development, which seems both in tune with and energized by the generational changeover currently happening across all industry sectors in the US. The approach seems well suited to food system investing also.

Whereas profit serves as an efficient organizing principle, and provides a simple scorecard, as a singular objective it has also contributed to the creation of many food products and related offerings which generate strong financial results, but deleterious health, community and environmental impacts. The addition of social and/or environmental targets in impact investing facilitate the incorporation of wellness (individual, community and of the natural resource base) into evaluations of success, however also result in multifaceted solutions and a need for multi-dimensional measurement.

Given the increased complexity, it may make sense to pursue a portfolio approach that is **broader than one's own portfolio.** In other words, by partnering, co-investing or collaborating with like-minded investors, multiple solutions to overcoming key challenges can be tested in a coordinated and transparent fashion, and the learning shared, to achieve the greatest possible impact. Furthermore, collaboration allows each investor to prioritize the opportunities most aligned with his or her objectives, confident in the knowledge that other investors in the collaborative network will focus on other pieces of the puzzle.

Start with the soil. Long-term competitive advantage in a resource-constrained environment is likely to ultimately go to players who effectively steward the resource base on which their business depends.

First, do no harm. Above all else, reviewing the existing portfolio and divesting from unaligned holdings may achieve the greatest incremental investment on behalf of regional food system development. Whether individually or on behalf of a foundation, if the investment thesis includes leveraging assets to promote values-aligned solutions ("impact investing"), then it may be counterproductive to focus energy on placing 5% of investments in "mission-related" vehicles (as is common), while leaving 95% of the portfolio invested in entities actively causing harm. Thus, reviewing the full portfolio and divesting from funds or other vehicles out of alignment with stated values or objectives could achieve an immediate spike in "social return on investment".

For additional recommendations for local/regional market development and improved food access by vulnerable populations, please see the recommendations for philanthropic, governmental, and programmatic players (section 12.2), and for further research needed, section (12.3) of the report.

1.4. How Was the Study Conducted?

The project team engaged in secondary data collection, analysis, and mapping. Primary research was conducted with a variety of key stakeholders via interviews, visits, and tours with producers and processors. In-depth secondary research was conducted for specific product categories. All results were vetted by partners, advisors, and industry experts.

We invite you to meet our hero, an aspiring impact investor named "Intrepid," as he digests this research and figures out his next steps, online at http://food-hub.org/regional-food-infrastructure/

2

Introduction

Photo courtesy John Valls

This project was proposed by Ecotrust and funded by Meyer Memorial Trust to meet three objectives on behalf of impact investors, practitioners, and policymakers interested in developing a strong domestic/regional food system in Oregon:

1. To provide an overview of key supply, demand, and infrastructure drivers affecting the development of Oregon's regional food system;

2. To illuminate aggregation, processing, and distribution infrastructure gaps inhibiting the flow of whole and minimally processed agricultural and food products from small and midscale Oregon producers to domestic wholesale food buyers, and;

3. To suggest opportunities for investment to advance the development of a robust regional food economy in Oregon.

What follows is an orientation to the supply, demand, and infrastructure landscapes of locally produced food in Oregon, including a discussion of key drivers in each area related to the development of a high-functioning domestic/regional food system in the state. Because most food system infrastructure is directly connected and customized to the product sector in which it operates, we also present a deeper exploration of six product categories: chicken, beef, pork, small grains and legumes, storage crops, and greens. These product chapters are not meant to represent the full breadth of food agriculture in Oregon, however they do provide a useful mechanism for understanding infrastructure gaps and opportunities in practical terms, and cover a meaningful portion of the average Oregonian's diet.

Throughout the report, we borrow from the Oregon Department of Agriculture's vernacular and use "**domestic**" market to refer to **in-state** trade. "**Export**" refers to products sold **out-of-state**, which also includes those sold out of the country (when important to the discussion, we delineate international trade).

Although we are well aware that the food system crosses state boundaries in terms of both production and demand for products that grow here, not to mention our appetite for products (coffee, chocolate, citrus) that don't generally grow here, the geographic scope of this report is focused on Oregon.

With those parameters defined, we move to an overview of the agricultural production that constitutes the supply side of the food system in Oregon.

3

Supply


Photo courtesy N. Scott Trimble

3.1. Introduction and Oregon Overview

An overview of Oregon's supply landscape is crucial to understanding key gaps, challenges, and opportunities for building robust regional food economies. Oregon has a **highly diverse** and productive agricultural sector, and while agriculture constitutes a significant proportion of the state's economy, it is important to realize that much of the production is of **nonfood crops** such as grass and other seed, nursery stock, wine grapes, and Christmas trees, and much leaves the state as **exports**. In this section we recap the robust agricultural diversity and economic impact of the agriculture sector in the state, describe **food and forage** as a subset of the total ag sector, illuminate food production by county, and then delineate and discuss significant **food production regions** used throughout this report.

Following that orientation, we discuss **key supply issues** with important implications for responsible food system investing. The first of these is scale of operation, during which we introduce the conceptual framework described as "**Ag of the Middle**" to help clarify, and then explore the necessity of **product differentiation** for Ag of the Middle producers.

3.1.1. Diversity and Impact

Oregon's highly diverse climate and productive soils have spawned a unique agricultural landscape capable of producing a wide variety of crops. There are over 220 different agricultural commodities produced in the state, and over **60 varieties of food products sold.**[6] Of the 20 most common food products consumed by an average American, Oregon produces all but 3[7].

Agriculture is an important part of the state's economy. While Oregon is only the twenty-eighth largest producer of agricultural products in the United States, agriculture (including nonfood production such as nursery stock, grass seed, wine grapes, and Christmas trees) is among Oregon's major industries, accounting for 9 percent of Oregon's gross state product and 8 percent of all Oregon jobs.[8] It's estimated that the **"economic footprint" of agriculture in Oregon is even broader, accounting for over $49 billion (15 percent) of the state's economic activity.** Associated jobs total more than 260,000 (12 percent) of the state's employment.[9]

In 2012, Oregon produced $4.88 billion in total agricultural output.[10] As much as 80 percent of the agricultural products grown or raised in Oregon are sold out of state, and half of that is exported to foreign countries.[11] Roughly

[6] OAIN Database Commodity Values, 2012.

[7] Commodity production data from Oregon Agriculture Information Network (OAIN), OSU, 2014. Consumption data from USDA Economic Research Service, 2012. High fructose corn syrup was excluded from the top 20 consumed products. Products not produced in Oregon include: rice, iceburg lettuce, and bananas.

[8] Bureau of Economic Analysis, 2013.

[9] "Oregon Agriculture and the Economy: An Update, 2011"

[10] "Oregon Cropland Data Layer," USDA, NASS, 2012.

[11] "Oregon Agriculture and the Economy, An Update" 2011.

42 percent of Oregon's total agricultural output in value ($2.03 billion) is exported internationally[12] and the state provides 100 percent of the nation's commercial output for blackberries, hazelnuts, boysenberries, and black raspberries. It ranks first nationally in a variety of other crops including three different kinds of grass seed, Christmas trees, sugar beets for seed, and onions, among others.[13] Agriculture accounts for about 19 percent of total state exports.

3.1.2. Food and Forage as a Subset of Agriculture

According to the 2012 Census of Agriculture, there are more than **thirty-five thousand farms and ranches** in Oregon, occupying about 16.4 million acres (not including publicly owned rangeland). We estimate that some variety of food product, either for human consumption or for livestock forage as an input into food production, is produced on twenty thousand to twenty-five thousand of these farms (roughly 60 to 70 percent of total farms). Approximately 1.2 million acres of land, not including that devoted to dairy, livestock, or poultry, is dedicated to production of food crops.[14]

Although three of Oregon's top five agricultural products are nonfood, food is still a major portion of Oregon's agricultural output. In 2012, **total food production in Oregon was valued at roughly 52 percent of total agricultural output ($2.56 billion)**, the majority of this originating from cattle and calves, dairy, and wheat.[15] In addition to these commodities, Oregon grows a wide variety of fruits and vegetables, which—when considered together—totaled close to $1 billion in 2012.

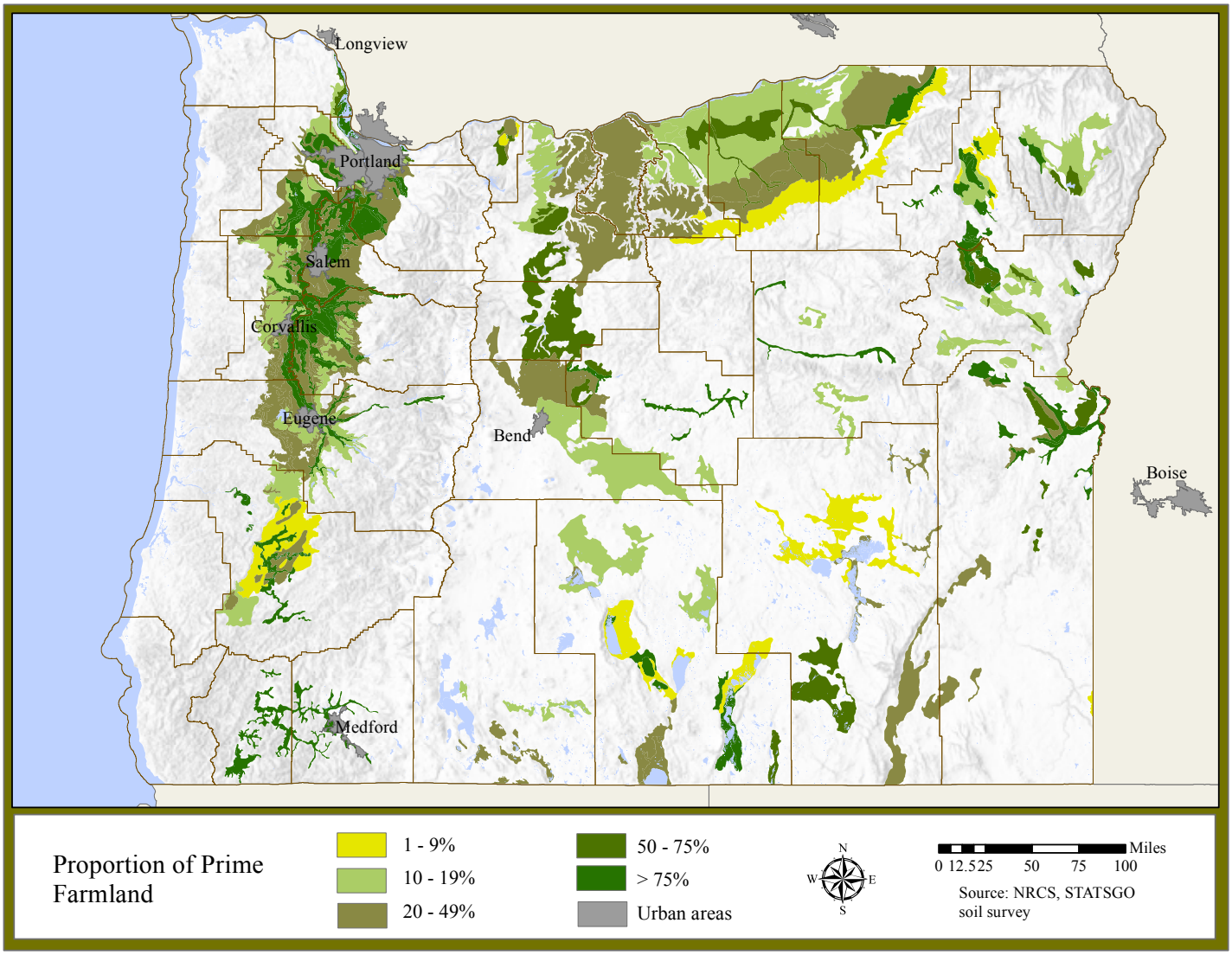
Alfalfa and other hay, small grains, and nonfood commodities (nursery stock, grass and grass seed, wine grapes, and Christmas trees, etc.) represent a significant proportion of the total agricultural acreage in Oregon, as noted above. Whenever possible, this report focuses on the subset of Oregon agricultural products grown specifically for human consumption. Forage is included as a vital input to meat production. Unless otherwise specified, "livestock" refers to animals raised for human consumption (e.g., cows, pigs, sheep), not including poultry, eggs, or seafood.

[12] "Small Grains 2014 Summary," National Agricultural Statistics Service, ISSN: 1949-162X, September, 2014.

[13] "Small Grains 2014 Summary," NASS, 2014.

[14] OAIN Database Commodity Values, 2012.

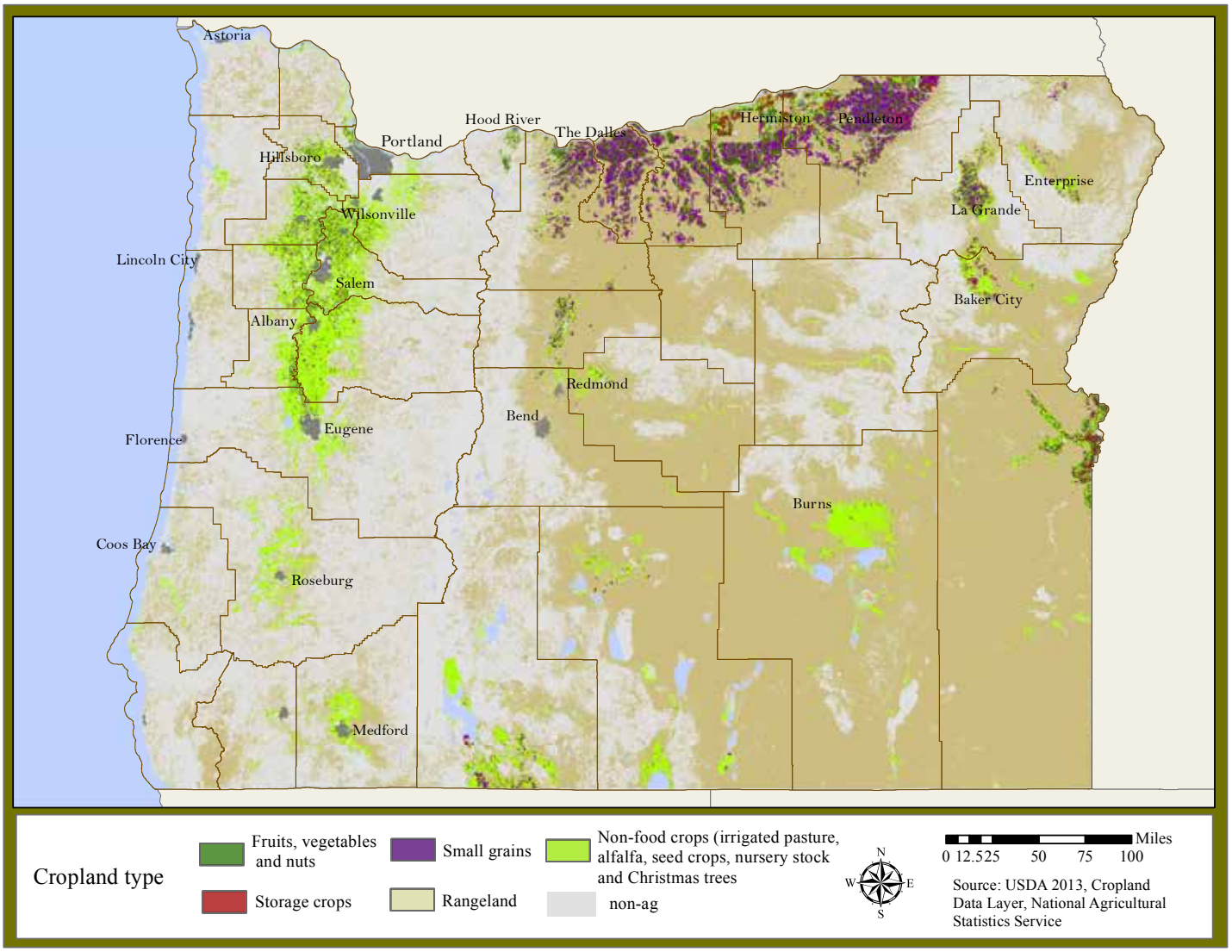
[15] 2012 Census of Agriculture, 2014.



Map 3.1: Proportion of prime farmland by soil unit.

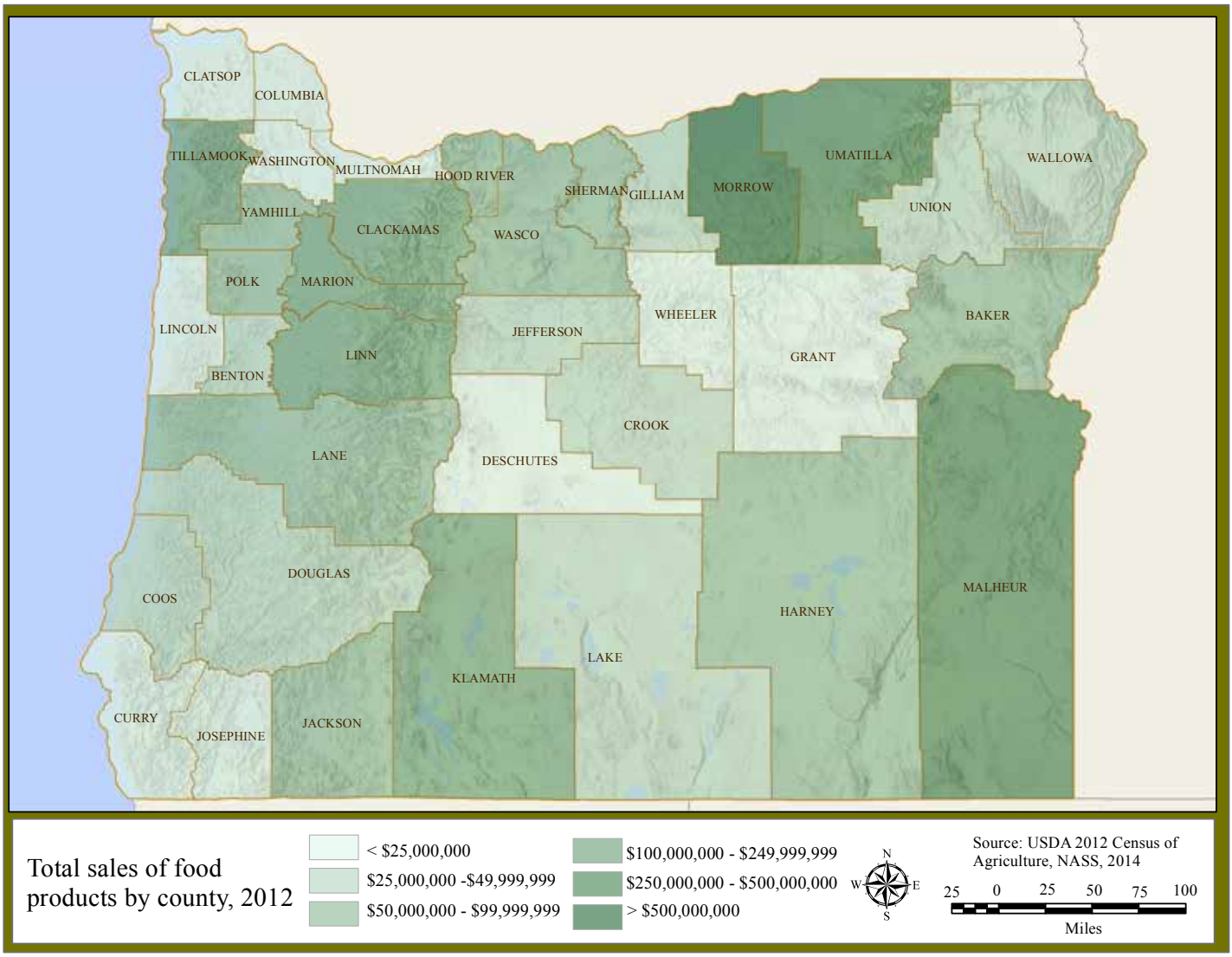
3.1.3. Food Production—County View

It is first important to understand the landscape of arable land in the State. Map 3.1 shows soils that have been identified as having some amount of "prime farmland" (as defined by The Digital General Soil Map from NRCS), with counties outlined. There are about 1.2 million acres of prime farmland in the state (78 percent of which occurs in the Willamette Valley) and more than 4.6 million total acres of high-value farmland soils.



Map 3.2: Location of production of major crop categories in Oregon.

Following from that view of prime farmland, Map 3.2 shows the location of production activity by major crop category. Note that additional production may also occur (fruit, vegetables and nuts in Jackson and Josephine counties or along the coast, for example), but doesn't appear on this map because the concentrations are too small to show up on the USDA Cropland Data Layer provided by the National Agricultural Statistics Service.



Map 3.3: Total value (farmgate sales) of all food products by county, 2012.

The top five counties in terms of sales associated with food products are Morrow, Umatilla, Malheur, Marion, and Clackamas, in that order.[16] Map 3.3 shows the value of total food production by county.

[16] 2012 Census of Agriculture, 2014.

The majority of food products in the most productive counties are actually **commodity products grown for export**, such as wheat grown in Morrow and Umatilla counties and exported overseas, or cattle raised extensively in eastern Oregon including Malheur County, then sold to out-of-state feedlots. Many of the state's fruit and vegetable products are also grown for export markets, such as berries grown in Clackamas, Marion, and Linn counties, and apples and other tree fruit grown in Hood River County. Figure 3.1 shows the value of different Oregon food products exported out of the country.

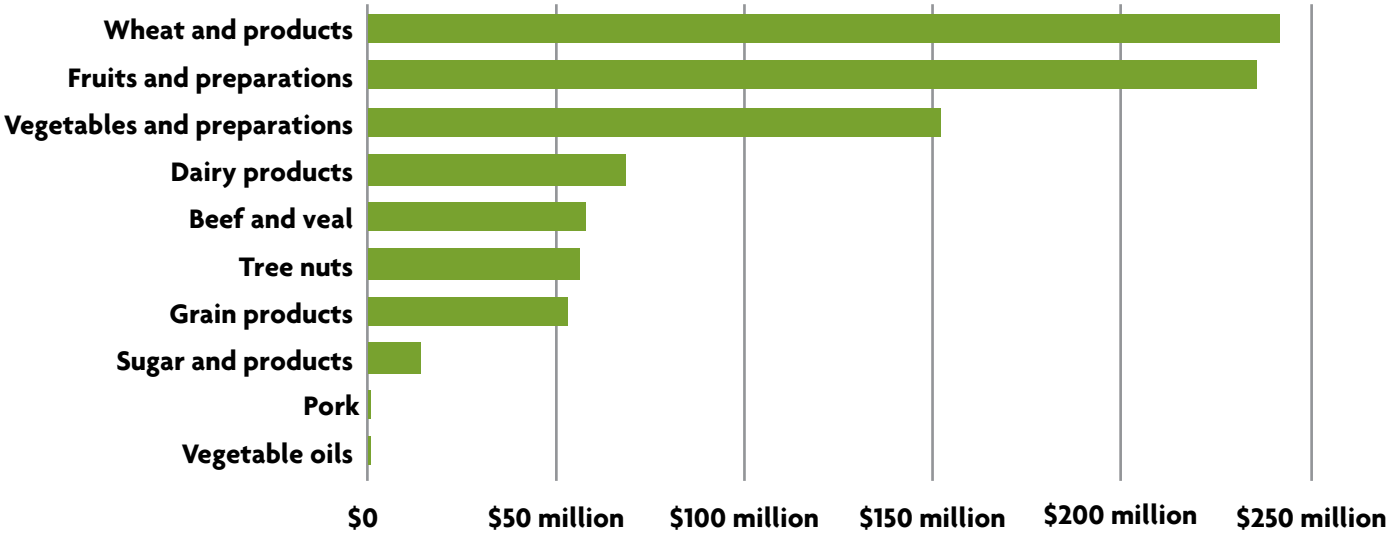


Figure 3.1: Oregon food product exports to other countries.

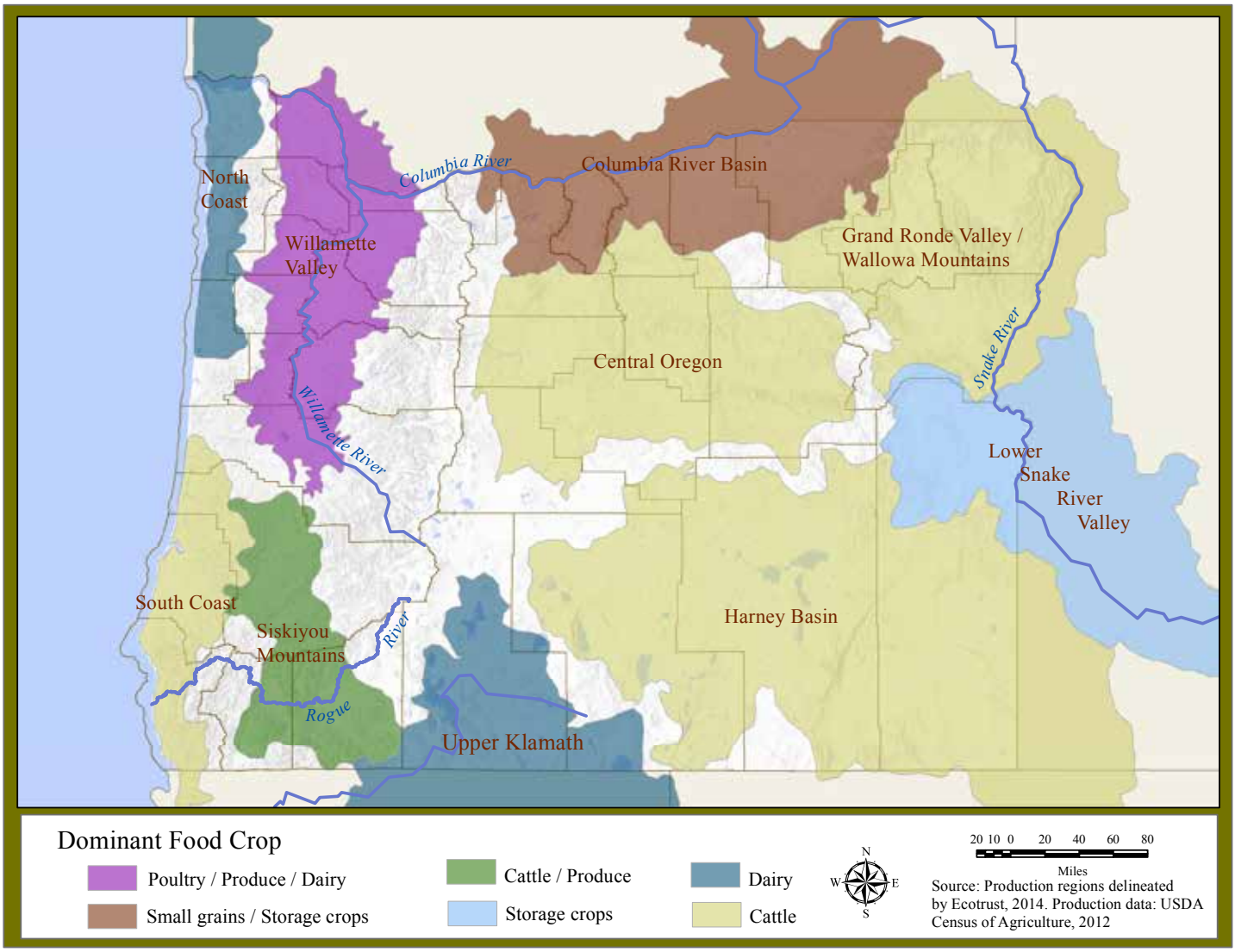
3.1.4. Food Production—Regional View

Products from Oregon's diverse food production spectrum are clustered in distinct regions across the state. This is largely a result of dramatically different growing conditions (temperature and precipitation) in the different areas, as well as factors such as access to water, land values, and access to markets. While rangeland represents by far the greatest land area—close to 30 million acres including publicly owned rangeland[17]—most of the rangeland in the state is dry and relatively unproductive, and thus can only support a few head for every acre.

In this section we explain the regional approach developed in parallel with this research, why we believe **production regions are the most compelling unit of analysis for food system studies**, and delineate and describe the characteristics of each region.

To a significant degree, food product ecosystems, including the six we explore in detail later in this report (chicken, beef, pork, small grains, storage crops, and leafy greens), have developed in distinct regions of the state owing to the resource base and **unique ecological features relevant to that system** in each location. As can be discerned from the map below, cropland is concentrated in the major river valleys: the Columbia, the Willamette, the Rogue (in the area labeled Siskiyou Mountains in map), and the Lower Snake,

[17] "Oregon cropland data layer," USDA, NASS, 2012.



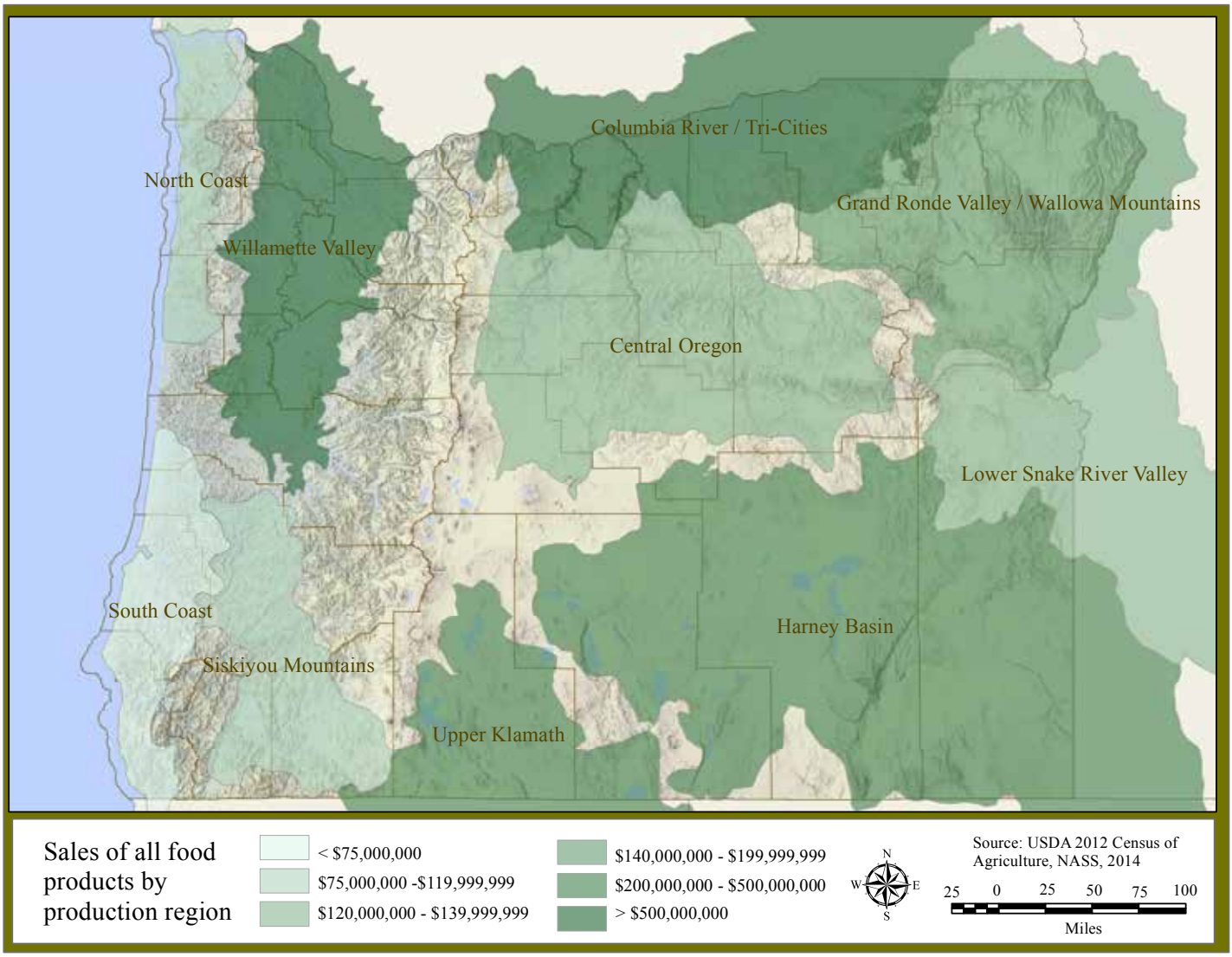
Map 3.4: Food production regions and major crops in Oregon.

while rangeland is prevalent throughout the state. Many of the major river valleys are highly productive and boast extensive prime farmland, while much of the eastern portion of the state—with less productive soils—is used for grazing livestock. Map 3.4 shows the major growing regions across the state, and highlights the primary product(s) produced in each region, from produce and poultry to storage crops and small grains.

Most available data pertaining to food production and agriculture statistics is aggregated to counties, but, given the regional nature of supply, demand, and related infrastructure capacity of the food system, we chose to re-aggregate our data according to the production regions shown in the map above. The inherent heterogeneity of production within counties and across the state is dependent on a wide array of geoclimatic and anthropogenic factors, but rarely on political boundaries. The flow of goods and services related to the food industry and infrastructure capacity often **spills over county boundaries**.

Furthermore, infrastructure capacity has emerged differently in the different regions due not only to production possibilities and market demand (i.e., what regions can grow and what they can sell—generally understood as supply and demand), but also because of important additional factors such as access to markets, technology lock-in, and path dependence. Forward (e.g., sales of products into supply chains) and backward linkages (e.g., farm inputs, equipment, financial services) are often regional in scale, with the farm activity occurring in rural counties and the support activities occurring in neighboring urban areas (e.g., Clackamas and Multnomah counties). For these reasons, we summarized key production, demand, and infrastructure capacity to production regions (for more information on the methods used to delineate production regions and to analyze data across them, see Appendix 14.1, Approach and Methodology).

This regional methodology, as shown on the following maps, more accurately depicts where agricultural activity is occurring across the landscape, particularly as that activity pertains to necessary and/or existing infrastructure. Map 3.5, for example, shows the total value of food products summarized to production region. Compared against Map 3.4 above, which shows value of food products summarized to counties, the map provides a much more telling story. For example, in Map 3.4, Malheur County is shown as producing a significant amount of the state's food value. However, in reality, a large portion of this value is originating from the lower Snake River Valley, and much of this product is most likely flowing through supply chains into the Boise area before being exported out of the region.



Map 3.5: Value (farmgate sales) of all food production by region, 2012.

The map shows food sales for Oregon only, even though the regions themselves spill over state boundaries. If we were to show the food production value for the entirety of each region, then the Columbia Basin, the Lower Snake, and the Upper Klamath/Modoc would all appear with higher values on the map.

Food production in Oregon occurs in **ten distinct growing regions**, presented here loosely from west to east:

1. The **North Coast** extends from Lincoln City north to the southern edge of Willapa Bay in Washington. One of the least productive in terms of agricultural value and total acreage (not including the value of fisheries, which constitutes one of the most valuable food products), the majority of agricultural activity is represented by dairy operations occurring in diked deltas and estuaries along the coast. The North Coast is extremely wet and temperate with temperatures rarely dropping below freezing. In addition to dairy operations, there are a small number of cattle and cow operations, vegetable production, and poultry and egg operations. In 2012, there were close to one hundred dairy farms along the North Coast representing nearly 30 percent of all dairy farms in the state.

2. The **Willamette Valley** is characterized by temperate climate year round and abundant winter rainfall. The soils in the Willamette tend to be highly productive and the region is by far the most populated in Oregon. Average farm size in the Willamette tends to be much smaller than other regions (mean farm size of ninety-two acres); it has by far more farms than any other region (over eighteen thousand) and produces the highest diversity of products. In addition to a variety of food products, the Willamette is known for its production of grasses, grass and other seed stocks, nursery stock, and Christmas trees.

3. The **Columbia River Basin** extends from the Hood River Valley on the western edge east to the towns of Hermiston and Pendleton. Of all the regions it ranks first in value of small grain production (more than $274 million in 2012), second in cow and cattle value, and second in produce production (mostly storage crops). The region has abundant water as a result of major government hydrologic projects and good transportation networks including rail, road, and water access to Yakima, the Tri-Cities, and Portland.

4. **Central Oregon** extends from the east side of the Cascades eastward toward the eastern end of Grant County and includes parts of Deschutes, Jefferson, Wheeler, Crook, and Grant Counties. Much of the region is high desert or mountainous, dominated by open range and forestland in the higher elevations. Alfalfa and other hay are the predominant crops here, most of which is concentrated around the cities of Bend and Redmond.

5. The **South Coast** is slightly less productive than the North Coast, and pales in comparison to some of the other regions (here again, we have omitted fisheries from our analysis). Production is dominated by rangeland in some of the more open coastal foothills. Sheep and lamb operations are common in many of the open rangelands, as well as fruits and vegetables in many of the smaller river valleys.

6. The **Siskiyou Mountains** are home to the Umpqua and Rogue River Valleys including the Applegate and Illinois Valleys. The uplands are rugged and mostly forested, but the river valleys have ample prime farmland and are capable of producing a wide variety of products. The temperatures tend to be warmer in the summer than most parts of western Oregon, but freezing temperatures in the winter are still a risk to many crops. While not a major agricultural hub, the area still produces a wide variety of products including fruit orchards, wine grapes, vegetables, grain, hay and alfalfa, and livestock.

7. The **Upper Klamath/Modoc Plateau** production region falls largely in California but does extend up through Klamath Falls including the Upper Klamath Basin. The region is dominated by cow/cattle and dairy operations. Almost all of the agricultural activity in this region is clustered around Klamath Lake (in California) and Upper Klamath Lake (in Oregon) and relies heavily on irrigation originating from the lakes and hydrologic projects along the Klamath River. Extensive irrigated pasture exists on the northern edges of Upper Klamath Lake while the southern valley between the lakes is dominated by large-scale grain and storage crop operations. The region also produces a significant amount of alfalfa and other hay.

8. The **Grand Ronde Valley/Wallowa Mountains** region is in the far northeastern part of the state. This remote region is mostly dry with warm summers and cold winters. The eastern end of the region is primarily open rangeland with the fertile Grand Ronde Valley flanking the western edge. The region is home to over two thousand farms and grows a substantial amount of produce (mostly storage crops), wheat, barley, and other small grains and livestock. Most of the crop production occurs around the cities of La Grande and Baker City, with some wheat and alfalfa production occurring around Joseph and Enterprise. The eastern portion of the region includes Hells Canyon and is home to several grassfed beef operations.

9. The **Lower Snake River Valley** is a highly productive with warm summer temperatures and ample water supply. Not usually associated with Oregon agriculture, the valley extends north and west, encompassing the border town of Ontario and the lower Malheur River, which includes the majority of agricultural output from Malheur County (excluding cow/cattle operations). Despite the small percentage of area in Oregon, and the limited number of farms (883), the region is still the third largest producer of produce (behind the Willamette Valley and Columbia Basin regions), nearly all of it constituted by potatoes and other storage crops.

10. **Harney Basin** is by far the most remote region in Oregon. It occupies most of southeastern Oregon, extending from Fort Rock Valley on the western edge, through to the Owyhee Basin on the eastern edge, which extends into Idaho and Nevada. It includes most of Lake, Harney, and Malheur Counties. The region is mostly high desert with extreme topographic features (Steen's Mountain Range, Alvord Desert, and Owyhee Breaks) and is extremely dry with limited irrigation sources. Other than some storage crops and alfalfa

production in the Fort Rock Valley, and alfalfa, pasture, and other hay operations that surround the town of Burns, the region is dominated by low productive rangeland where large cow and cattle operations function on both private and public lands.

It is enlightening to organize agricultural statistics by these production regions, as each region has a unique set of growing conditions, which suggest a unique set of food infrastructure requirements. Figure 3.2 shows the value of the various food product categories by production region.

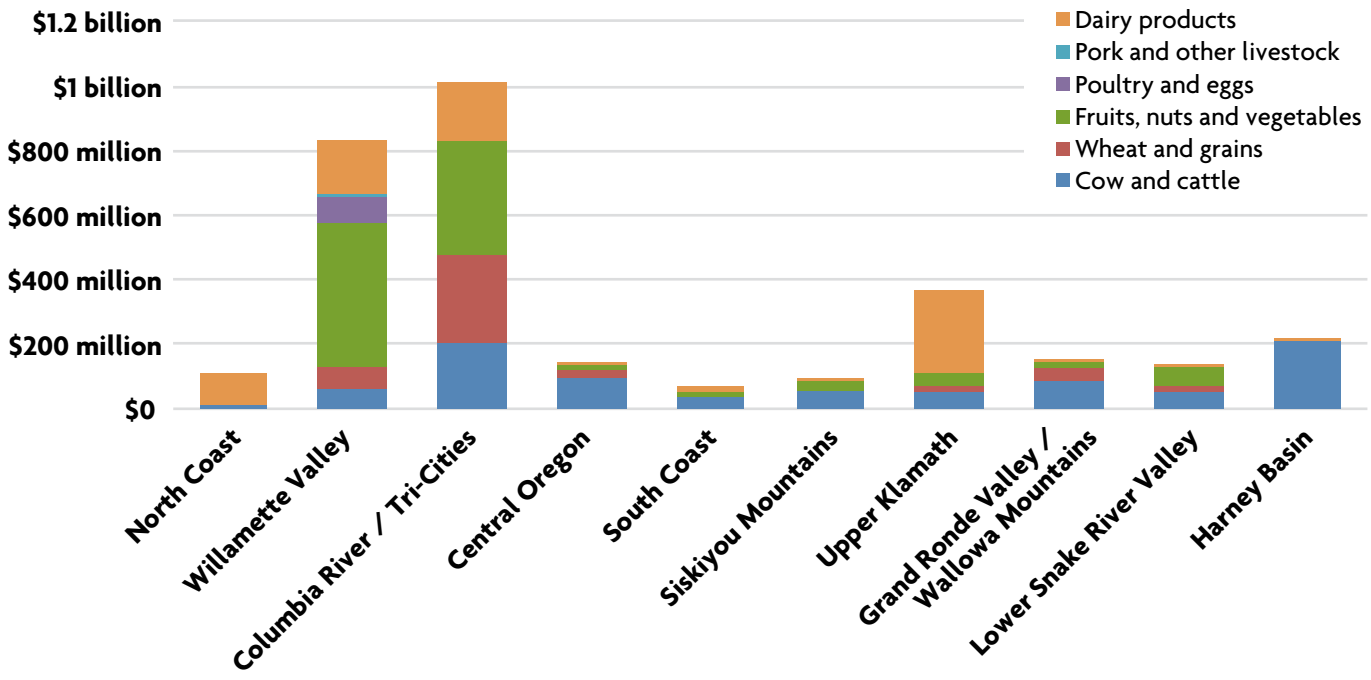


Figure 3.2: Value of agricultural food products by region.

Furthermore, by aggregating data to these regions, we can also gain an understanding of how changes in the underlying variables that are used to define the regions can inform the potential vulnerabilities and/or opportunities that might exist in each region. For example, although outside the scope of this project, regional factors could be used as a way to test potential vulnerabilities to climate change in different parts of the state.

While food production regions help to illuminate regional capacities to produce different types of crops, it **masks nuance important to regional food systems because the highest production regions in terms of volume and sales according to available data are based on commodity and export products**. To understand the infrastructure gaps and catalytic opportunities to develop strong regional food systems, we must examine the issues related to scale of operation. The next section explores issues of scale and the differentiation that is required for non-commodity producers to succeed in a competitive market.

3.2. Issues of Scale

Scale of operation is a key variable in understanding both where gaps exist, and what type of producers (farmers and ranchers) and processors (value-added and specialty producers, artisans and entrepreneurs, or operators of enabling infrastructure) would most efficiently metabolize investment or other support into desired outcomes.

3.2.1. Agriculture of the Middle

We explored the conceptual model described as "**Agriculture of the Middle**" (also Ag of the Middle or AOTM) and found it to be a useful construct in framing the challenges and opportunities facing regional-scale producers. In conceptual terms, Ag of the Middle producers are those **too small to compete successfully in commodity markets, and too big to participate exclusively in direct to consumer channels such as farmers' markets**. Such producers operate at a scale sufficient to productively engage wholesale buyers, and to generate meaningful social and environmental benefits (both on-farm and throughout the value chain). They are also nimble enough to respond quickly to market signals relative to the largest commodity farms, which tend to be slower to change. The polarization of agriculture into large commodity farms and small direct market farms has rendered the broad conceptual class of AOTM producers relatively few in number.

Between 1935 and 1997, the total number of farms in the United States declined from a peak of **7 million to 1.9 million**, however the trend varies by acreage class and gross sales. The number of farms larger than 500 acres or grossing more than $250,000 annually continued to grow (the class of farms grossing more than $500,000 annually grew the fastest). Further, the class of farms with 1 to 49 acres lost members at a slower rate than did that of farms of 50 to 499 acres. As a result, farms with fewer than 50 acres and those with more than 500 acres have both increased their share of total farms since 1974, but **midsized farms' share has declined**.[18]

In Oregon, the size of farm operation varies dramatically by region and product category. Unfortunately, it is impossible to categorize only food-producing farms into discrete classes by size, since many farms engage in both food and nonfood production, preventing mutually exclusive classifications. We did, however, evaluate the size distribution of all agricultural lands: small farms dominate the landscape in the Willamette Valley and along the North Coast, with an average farm size of just 92 acres, compared to the state average of 459 acres, in 2012.[19] By contrast, average farm size east of the Cascades was almost 1,300 acres. The 2012 USDA Census of Agriculture reports that within Oregon, more than 50 percent of all farms are smaller than 50 acres, and more than 35 percent are smaller than 10 acres. While the number of the smallest farms (fewer than 10 acres) has remained somewhat stable over the past two decades, all other size categories have decreased, with farms of 50 to 1,000 acres decreasing by more than 22 percent since 1982.

[18] USDA Agricultural Fact Book, 2001–2002.

[19] "Small Grains 2014 Summary," NASS, 2014.

Unfortunately, those **midsized farms may be what is needed to serve a strong regional food system**. Better economies of scale facilitate rationalized pricing relative to small farms, and provide higher product volumes and often more consistent quality. Production capacities may be well matched to serve regional demand relative to very large farms (which often require export and commodity markets to manage product flow). Potentially as important, although difficult to measure, are benefits stemming from the fact that AOTM farms are often owned and managed locally, and thus engage more actively in their communities (more on that topic below).

While farm size is one facet useful to understanding scale, Ag of the Middle tends to be defined by gross sales rather than acreage.[20] It is important to reiterate that both acreage and gross sales ranges differ significantly across product categories, geography, and, to some degree, market channel. (For example, one acre of blueberries sold primarily via farmers' markets has the capacity to yield very different gross sales than one acre of pastureland for a cow/calf operator.) With this limitation in mind, AOTM farms are roughly associated with gross annual sales of $50,000 to $500,000 by the national Ag of the Middle working group.[21] Depending on the category, however, $500,000 as a ceiling may be way too low. As those who coined the term point out however, AOTM is not just about size.[22]

AOTM farms are further delineated by the organization of their business and the production and marketing strategies that they employ, as well as by their participation in "Values Based Supply Chain," as described in more detail by the national Ag of the Middle working group:[23]

> Agriculture of the Middle (AOTM) encompasses a spectrum of farms and ranches that are declining because they are too small to be served well by commodity markets and too large to be served well by direct markets. Most AOTM farms are characterized by: (1) their size; (2) their business organization; and (3) the production and marketing strategies they adopt to remain viable.
>
> **(1) Size:** It is important to recognize that the definition of AOTM farms and ranches is scale related but not scale determined. Most farms are in the $50,000 to $500,000 range of gross sales. But there may be farms with higher gross sales that meet the other criteria. The specific size that is too big for direct markets but too small for commodity markets varies with crops produced, geography, and market.

[20] "Characterizing Ag of the Middle and values-based food supply chains." Agriculture of the Middle, (n.d.).

[21] "Agriculture of the Middle," (n.d.).

[22] In contrast, the USDA Economic Research Service defines small family farms as having less than $250,000 in gross farm sales, while midsized farms are classified at $350,000–$999,999. However, the concept of AOTM is probably more important than specific numerical ranges. See here.

[23] "Agriculture of the Middle," (n.d.).

(2) Business Organization: AOTM farms and ranches tend to fall into either the farming occupation farms or large family farms categories of the USDA farm typology. They rely on farming as a main source of income for the household. They also tend to be businesses in which one or more family members make the majority of on-site management decisions, and contribute substantially to the labor requirements of the operation.

(3) Production and Marketing Strategies: Agriculture of the Middle as a term also incorporates strategies that AOTM farms and ranches have taken to create markets that address the decline. These strategies enable midsized farms and ranches to produce and retain more value and profit. Many successful AOTM businesses market differentiated food products through wholesale supply chains, and operate with high environmental standards. They mainly supply markets that are larger than most farm-direct markets and more differentiated than commodity markets. Many but not all AOTM farms/ranches participate in business organizations that serve as product aggregators (e.g., co-ops, LLCs, etc.).

Values based food supply chains are strategic business alliances among farms/ranches of the middle and other agrifood enterprises that: (a) handle significant volumes of high-quality, differentiated food products, (b) operate effectively at multi-state, regional levels, and (c) distribute profits equitably among the strategic partners. Values-based supply chain business models place emphasis on both the values associated with the food and on the values associated with the business relationships within the food supply chain.

Ag of the Middle producers may be bringing **multiple products to market** in order to maximize revenue streams and/or to meet environmental objectives (including livestock in crop rotations to build soil health, for example).

They work to **negotiate pricing in partnership with their buyers**, and **hope to capture more of the retail value** of their products by managing the intermediate steps in the supply chain. This approach differs significantly from commodity markets, in which the price is set by the market, and producers feed into a well-established system. In a nutshell, Ag of the Middle producers can be characterized as those with "local values and wholesale volume".

3.2.2. Product Differentiation

Because AOTM players are unlikely to compete successfully on price, they must compete based on **product differentiation** for which they can capture value sufficient to cover their costs (which are often higher due to lesser economies of scale). Differentiation can be achieved based on multiple dimensions related to product attributes, production practices, business structure, geography, brand, or a combination thereof. Common examples include:

- **Production practices (often verified by certifications):** certified organic, Food Alliance Certified, Non-GMO Project Verified, Animal Welfare Approved, grassfed, pastured, antibiotic-free, etc. (e.g., Stahlbush Island Farms, Carman Ranch)
- **Business type**: family-owned, farmer-owned, B-Corp, co-op (e.g., Deck Family Farm, Shepherd's Grain)
- **Local**: Gorge Grown, Oregon Grown, Northwest Grown, Homegrown, Food From Around Here (e.g., Olympia Provisions, Bee Local, Camas Country Mill)
- **Product attributes**: flavor, freshness, nutrition profile (e.g., Tails & Trotters, Gathering Together Farm, Organic Valley)
- **Brand**: story, identity (e.g., Jacobsen Salt, Sauvie Island Organics)

For most AOTM producers and similarly oriented processors, simply **being "local" is not enough**. While retail, restaurant, and institutional food buyers we interviewed all reported customer interest and demand for local food, they were also clear that "local" alone was not sufficient justification for the price premiums generally sought (and which may be necessary for regional AOTM farms and ranches to be financially successful). To compete against less expensive commodity options, local products must be higher quality and have clear differentiation based on some combination of attributes, certifications, branding, source transparency, and story. If differentiation isn't clear or doesn't seem possible (as may be the case with Oregon-grown greens, as described further in that chapter), it is unlikely to be a fruitful regional food system investment.

3.2.3. Summary

Important facets of the supply side of the regional food system in Oregon include the following:

- **Food and forage are subsets of a robust agriculture sector in the state that also includes nonfood crops such as grass and other seed, nursery crops, wine grapes, and Christmas trees.** It can be difficult to parse "food- and forage-only" information from available state and federal agricultural data. We would recommend further study to develop a set of data protocols to be used by entities—government, nonprofit, university, investor—with a shared interest in developing Oregon's domestic food system.

- **With due respect to civic infrastructure at the state, county, and municipal levels, regional production zones may be a more useful construct for evaluating challenges and devising solutions in food system development.** Availability of key natural resources and the contours of the land itself create productivity zones that suggest synergistic clusters of activity, irrespective of county or state boundaries. The ten production zones defined in this report offer a map that may be useful in suggesting cross-county collaborations by government and nonprofit organizations.

- **Scale is a vital factor in discussing food system development in Oregon,** as there are key differences in the opportunities and challenges all along the spectrum from commodity scale producers and processors at the large end to direct-market producers at the small end. This report focuses in on the "**Ag of the Middle**"—producers and processors seeking markets bigger than farmers' markets and CSAs and smaller than traded-sector commodities. We submit that if models can be created to support their financial viability, Ag of the Middle producers and processors participating in "values-based supply chains" may offer solutions for creating a robust domestic food system that also helps build regional resilience.

- **Ag of the Middle actors go to market using different strategies than commodity producers.** In commodity markets, producers most often supply inputs into supply chains and take the price set by the market. Differentiated Ag of the Middle producers are often responsible for multiple links or entire supply ecosystems, and may bring multiple products to market. They attempt to negotiate pricing as partners with their buyers and hope to capture more of the final value of the product by managing the intermediate steps.

- **They key to creating viable Ag of the Middle operations is differentiation.** Whether based on production practices, business structure, geography, product attributes or brand, or a combination of those, differentiation is absolutely vital for midscale producers and processors to flourish in a competitive marketplace.

In the next chapter we explore the demand-side dynamics of the domestic food system in Oregon.

4

Demand

4.1. Introduction and Oregon Overview

The Customer is King (or Queen, we assume), so the old adage goes. The development of regional food systems, and the corresponding opportunities for successful investments, is highly dependent on **eater demand and purchasing patterns**. In this chapter we explore demand drivers from several perspectives.

First, we offer an orientation to **basic market sizing** by describing the current population of Oregon and its expected growth, as well as broad consumer food spending patterns in the state. We then share an analysis of **population-based demand determinants**, in an effort to assess whether **Oregon has the resource base to support feeding itself** at a meaningful proportion of total consumption, and we further attempt to match that demand to the production capacity for key product categories by region, as defined in the last chapter.

Next, we highlight **consumer demand trends** related to differentiated product both in Oregon and beyond, and discuss the long-term supply scarcity anticipated as a result. With scarcity as context, we explore the issue of **equitable food access** and the demand for **food for hunger relief** in the state, based on input from the Oregon Food Bank. At this point we also dive deeper into the contours of **institutional demand**, and explore potential opportunities for institutions to serve both as anchors of strong regional food systems and as vehicles for creating access to fresh, healthy food by vulnerable populations.

Finally, we return to the present and face the **reality of price pressure** and buyer willingness to pay, both at the consumer (retail/restaurant) and institutional level.

4.1.1. Population

In 2014, Oregon was home to an estimated **3.97 million residents,**[24] a 3.6 percent increase in population since 2010, and a growth rate higher than the national average of 3.3 percent during the same period. Oregon's population is projected to reach more than **5 million within twenty years**, and close to 6 million by 2050.[25] Some estimates project the Willamette Valley population (home to 68 percent of Oregon's residents) to double by the year 2050,[26] which, if accurate, would put Oregon's total population at well over 6 million by the year 2050. Whichever projections we follow, it is clear that **Oregon's population is growing rapidly** with important implications for our food system.

4.1.2. Food Spending Patterns

In 2013, **Oregonians spent nearly $11 billion on food**, including both food consumed at home and food away from home, which constituted almost 13 percent of total expenditures.[27]

[24] State and County QuickFacts, US Census Bureau, 2014.

[25] Bureau of Economic Analysis, 2013.

[26] "Willamette Water 2100," 2012.

[27] "Consumer Expenditure Survey," Bureau of Labor and Statistics, 2013.

- **Food consumed at home** made up approximately 60 percent of the $11 billion total spending, or nearly **$6.4 billion**. Food consumed at home is calculated based on purchases made via a variety of outlets, including "big box" retailers, traditional grocery stores, convenience stores, fruit and specialty stores (e.g., butchers), and to a far lesser degree, farmers' markets and community supported agriculture (CSA), among others. It includes purchases made with cash/credit, and with Supplemental Nutrition Assistance Program (SNAP) or WIC (Women, Infants and Children) funds.

- **Food away from home** totaled roughly **$4.3 billion** in 2013, including purchases from full-service restaurants (approximately sixty-two thousand statewide), fast food outlets, food carts, and at institutional foodservice operations such as those at schools, hospitals, and college campus or corporate cafeterias. It includes food furnished to inmates, patients, and employees.

While specific figures are not available for the proportion of our total food budgets spent on local products, according to the 2012 Census of Agriculture, direct sales (sales of products sold directly to consumers for human consumption) statewide totaled more than $44 million. While this represents less than 1 percent of total food at home expenditures, it represents a much larger proportion (roughly 5 percent) of expenditures on **produce** consumed at home (which is the most common product sold directly to consumers). This is discussed in more detail below. (It may also be worth noting that the USDA, Farm Credit, and multiple research organizations and institutions are actively working to develop standardized means of measuring "local" or otherwise differentiated spending, so measurement and evaluation is an area to watch for future developments.)

4.2. Determination of Population-Based Demand

To get a sense of how demand translates onto the agricultural landscape, and to make some rough assessments of whether the existing resource base has the capacity to support increased domestic sourcing, we **evaluated demand in terms of volume for specific food product categories, and matched that to production by region**. Product category estimates were derived using statistics on per capita caloric consumption. To do so, we drew on national consumption statistics as a proxy for Oregon eaters, and then determined product categories associated with this consumption. For more details on the methodology used in this analysis, see Appendix 14.1: Approach and Methodology.

Figure 4.1 shows the estimated statewide consumption (total tons) of the top ten most common food products in 2012. (To preemptively answer a likely question, high fructose corn syrup is indeed classified as a food product.)

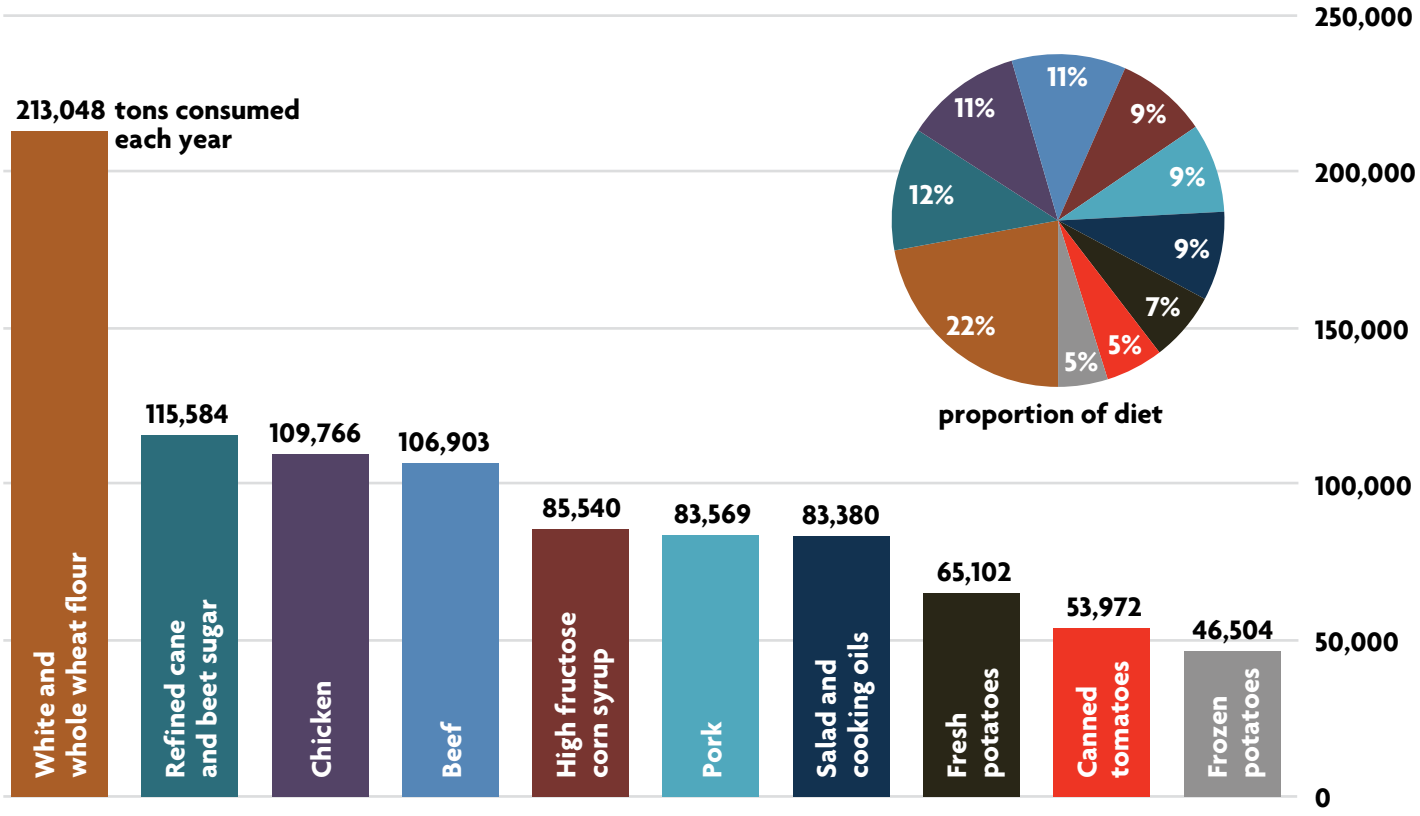


Figure 4.1: Statewide consumption of top ten food products in tons, as calculated by ERS/USDA based on data from various sources.[28]

Using the 2010 census data by block, we were then able to map the estimated consumption by product category and subsequently summarize this data to the production regions defined in the supply chapter. From these data we converted the volume demand figures to the same units used in crop statistics data (e.g., OAIN, 2012) for specific product categories. In this analysis we **included** neighboring state populations that fell within production regions (i.e., the city of Boise falls within the Lower Snake river production region), in addition to in-state demand. For ease of comparison, we also estimated the production in **like units** using data collected through OAIN, 2012. Note that this analysis does not also consider land required for growing forage. Table 4.1 shows the estimated demand and comparative production of certain product categories by region.

[28] "Food Availability (Per Capita) Data System: Overview," USDA, ERS, 2014.

	Cattle (head)		Small grains (tons)		Produce (tons)		Storage crops (tons)	
Region Name	**Production**	**Demand**	**Production**	**Demand**	**Production**	**Demand**	**Production**	**Demand**
North Coast Oregon	65,150	11,744	0	6,268	3	23,263	0	6,161
Willamette Valley	179,632	311,740	431,310	166,385	136,590	617,480	4,085	163,524
Columbia River/Tri-Cities	124,176	44,800	1,187,245	23,911	272,335	88,739	1,029,390	23,500
Central Oregon	178,272	18,552	100,548	9,902	166	36,747	3,378	9,731
South Coast Oregon	34,305	10,100	30	5,391	244	20,006	29	5,298
Siskiyou Mountains	55,035	33,789	3,595	18,034	8,355	66,927	2,760	17,724
Upper Klamath	159,999	9,475	74,559	5,057	21	18,768	117,660	4,970
Grand Ronde Valley/Wallowa Mountains	201,171	4,958	182,894	2,646	1,371	9,821	137,007	2,601
Lower Snake River Valley	75,191	65,021	78,639	34,704	0	128,791	459,426	34,107
Harney Basin	383,221	940	3,916	501	0	1,861	266	493
Total	**1,456,152**	**511,119**	**2,062,736**	**272,799**	**419,085**	**1,012,403**	**1,754,001**	**268,109**

Table 4.1 Production and demand of key product categories by production region, derived using data from ERS/ USDA and OAIN 2012 as described above.

An example will help clarify how this data is to be read: As shown in Figure 4.1 above, Oregonians consume roughly 107,000 tons of beef each year, which actually translates into demand of 112,000 tons because of retail loss (mostly due to product expiration). There are, on average, 430 pounds of retail cuts on each cow.[29] This translates to demand for 511,119 head of cattle per year, not including breeding stock or average mortality rates. Table 4.1 above shows that nearly 1.46 million head of cattle in total are raised within Oregon, which would indicate, at least at a high level, that we **do** have the capacity to meet our demand for beef from production domestically, assuming the infrastructure and markets existed and we thought it prudent to do so.

In reviewing the other categories above, most regions out-produce estimated demand for most items and collectively we seem to have much of what we need as a state, with the notable exception of produce (which is consistent with our findings regarding opportunities in the greens category; see the Greens chapter for details). However, most of these products are currently sold through commodity markets, and thus only a very small share is sold via local and regional channels.

Bear in mind that we are not actually suggesting, based on this data, that 100 percent of consumption be produced within Oregon, even as an aspiration or goal, as that would leave our population vulnerable to crop failures or other localized interruptions. That said, the important takeaway from this analysis is that the data indicate that **growing conditions and production capacity should not pose a barrier to increasing the amount of Oregon-grown food**

[29] "How Much Meat?" Oklahoma Department of Agiculture, Food and Forestry, 2012.

consumed in Oregon. (This data might suggest a different conclusion if done on a state with a different ecological profile, such as New Mexico or Utah, for example.) As examined later in this report, the barriers hindering domestic consumption of Oregon-grown products are more complex than production capacity.

4.3. Consumer Demand Trends and Anticipated Scarcity

Demand for differentiated food is growing nationally, as evidenced by the rapid increase in retail, restaurant, and manufactured food brands promoting "local," "natural," certified organic, or otherwise differentiated products and offerings. The top three culinary trends reported by the National Restaurant Association in 2014[30] and 2015[31] were:

1. Locally sourced meat and seafood
2. Locally grown produce
3. Environmental sustainability

In fact, trends related to differentiated products have appeared on a broad spectrum of culinary lists over the last several years.[32] Now mainstream national chains such as McDonald's[33], Chick-Fil-A[34] and others have followed the lead of early adopter restaurants like Chipotle[35] and announced efforts to reduce or eliminate the use of antibiotics important to humans in their offerings. The country's largest retailers, including Walmart[36], Costco,[37] and Kroger,[38] have all promoted initiatives related to sourcing differentiated product. Grocery retailers that have made differentiated product an integral part of their brands, such as Whole Foods Market nationally, or New Seasons Market locally, have experienced significant growth. According to public statements made by Whole Foods Market, the chain expects to grow from 411 locations nationwide in March 2015 to 1,200 locations by 2020.[39]

Oregon, and Portland in particular, have been at the forefront of the emerging national trend toward differentiated products for more than twenty years. Since the opening of Higgins (1994), Paley's Place (1995), and Wildwood (1994), Portland has been **home to culinary innovators** defining the sector now known as "farm to table," and building awareness of and momentum toward local, sustainable, source-identified, storied, or otherwise differentiated

30 "What's Hot, 2014 Culinary Forecast," National Restaurant Association.

31 "What's Hot, 2015 Culinary Forecast," National Restaurant Association.

32 One example from the general-interest Food Network: "What's Next in Food Trends for 2014."

33 "McDonald's USA Announces New Antibiotics Policy and Menu Sourcing Initiatives," McDonalds, 2015.

34 "Our Journey: Antibiotic-Free Chicken," Chick-Fil-A, (n.d.).

35 "Antibiotic-Free Meat Business Booming, Thanks to Chipotle," NPR, 2012.

36 "Sustainable Food," Walmart, (n.d.)

37 "Exclusive: Costco Working to End Use of Human Antibiotics in Chicken," Reuters, 2015.

38 "Kroger on the Cutting Edge," Food Business News, 2015.

39 "Whole Foods Market CEOs: We want 1,200 Stores in US," CNBC, 2013.

products. (Independent, mostly certified organic, farmers had been creating the products that gave rise to that culinary trend for twenty years prior).

A recent perusal of Portland culinary trend lists suggests that the innovative, entrepreneurial spirit tied to Oregon-grown food products is alive and well, as product categories only beginning or as yet to emerge on the mainstream national radar already seem well defined here (e.g., lacto-fermented food and beverages, stone-milled flours from local grains, hyper-local honey, rotational grains, raw milk dairy products).

United States consumers aren't the only ones in the market for Oregon-grown and -processed products. As noted earlier, Oregon already **exports** a significant proportion of its agricultural output out of state, and international export opportunities for Oregon-grown and -processed products continue to grow. Oregon food and agriculture exports grew 22 percent from 2010–2014 (Euromonitor International).

"Exports are very important to Oregon agriculture since **40 percent of what we produce moves into an international market**," said Oregon Department of Agriculture Secretary Katy Coba recently.[40] The US Department of Commerce International Trade Administration reports that **$2.6 billion in Agricultural Products were exported from Oregon in 2014.**[41]

On a March 2015 visit to Oregon, USDA Deputy Under Secretary Alexis Taylor, who is responsible for overseeing the department's international activities, described the export potential to countries with a rapidly expanding middle class: "Historically, when people in these countries start making more money, they spend it on more food, better food, high protein food—things the US excels in producing." That perspective would indicate that the Asia-Pacific region (one which Oregon is well positioned geographically to serve) will become an ever more important trading target because, according to data from the OECD,[42] the **middle class in that region is expected to grow by 85 percent** between 2009 and 2030. That translates into roughly an incremental 3 billion people in the Asia-Pacific region alone keen to eat more, better, and high-protein food.

Such scale of international demand represents **unprecedented economic opportunity for Oregon producers and processors**, especially for those already well-positioned (with significant volume, reliable infrastructure, and proven quality) to capitalize on the opportunities in the near term. The rapid expansion of Oregon's export market also has the potential to create or exacerbate scarcity for local markets, however. Anecdotal stories have already

[40] "Oregon: USDA Trade Official Visits With Oregon Exporters," National Association of the State Departments of Agriculture (NASDA), 2015.

[41] "Oregon: Expanding Exports and Supporting Jobs through Trade Agreements," US Dept of Commerce, International Trade Administration, 2015.

[42] "The Emerging Middle Class In Developing Countries," Organization for Economic Cooperation and Development (OECD), 2010.

begun to emerge on the Oregon coast of local fish buyers getting outbid on the docks by Chinese buyers who have arrived recently and begun buying entire catches. While a boon to boat captains and fishermen, it means local seafood may be increasingly difficult to access locally, even at restaurants situated across the street from the docks. Furthermore, the incentive created by such voracious demand and higher prices is to catch as much as possible, increasing pressure on a limited resource.

The fish tale described above plants a **cautionary flag** in the path toward unbridled economic development via export across many of the categories explored in this report. Beef warrants attention, since one of the key cultural affects of the expanding middle class in developing countries is the desire to adopt industrialized nations' appetite for protein, and specifically beef. China currently bans US beef for direct import, however the US exported more than 154,500 tons of beef and beef products to Hong Kong in 2014, according to USDA information cited by Reuters in a recent article on transshipments of beef into China.[43] As global demand and water scarcity combine to push commodity beef prices higher, it may become an economically irrational choice for ranchers not to participate. The **conundrum is difficult to untangle**: significant economic opportunity for producers and processors, increased scarcity and potentially higher prices for local populations, and incentives to maximize production exclusive of environmental or social considerations.[44],[45]

In the face of anticipated long-term scarcity of supply, progressive food buying entities we interviewed in the retail, restaurant, and manufacturing sectors have begun negotiating **long-term contracts** with producers and processors, or even **purchasing farmland directly** in order to secure supply. Those entities either unfamiliar with the dynamics described above, or without the means to proactively secure supply, risk being left without reliable access to locally produced and processed food products.

With that potential scarcity as a backdrop, we asked those responsible for sourcing food at the **Oregon Food Bank** (OFB) for perspective on the need for hunger relief services in the state, and the role food banks play in the regional food system. The next section was contributed by **Gretchen Miller**, food resource developer at OFB.

[43] "'Huge amounts' of beef going to China despite ban—U.S. official," Reuters, Huffstutter, P.J. and Hughes, Krista; March 19, 2015

[44] To begin an exploration of the pressure on the resource base created by such incentives, consider the perspective of thought-leader Mark Bittman in his 2013 opinion article "On Becoming China's Farm Team." Please note however that, as advertised, the article is highly opinionated and doesn't necessarily reflect the opinion of the authors. It is the position of Ecotrust that export and domestic markets should both be developed to serve the needs—economic, environmental and social—of all life in the region.

[45] Although beyond the scope of this report, supply scarcity and increasingly higher prices have also spurred a trend toward corporate investment in agricultural land, with significant implications for land access and management. A starting point for research on that topic is Oakland Institute's 2014 report: "Down on the Farm, Wall Street: America's New Farmer."

4.4. Working to Eliminate Hunger and Its Root Causes: Oregon Food Bank

Food banks are an incredibly important part of our regional food system. They have a unique opportunity to play at the intersection of community food access, health, economic development, and sustainability. Through its myriad food-sourcing strategies, Oregon Food Bank (OFB) works to provide reliable access to food that supports the health of individuals experiencing hunger. At the same time we work to support local farms and businesses, and to divert food that is headed for landfills or plowed back into farm fields to the plates of some of our most vulnerable community members instead.

We at Oregon Food Bank work with hundreds of food donors across the state to receive food that is distributed to twenty-one regional food banks, which together serve **270,000 individuals each month**, providing nearly 4 million meals in 2013–2014. During the same period, OFB received and distributed more than 40 million pounds of food with an additional 40 million pounds sourced through regional food banks, totaling 80 million pounds of food moving throughout Oregon and Southwest Washington to reach people in need.

In the past, food moving through the hunger relief network was focused almost exclusively on **number of calories**, not necessarily **quality of calories**. A new era is arriving in the food-banking sector, wherein our focus is shifting from capturing any surplus food to strategically sourcing more nutrient-dense pantry staples, fresh produce, and lean proteins. As described by OFB Strategic Sourcing Manager Katie Pearmine, "Our focus going forward will be on sourcing more **produce, proteins,** and **pantry staples**. We are working with growers, producers and retailers in Oregon and around the region to provide nutrient-dense food to individuals experiencing hunger in our communities."

Two programs serve as meaningful tools in helping us pursue this strategy at OFB. The first is the **Crop Donation Tax Credit**. Oregon farmers can donate surplus product, or product that doesn't meet retail market specifications (e.g., off-sized, blemished, etc.), and receive a portion of the wholesale market value as a tax credit, rather than turning the product back into the field or dumping it in the compost heap. Oregon Food Bank also has the ability to pay small fees to offset some of the packaging and handling costs associated with getting food from the farm into a distributable, consumable form. This opens up secondary and tertiary markets for producers and processors to move their otherwise unsaleable product, infusing dollars into our regional food economy.

Secondly, OFB's **Retail Capture** program allows us to claim food nearing its "sell by" or "best by" dates from area retailers. Millions of pounds of food nearing these dates are cleared from supermarket shelves, coolers, and freezers each year and discarded in landfills, despite their remaining value. Our Retail Capture program facilitates the gleaning of this (often very nutritious) food, and quickly distributes it to food pantries and meal sites, thereby helping

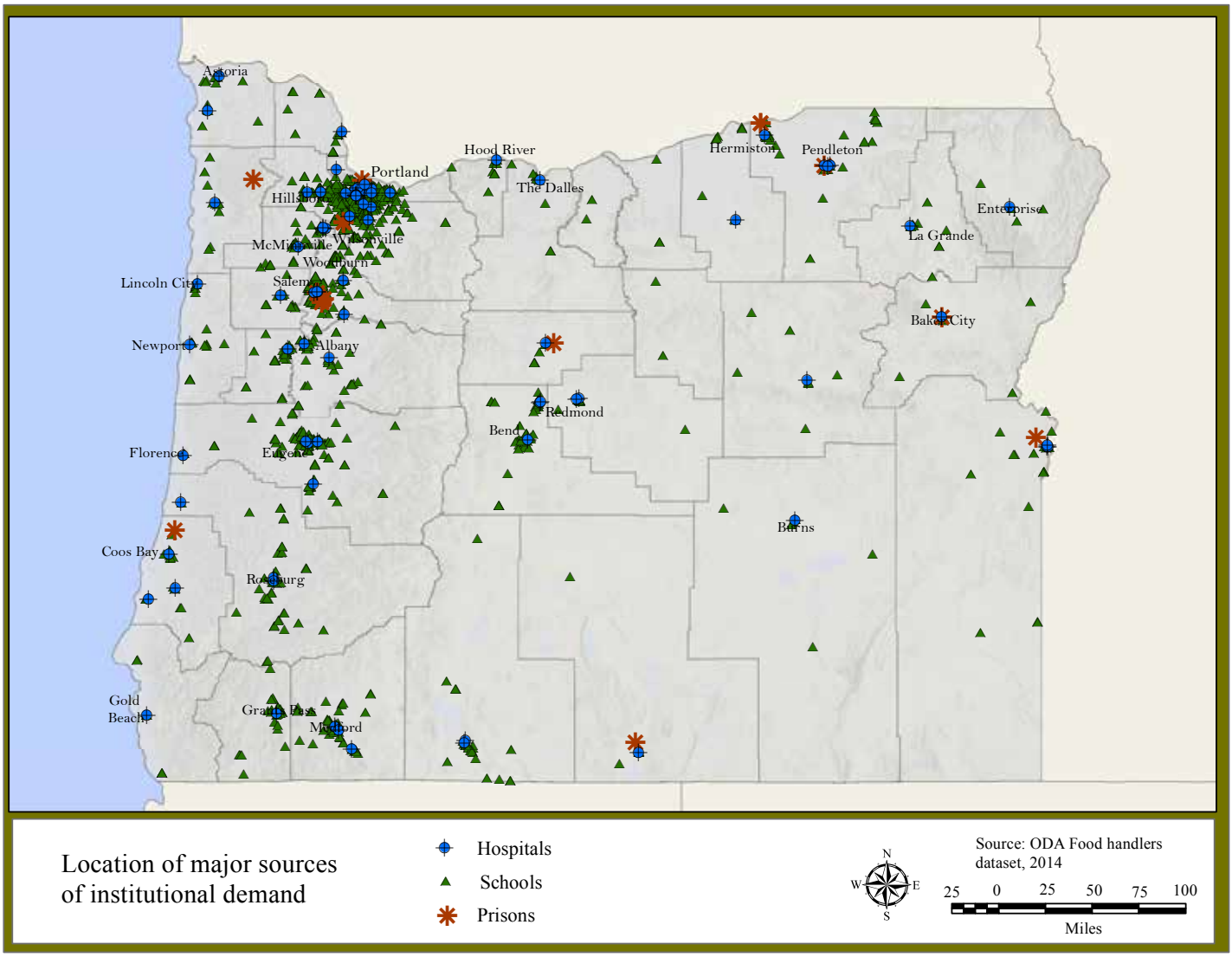
reduce the retailers' environmental impact while simultaneously distributing highly desirable food into the community.

Finally, food banks don't exist on donations alone, we are also **significant food purchasers**. Oregon Food Bank actually purchases more than 20 percent of all of the food we process through our system. Because of the large volumes of food we move, we have a meaningful opportunity to leverage our purchasing dollars to also make a positive impact on the local community. We do that both by buying products that facilitate scratch cooking of nutritious meals by our clients, as well as by directing dollars to regional businesses whenever possible. Regional processors like Grain Millers in Eugene, Oregon, and Central Bean in Quincy, Washington, are great examples of good purchasing partnerships.

The strategy is working. In 2013–2014, we distributed 10 million pounds of fresh produce, and intend to increase that number by one million pounds every year for the next five years. However, some products, such as animal proteins, continue to be difficult to access because of price. As we've done with produce growers though, we hope to develop mutually beneficial partnerships with Oregon's fishermen and ranchers to facilitate secondary and tertiary markets while also helping get nutritious food on the plates of folks struggling for food access.

4.5 Institutional Demand

Beyond food banks, which offer vital sustenance for those in our communities experiencing hunger, there is a significant class of operations feeding hundreds of thousands of meals per day to Oregon residents: **institutions**. Broadly defined to include schools and preschools, hospitals, assisted living facilities, correctional institutions, colleges and universities, as well as corporate cafeterias and special event venues (such as the Moda Center, Oregon Zoo, or OMSI), "institutions" are feeding a substantial proportion of our general population, including a great many working families, low-income residents, and vulnerable populations (e.g., children, hospital patients, and the incarcerated).



Map 4.1: Location of major sources of sources of institutional demand.

We collected data on school, university, prison, and hospital locations in Oregon[46] to illustrate the potential market size for differentiated product at institutions in the state. Map 4.1 shows the location of these institutions.

[46] We did not map locations of corporate cafes, although we believe they too represent a significant source of institutional demand. For example, Bon Appetit Management Company (BAMCO) estimates it serves roughly 635,525 meals per day across all of its locations in Oregon and Washington, and corporate campuses (e.g., Nike, Intel) make up a significant proportion of its business.

We further estimated demand from prisons, hospitals, and schools by analyzing number of meals served and average amounts of meal components in each setting. Note that hospital meals only include an estimate of patient meals, and do not include cafeteria operations feeding staff and visitors (which, if included, we estimate could triple the numbers shown below). For more details on these analyses, see Appendix 14.1, Approach and Methodology.

We then mapped estimated demand, based on number of meals per year and by institution type to the production regions delineated earlier. Data is presented in Table 4.2:

Table 4.2: Number of meals per year for key institution types by food production region.

Region Name	Prisons	Hospitals	Schools	Total
Willamette Valley	6,548,100	3,163,392	14,410,291	24,121,783
Columbia River/Tri-Cities	3,903,675	65,965	1,121,658	5,091,298
Lower Snake River Valley	2,998,110	20,899	311,035	3,330,044
Siskiyou Mountains	0	447,257	1,989,787	2,437,044
Central Oregon	844,245	218,323	1,113,703	2,176,271
Upper Klamath	535,455	66,360	422,311	1,024,126
South Coast	320,835	87,047	336,735	744,617
Grand Ronde/Wallowas	389,820	25,748	249,730	665,298
North Coast	0	50,872	440,827	491,699
Harney Basin	0	2,913	48,508	51,421
Total	**15,540,240**	**4,148,776**	**20,444,585**	**40,133,601**

Although institutional meals per year do not translate directly to market opportunity for Oregon producers and processors, it is a useful proxy for understanding the potential breadth and volume of institutional demand across the state. If hospital cafeteria operations were included in the analysis above, we estimate the totals in the hospital column would be roughly three times higher, making the **total meals served per year in Oregon 20 million, 16 million, and 12 million for schools, prisons, and hospitals, respectively.**

Owing both to their extremely high demand for whole and minimally processed product volume, and to their large food procurement budgets, institutions play a significant role in the food system writ large. Because of the magnitude of their purchasing, even relatively small preferences for Oregon-grown and -processed sourcing by the foodservice operations of institutions would have a significant ripple effect across the domestic food system.

Our primary qualitative research indicates that, as a segment, **institutions seem to lag well behind retailers, restaurants, and manufacturers in their**

interest and current activity sourcing differentiated food products (with the notable exception of those with operations subcontracted to foodservice operator Bon Appétit Management Company (BAMCO), a subsidiary of multinational foodservice management firm Compass Group). Several explanations for the discrepancy surfaced in our interviews:

- **Cost**: Whether subcontracted or self-operated, foodservice is usually run as a cost center at institutions, and thus price sensitivity is high. At such large purchase volumes, even a few pennies more per case can add up to substantial budget increases. Furthermore, institutions wrestle with the labor cost of peeling, slicing, filleting, or portioning product that is delivered whole, and therefore usually require product that has been at least partially prepped.

- **"Credit"**: Ingredient sources, brands and stories are generally not transparent to eaters in a buffet-style setting, making it challenging to "claim credit" for the differentiation and pass along associated price premiums.

- **Customer**: As noted above, foodservice operations tend to serve the general population, rather than the subset of customers seeking, and willing to pay more for, differentiated product.

- **Capacity**: Serving thousands of meals per day means making soup by the vat and tetrazzini by the flat. Such volumes outstrip the capacity of individual producers, and require that product in each category be aggregated from multiple sources. As we'll explore in the next section, aggregation infrastructure is currently best available for commodity markets.

- **Consistency**: The recipes and workflow of institutional kitchens are generally based on ingredients meeting exacting specifications for size, grade or weight. Further, institutional menus rarely account for geography or seasonality (e.g. bananas and strawberries on a yogurt parfait year round), and therefore require consistent month-to-month volume of core ingredients (school and college/university vacation periods notwithstanding).

- **Complexity**: Transaction costs are currently high for sourcing differentiated product, to the extent that, given current fragmentation in the marketplace and lack of optimized aggregation and distribution (more on that in the next chapter), sourcing from many vendors is required. Foodservice directors we spoke with explained that it would be prohibitive, in terms of vendor management, accounts payable, food safety and liability insurance verifications, and receiving (especially for institutions with multiple locations, as in school districts or on college campuses), for institutions to source directly from small and midsized producers and processors. Moreover, at a basic physical level it would be infeasible to receive dozens of

deliveries at their docks daily.

- **Certification**: Food safety concerns and liability loom large over transactions with institutions. Such facilities carry enormous responsibility for the health and safety of eaters, given the number of meals served per day, and are therefore highly motivated to minimize both risk of incidents and the associated legal liability.

The needs and dynamics of institutional foodservice operators described above have given rise to an industry optimized to address those needs. While many institutions operate their own foodservice (known as "self-operators" and particularly prevalent in the hospital arena), food is often hired out to foodservice contractors (e.g., Sodexo, Aramark, and the aforementioned Compass Group brands). Those entities are usually partnered or integrated with food distributors (e.g., Sysco, Food Services of America, US Foods) and/or with related food purchasing entities (e.g., Foodbuy). **These partnerships are optimized for price, volume, consistency, and food safety compliance, and thus tightly integrated with commodity markets**. A system of incentives, often referred to as "volume allowances," motivate foodservice procurement staff to make most, if not all, purchasing with preferred vendors.

While Ag of the Middle and smaller producers face significant challenges accessing institutional markets given the forces at work, there are **examples of successful differentiated and regional procurement by Oregon institutions**, notably Oregon Health Sciences University (OHSU), several public school districts (e.g., Portland Public Schools, Beaverton School District, Bend-LaPine District), and specialty venues such as the Oregon Museum of Science & Industry (OMSI) and Intel corporate campus, both of which are BAMCO accounts. Furthermore, as with food banks, if workflows can be loosened a bit, institutions may have the flexibility to accept product that does not meet retail specifications, potentially opening up secondary markets for producers and processors.[47]

Given the challenges described above, institutional markets may require additional development before good investment opportunities oriented toward moving differentiated food into institutional kitchens arise; more discussion on that point in the Conclusions section of this report.

Before moving on, however, we'd like to touch on the potential capacity, noted earlier, of institutions to serve as vehicles for delivering nutrient-dense food to vulnerable populations. In Oregon, **more than half** (54 percent) of the K–12 public school student population **qualifies for free or reduced lunches**, and **17 percent** of the adult population qualify as **Medicare** beneficiaries,[48] making schools and hospitals important venues for reaching low-income populations.

[47] For example, BAMCO recently launched the "Imperfectly Delicious" produce program specifically to facilitate procurement of food with good flavor but cosmetic imperfections.

[48] Percentage calculated by dividing total number of 2012 Medicare beneficiaries (653,905) by 2012 Oregon population (3.89M).

As for correctional institutions, it seems safe to assume that **100 percent** of people incarcerated or in the juvenile justice system could be considered **"at-risk**." Colleges and universities may also be reaching vulnerable populations, if we consider that the percentage of freshman entering institutions of higher education in the US who are **first-generation college students** (generally understood as neither parent having received a four-year college degree, and often used as a proxy for low income) is estimated at **30 percent**.[49] Indeed, one recent study by researchers at Oregon State University, Benton County Health Department, and Western Oregon University found that "**food insecurity**"[50] **among college students in rural Oregon can reach as high as 59 percent**, that food insecurity can affect cognitive, academic, and psychosocial development during college years, and that food insecurity is inversely related to academic performance.

For foundations, practitioners, and policymakers interested in improving **public health outcomes and food access**, institutions may well represent an opportunity for further research and investment; more discussion on that idea is available in the Conclusions section of this report.

4.6. Price and Consumer Willingness to Pay

While long-term demand for differentiated food grown or processed in Oregon is believed to be very large, as the discussion of institutions makes clear, in the near-term demand is only demand at a price. Most institutions manage their foodservice operations as cost centers and are often locked into exclusive contracts or incentive programs optimized for price, volume, consistency, and food safety risk avoidance. Retailers, restaurants, and manufacturers focused on serving a discerning clientele may have more opportunity to pass along price premiums, however margins in food businesses are generally considered lean across the board.

To wit, US consumer households can also be largely characterized as price sensitive, spending only about **13 percent of their total budgets on food** (both food consumed at home and food away from home), as noted above. Our research with small and midsized Oregon producers of differentiated products indicated that **Oregon eaters may be less financially able or willing to absorb the price premiums for differentiated product**, relative to their neighbors in affluent cities like Seattle and San Francisco. At twenty-first, Oregon ranks behind Washington (eleventh) and California (fourteenth) in median household income by state,[51] and, unlike both Seattle and San Francisco, Portland does not appear at all in a 2014 Wealth Report.[52] Lack of discretionary income to

[49] "Supporting first-gen college students," University Business, 2015.

[50] Food insecurity was measured using the USDA Household Food Security Survey Module: Six-Item Short Form. For details, please see the full study: "Prevalence and Correlates of Food Insecurity Among Students Attending a Midsize Rural University in Oreon."

[51] "Current Population Survey," US Census Bureau, 2012, 2013; "Annual Social and Economic Supplements." US Census Bureau, 2014.

[52] The "2014 Wealth Report" is a study of twelve markets with the highest number of high net worth individuals. Source: "United States Wealth Report," Capgemini and RBC Wealth Management, 2014.

spend on food may limit how quickly a nascent regional food system, as yet dependent on affluent consumers paying higher prices, can grow.

Economic analysis of supply chains for key product categories could help identify opportunities where efficiencies may be gleaned or market value harvested to support increased cost, given that product differentiation often requires production practices or product features that are less financially efficient. We attempted one such analysis in the chicken supply chain as an illustrative example (please refer 6.10. Case Study: Toward a Profitable Supply Chain for Pastured Poultry), and recommend further research in this area.

4.7. Summary

Important facets of the demand side of the regional food system in Oregon include the following:

- Oregon's current population of almost 4 million people is expected to grow rapidly and reach more than 5 million within the next twenty years.
- In 2013, Oregonians spent nearly $11 billion on food, including both food consumed at home and food away from home, which constituted almost 13 percent of total household expenditures.
- A rough estimate of regional production capacity indicates that Oregon does indeed have the resource base sufficient to support increased local consumption of Oregon-grown and -processed products in key categories.
- National and local trends show increased demand for differentiated products by relatively affluent and educated market segments, with retailers, restaurants, and manufacturers responding fastest to market signals.
- Demand is also increasing from international consumers, with the growing middle class population in the Asia-Pacific region likely representing a very significant source of demand in the coming years.
- While creating significant economic opportunity for Oregon food producers and processors, national and international demand also has the potential to create long-term scarcity of supply at affordable prices to domestic markets, particularly for those experiencing food insecurity.
- Institutions (schools, correctional institutions, hospitals, college campuses, corporate cafès, special event venues) serve hundreds of thousands of people across the general population daily; in fact, schools, corrections, and hospitals alone serve almost 50 million meals per year in the State.
- At such significant volumes, even small preferences for Oregon-grown and -processed products would have significant ripple effects across the entire regional food system. Furthermore, institutions may serve as efficient delivery vehicles of nutrient-dense foods to vulnerable populations. Government and/or philanthropic support may be required to help

overcome sourcing and processing challenges before profitable investment opportunities arise.

- In the near term, price sensitivity is relatively high and margins relatively low for whole and minimally processed food products across all channels. Oregon consumers may be less able or willing to pay price premiums for differentiated product, relative to more affluent neighbors in cities like San Francisco and Seattle.

In the next section we begin the discussion of food system infrastructure.

5

Infrastructure

Perceived gaps in food system infrastructure are what led us to this research. Our hypothesis, based on feedback from farmers, ranchers, fishermen, and specialty producers who have been using Ecotrust's FoodHub platform since its launch in 2010, was that **lack of availability or access** to aggregation, processing, and distribution infrastructure (e.g., warehousing, cold and frozen storage, trucks, processing facilities) was inhibiting access by smaller and/or differentiated local producers to wholesale markets for whole and minimally processed food products.

As originally conceived, "infrastructure" was defined as both the **physical** components of food aggregation, processing, and distribution (e.g., warehouses, equipment, trucks), as well as the network of **relationships** (e.g., producers, processors, butchers, brokers, distributors, chefs), required to move food from the farm or ranch (or ocean, river, or aquaculture facility, although seafood was beyond the scope of this study) to the point of consumption. In actuality, infrastructure became the **entry point** into a much broader examination of the challenges and opportunities posed by the investment in and development of regional food systems.


Photo courtesy N. Scott Trimble

As in the supply and demand sections, we start with a broad orientation to infrastructure and existing capacity in the state, including analysis by region. We then discuss issues related to availability of and access to key components of infrastructure by Ag of the Middle producers and processors in Oregon, and highlight **pinch points infrastructure to serve the regional food system** at an overarching level. Because most factors of infrastructure are unique to the product category they serve, we then explore **six product supply chains** in much more depth: chicken, beef, pork, small grains, and legumes, storage crops, and greens, in six separate chapters. Each chapter includes an overview of the sector, including important market trends and segmentation, summaries of wholesale demand and local production, descriptions of processing requirements and supporting infrastructure, and illumination of potential opportunities for regional development and investment.

5.1. Overview

As just discussed, **most factors of infrastructure are unique to the product category in which they operate**. The beef supply chain includes facilities for animal slaughter, cut and wrap, aging, cold storage, and perhaps dry-aging, grinding, blast-freezing, or vacuum-packing.[53] Fruits and vegetables, on the other hand, require washing, cooling, storage and packaging, and perhaps peeling, slicing, freezing or canning. Small grains require seed sorting, cleaning and hulling, and then milling or oil pressing, and so on for each category. In addition to being sold in whole or minimally processed form, products from each sector are often further processed into "value-added" products (e.g., sausage, tomato sauce, bread) or become inputs into

[53] Note how equipment is intimately tied to a producer's potential offerings, particularly for more lucrative value-added products: If a rancher wanted to market and sell local, antibiotic-free, grassfed hot dogs, s/he would need to have access to an emulsifier. Burgers require a grinder; sausage requires a bowl-chopper; steaks for fine dining require a dry-aging room.

other types of food manufacturing, creating all manner of multi-ingredient products filling grocery store shelves (e.g., frozen burritos, ready-to-eat soup, condiments and sauces, baked goods). Although not addressed in this report, each category also faces unique **regulatory and food safety requirements**, and is in the jurisdictions of multiple state and federal agencies.

Due to the wide range of activities that can fall under the heading of "infrastructure," it may be helpful to divide them into "**first mile**" and "**last mile**" infrastructure.

First mile infrastructure generally includes the set of activities, and supporting assets and relationships, that conceptually—and sometimes physically—take place in closer proximity to the initial producer. Depending on the product, first mile activities may include post-harvest handling, cooling, processing, seed cleaning and sorting, or animal slaughter and initial processing.

Last mile infrastructure generally includes such activities as packaging, labeling, value-added processing, last mile logistics, and distribution. Because last mile activities are usually customized to the buyer segments they serve (packaging, for example, may include totes or primal cuts for foodservice or manufacturing clients, but individual shrink-wrapping or vacuum-sealing, barcoding, and labeling for retail sale), these activities often occur conceptually and/or physically closer to buyers.

Thus, it is often the case that first mile infrastructure is associated with **rural** areas where initial production often occurs, and last mile infrastructure with **urban** areas where buyers are concentrated, but this is by no means always the case (urban agriculture is becoming more prevalent, and the most efficient means of accessing "first mile" infrastructure, even for a rural producer, may well be to truck it across the state to a processor in the Willamette Valley, for example).

5.2. Production Capacity by Region

We employed a couple of different approaches to analyze the **geographic distribution of existing infrastructure** across the state, according to both the type of physical infrastructure (e.g., aggregator, processor, distributor), and the first mile or last mile classification, in an attempt to understand the type and magnitude of potential gaps. Our analysis is presented below.

In order to get a general understanding of current infrastructure capacity at the statewide level, we began by analyzing the geographic distribution of existing facilities. Foundational data was gathered from the Oregon Department of Agriculture (ODA) food handlers' licensing database, and supplemented by data collection and interviews with operators of cold-storage facilities, food distributors, and small and midsize producers. Qualitative interviews provided insight into the **awareness of and perceived barriers to access** of existing capacity by regional producers.

The initial dataset of food handlers' licenses, including more than two thousand facilities, was segmented based on license types related to food processing, storage, and distribution, and then further broken down into component categories to facilitate the removal of facilities tied to product categories not relevant to this study (e.g., wine, coffee, candy, seafood). For details on data hygiene and classification methodology, please see Appendix 14.1, Approaches and Methodology.

We then attempted to designate the remaining facilities as "first mile" or "last mile." Bearing in mind that many of these facilities serve both needs (or are difficult to categorize), these classifications are **broad descriptors** meant only to aid understanding of potential infrastructure gaps. Table 5.1 shows the facility type, the number of facilities in the state, and the first mile/last mile activities we believe the facilities may serve.

Table 5.1: Type and number of facilities.

Infrastructure Type	Number	First Mile	Last Mile
Custom meat processor	89	X	
Custom mobile slaughter	59	X	
On-farm processing	48	X	
Produce processing and packers	37	X	
Poultry and rabbit slaughter	19	X	
Slaughterhouse (USDA)	13	X	
Food banks or food safety	11	X	
Grain warehouse	7	X	
Refrigerated locker plant	28	X	X
Non-slaughtering processor	147		X
Secondary value added processors	55		X
Produce distribution	42		X
Meat distributors	17		X
Flour milling	12		X
Custom stationary slaughter	11		X

We then summarized all facilities to our now familiar production regions. Figures 5.1 and 5.2 show the number and type of facilities by first and last mile designations respectively. First mile facilities are **normalized by number of farms** (number of facilities per one thousand farms) and last mile facilities are **normalized by population** (number of facilities per one hundred thousand people). Cold storage appears in both figures.

The North Coast appears to have a meaningful amount of both first and last mile infrastructure, relative to its population and number of farms. Harney Basin appears low on all infrastructure except for grain milling, which may not be surprising given its relatively low population, remote location, and production capacity.

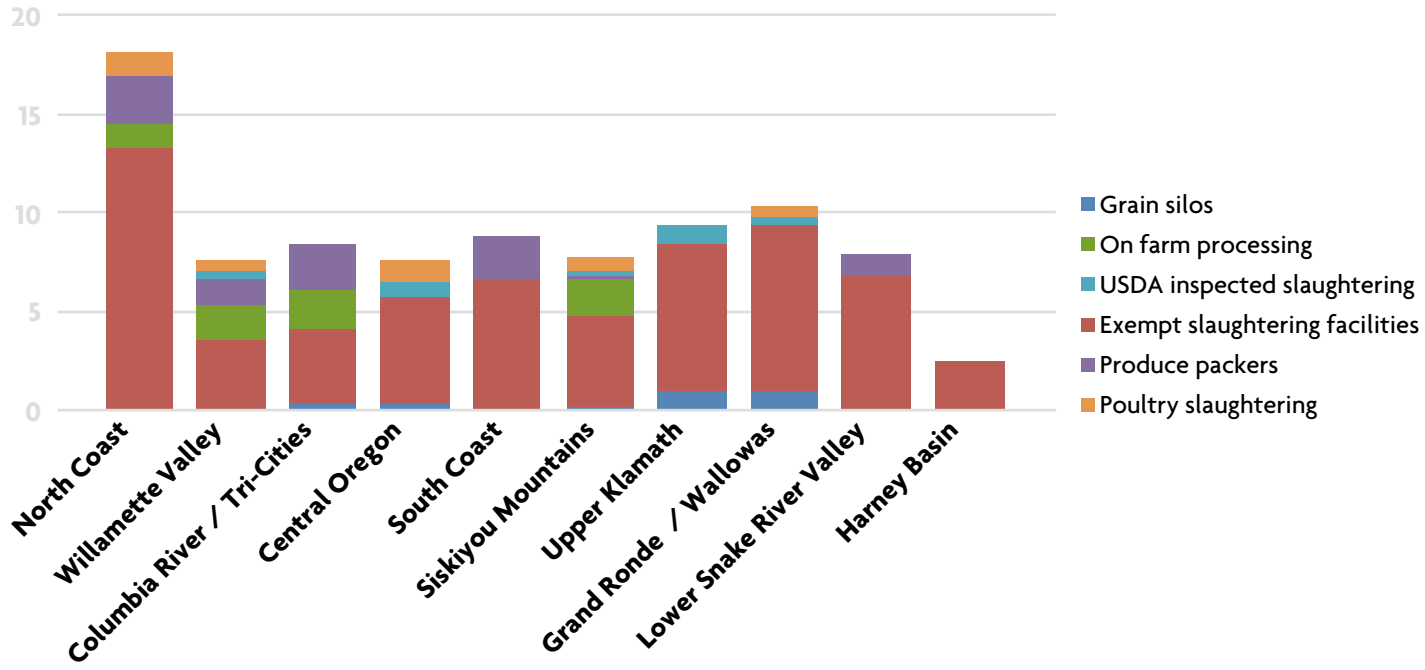


Figure 5.1: Number and type of "first mile" facilities (number of facilities per one thousand farms) by production region.

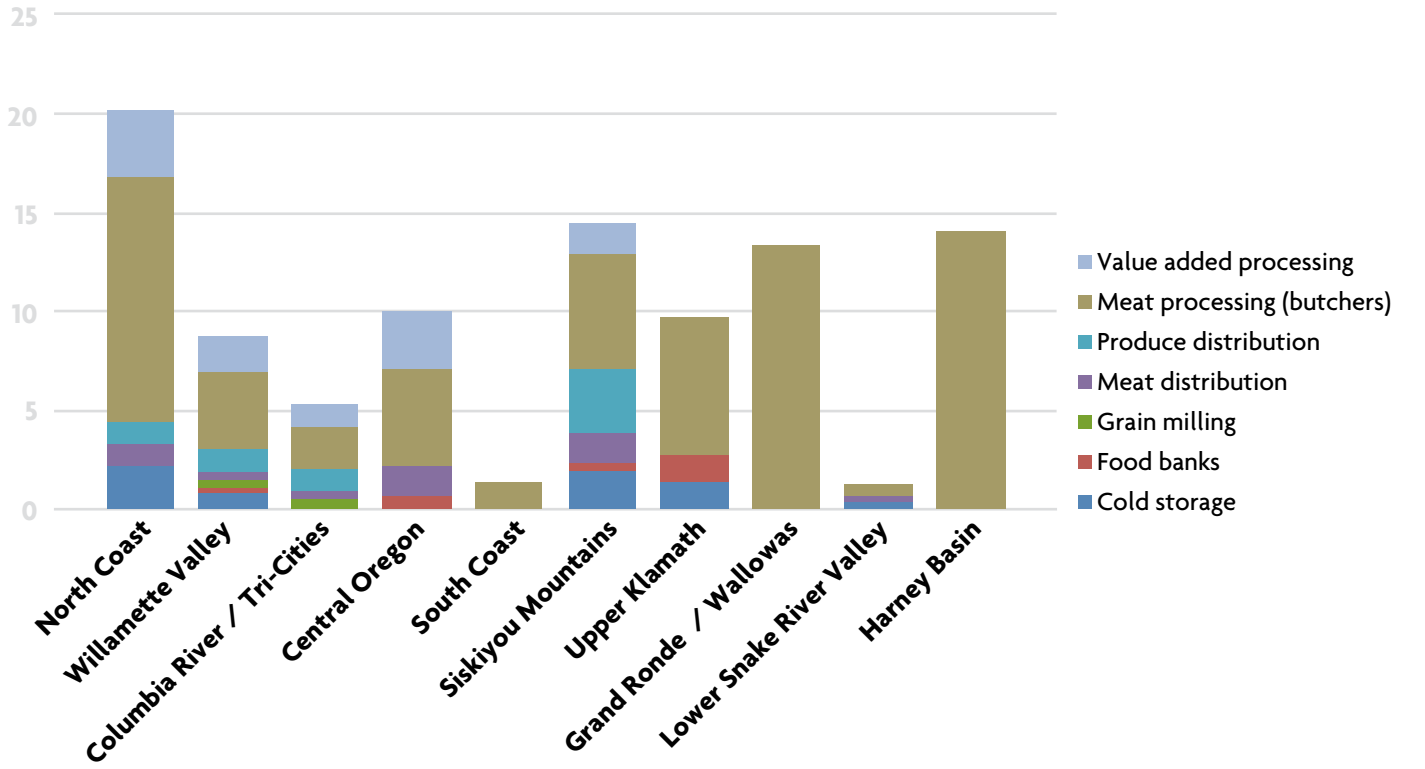


Figure 5.2: Number and type of "last mile" facilities (number of facilities/ one hundred thousand people) by production region.

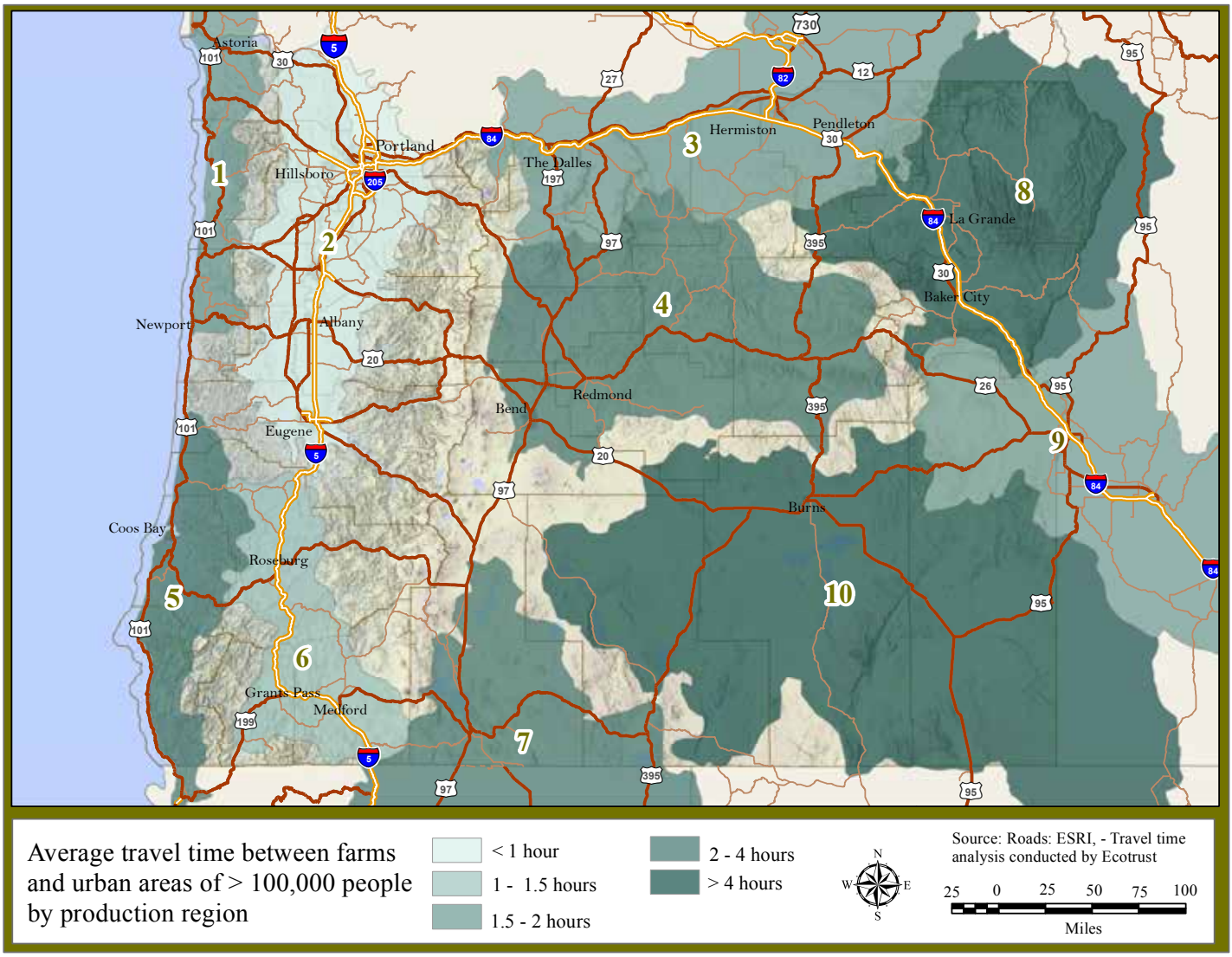
This view of infrastructure along the coast is interesting. You'll recall from the supply chapter that relatively little prime farmland is located along the coast (**Map 3.1: Proportion of prime farmland by soil unit**), with the North Coast being described in the overview of production regions as slightly more productive than the South (due in large measure to a robust dairy sector). This view of infrastructure indicates that the North Coast and South Coast have very different levels both first and last mile infrastructure, on a normalized basis, perhaps indicating a need for further investment on the South Coast.

Harney Basin, Columbia River, North Coast, and South Coast all **lack convenient access to USDA-inspected meat-slaughtering facilities**, although three of these regions produce a significant amount of livestock (most of which depart the state for finishing at feedlots elsewhere). Most regions have ample non-slaughtering meat processors (the high number of butchers per one hundred thousand people in the sparsely populated regions of the Grand Ronde Valley/Wallowa Mountains and the Harney Basin likely include mostly custom-exempt facilities servicing hunters), however most regions seem to be lacking independent meat distributors. Even the Willamette Valley has only .34 meat distributors per one hundred thousand people (compared to Central Oregon which has 1.42 and Siskiyou Mountains which has 1.56). Again, that conclusion is logical when you consider that Oregon is primarily a state of cow/calf operators, rather than feedlot, finishing and cut meat production. See the beef section of this report (chapter 7) for details.

Produce packers are concentrated in the Columbia River/Tri-Cities region, Lower Snake, South Coast, North Coast, and in the Willamette Valley. Independent produce distribution seems lacking in Central Oregon, the Lower Snake, South Coast, Harney Basin, and Grand Ronde Valley, which makes sense given the relatively lower levels of produce grown in those areas at present.

Finally, this analysis would show an apparent lack of grain silos in the Columbia River/Tri-Cities region, however facilities serving that region may well be located on the Washington side of the border.

To examine the issue from another perspective, location theory, which studies questions related to what economic activities are located where and why, indicates that optimal economics are tied to **minimizing transportation costs**. For products whose **raw materials are heavier to transport relative to the finished product** (a.k.a. weight-losing products), proximity of first mile facilities are most important. Livestock provide a good example: because live cows and pigs are heavier to transport than primal cuts post-slaughter, transportation costs would be minimized (all other factors being equal) if livestock slaughter facilities were located as physically close to the source of production (ranches) as possible. Alternatively, for those product sectors whose **raw materials are cheaper to transport than the final product** (a.k.a. weight-gaining products, like most beverages), or where the final products are an



Map 5.1: Major road networks and travel times to urban areas (includes out-of-state cities such as Boise, Redding, and the Tri-Cities) by production region. Region legend: 1. North Coast; 2. Willamette Valley; 3. Columbia River Basin/Tri-Cities; 4. Central Oregon; 5. South Coast; 6. Siskiyou Mountains; 7. Upper Klamath; 8. Grand Ronde Valley/ Wallowa Mountains; 9. Lower Snake River Valley; 10. Harney Basin.

amalgamation of multiple inputs coming from different regions, proximity of last mile infrastructure is most important.

To get a sense of transportation as a factor, we estimated **travel time to urban areas** of different sizes. Our methodology takes a cost/distance approach following road networks, where the cost to traverse a given area varies depending on the type of road available (e.g., freeway, state highway, arterial, etc.). Additional details regarding the calculations can be found in Appendix 14.1, Approaches and Methodolgy. Note that out-of-state metro areas were included in this analysis (e.g., Boise, Redding, and the Tri-Cities).

Map 5.1 shows major road networks and travel times by production region.

Logically, travel times from farms in regions that lie along the Interstate-5 corridor are the shortest. Those in the Lower Snake River Valley have **relatively easy access to the Boise area**, as mentioned in the supply chapter. Harney Basin and Grand Ronde/Wallowas are the most difficult to access, and are also key production regions for livestock. As weight-losing industries, this analysis indicates that a USDA-certified slaughter facility convenient to those

regions could be catalytic in converting a portion of Oregon's beef sector from cow/calf operations to finishing and processing.

For those interested, further analysis could be done on travel times, in that the time distances to smaller urban areas are important in understanding the strength of backward linkages (e.g., production inputs, equipment, financial services), whereas distance to larger urban areas represents potential barriers to forward linkages (e.g., sales).

To paint a more **holistic picture** of existing infrastructure, including the dimensions described above, as well as additional aspects relevant to developing domestic markets, we matched facility types and locations up with regional production, and then compared the two against a suite of production and market characteristics, including travel time to urban areas of different sizes, potential local markets (using the demand data outlined in the previous chapter), general farm characteristics, and an index used to assess the support capacity local and regional food system development.[54] This data is presented in Table 5.2 below.

[54] "2014 Community Food System Assessment," Meyer Memorial Trust, 2014.

		Region Name									
		North Coast	Willamette Valley	Columbia River/Tri-Cities	Central Oregon	South Coast	Siskiyou Mountains	Upper Klamath	Grand Ronde/Wallowas	Lower Snake River Valley	Harney Basin
Production	Total farms	825	18,091	3,433	2,777	901	4,221	1,073	2,032	883	1,199
	Value of food products ($1,000)	115,919	831,621	1,011,119	993,552	67,923	93,807	365,634	149,048	134,168	215,537
	Median farm size	42	19	807	164	82	26	80	117	68	222
Markets	Population (2012)	89,057	2,363,923	339,722	140,679	76,589	256,219	71,850	37,597	493,057	7,125
	Hours to urban areas	1.93	0.66	1.83	3.97	3.23	1.32	3.71	4.17	1.95	5.44
	Direct sales ($1,000)	1,556	31,259	2,878	1,386	441	4,330	277	271	230	477
	Community food score	56	66	47	44	60	62	43	50	44	37
First mile infrastructure	Grain silos	0	1	1	1	0	1	1	2	0	0
	Exempt slaughtering facilities	11	64	13	15	6	19	8	17	6	3
	On farm processing	1	32	7	0	0	8	0	0	0	0
	Produce packers	2	23	8	0	2	1	0	0	1	0
	USDA inspected slaughtering	0	8	0	2	0	1	1	1	0	0
	Poultry slaughtering	1	11	0	3	0	3	0	1	0	0
Last mile infrastructure	Cold storage	2	18	0	0	0	5	1	0	2	0
	Food banks	0	8	0	1	0	1	1	0	0	0
	Grain milling	0	10	2	0	0	0	0	0	0	0
	Meat distribution	1	8	1	2	0	4	0	0	1	0
	Produce distribution	1	29	4	0	0	8	0	0	0	0
	Distribution per 100,000 people	2.25	1.57	1.47	1.42	0.00	4.68	0.00	0.00	0.20	0.00
	Meat processing (butchers)	11	92	7	7	1	15	5	5	3	1
	Value added processing	3	40	4	4	0	4	0	0	0	0

Table 5.2: Production, markets and infrastructure by production region.

Before addressing infrastructure directly, it is **illuminating to see the dimensions of production and markets discussed in the supply and demand chapters presented here in one table.** Columbia River/Tri-Cities, the Willamette Valley, and Central Oregon all stand out as highly productive regions, based on their natural resource bases, access to buyers, and success in developing commodity markets.

Also included in the last line of the "Markets" section is a "**community food score**." The score is drawn from a rubric designed to help assess Community Food System (CFS) development and capacity in Oregon. The scores are based on indicator data collected in four subject areas: Food Access and Food Insecurity, Community Capacity, Farm Base, and Market Linkages. Each subject area contains indicators related to CFS concerns. For example, Food Access and Food Insecurity includes measures for the number of grocery stores in each county, the percentage of low-income households that live more than ten miles from a grocery store, and the average cost of providing a meal.[55] In order to derive CFS score by region, an average was taken of the scores of all counties included, in whole or in part, in that region. The scores are not surprising, given all that we now know about supply, demand and infrastructure, with the Willamette Valley showing up at the top of the list, and Harney Basin at the bottom.

In moving down the table to compare existing first and last mile facilities against the production and market characteristics, we see again the gaps in first mile facilities in many of the more remote production regions, in particular Harney Basin, Grand Ronde/Wallowa Mountains, and South Coast.

While the number and density of facilities by region is enlightening, it is incomplete, given that a true assessment of gaps would require data on **facility and equipment capacity**, as well as **availability of required inputs**, in order to evaluate **throughput and utilization**. Because such data is not readily available, we supplemented this analysis with qualitative interviews with distributors, cold storage operators, and Ag of the Middle producers, to gain additional insight into the adequacy of existing infrastructure and perceptions of the biggest gaps.

From **primary interviews with distributors, cold storage, and warehousing operators**, we learned that their capacity, throughput, and utilization vary dramatically from one to another. Most of these facilities are located along the Interstate-5 corridor, and most identified consistent volume of local and regional supply as the main limitation to increasing the flow of such products through the system. In other words, the perception among operators is that **adequate capacity exists**, or could be easily expanded, **provided consistent minimum volumes could be reached** (individually, or, we assume, in aggregate), to meet thresholds designed to limit transaction costs. This feedback is consistent with input from small and midsize producers, who said they believe storage and distribution capacity exist, but that volume minimums are too high, vendor requirements too stringent, or cost structures of existing entities were otherwise prohibitive.

From both the data analysis and primary research emerged the issue of "**redistribution**" of all products—regardless of whether they are weight-gaining

[55] For additional information on the CFS indicators and to access the final report due out Fall 2015, please contact Matthew Buck (matthewbuck.consulting@gmail.com).

or weight-losing—as a significant barrier. Also often referred to as "last mile logistics and distribution," adequate availability of and access to aggregation, storage, and distribution facilities are essential to moving larger quantities of raw product from agricultural areas and "re-distributing" them to smaller entities in urban areas.

5.3. Ag of the Middle Pinch Points

Because of fundamental differences in their go-to-market strategies, our research indicates that **Ag of the Middle producers face significant infrastructure challenges relative to commodity players**. They often don't meet volume minimums, won't make exclusive contracts, or can't otherwise overcome barriers to entry to access existing infrastructure. They must therefore spend significant time and energy to handle portions of the process themselves (affixing labels, picking and packing orders, doing deliveries, etc.), or to patch together a constellation of suppliers, partners, or fellow producers to connect the dots.

The small, direct-to-consumer producers we interviewed who were selling via neighborhood farmers' markets, community supported agriculture (CSA), and on-farm retail such as farm stands, U-Pick, or other farm gate sales, seemed comfortable absorbing labor and coordination costs in exchange for capturing 100 percent of the retail sales value of their products (although many, if not most, were not accounting for their own time, and many were supporting their operations with off-farm jobs). Few processing, aggregation, or distribution infrastructure needs surfaced relative to direct market channels, given that products in that channel are generally sold raw and whole.[56] That situation would change dramatically as producers grow, we assume.

As **Bridget Cooke**, executive director and cofounder of **Adelante Mujeres**, an organization that helps low-income Latina women in Oregon develop food businesses to support their families, describes:

> "Gaps in local and regional food systems infrastructure become particularly apparent when it comes to smaller producers. Small farmers can sell their produce at farmers' markets and through other direct-to-consumer outlets, but at a certain point, many small farmers want to access larger markets in order to grow their businesses. Yet when they try to break into those larger markets, they can't compete against larger producers who benefit from better economies of scale. Large distribution companies are set up to work with large farms; their requirements are cost-prohibitive for small producers and do not take into account the higher level of risk on small farms. Full participation in the food system is particularly challenging for the smaller-scale Latino farmers we support, who face added language and cultural barriers. All of these gaps, however, illustrate that there is opportunity for the local food

[56] Recent regulatory relief on food licensing standards for on-farm processing, facilitating direct sale of value-added products such as salsas and fermented foods, has created market opportunity in these product categories and may eventually spur a need for additional processing capacity.

> systems infrastructure to better serve small producers in ways that allow them to be viable and thrive."

Thus, **Ag of the Middle producers attempting to produce and market differentiated food products domestically seem to be suffering most of the pain of inadequate regional infrastructure**. Because they find themselves taking responsibility for multiple links or entire supply chains in order to achieve differentiation—from production, processing, and packaging, to market development, sales and distribution—they appear to wrestle with complexity and challenges from the first mile to the last.

Such producers may also be bringing multiple products to market in order to maximize revenue streams and/or to meet environmental objectives, further increasing the complexity and number of processing suppliers they must manage. They work to negotiate pricing in partnership with their buyers, and hope to capture more of the retail value of their products by managing the intermediate steps in the supply chain. Unfortunately, the potential for incremental value capture is often at risk due to processing or distribution failures. We heard from the experiences of many aspiring Ag of the Middle producers that such failures can be frustratingly frequent, owing to the number of partners, the compartmentalization of processing steps and associated legal liability, and the complexity of the supply ecosystems.

To illustrate these dynamics, consider the ecosystem developed by **Carman Ranch** for its primary product, grassfed beef:[57]

> Cory Carman, who owns and operates Carman Ranch, a 100 percent grassfed beef ranch in Wallowa, took on complete responsibility for processing and distributing her own products in 2013. Since first entering the wholesale marketplace in 2010, she had relied on Fulton Provisions, a division of Sysco, for post-slaughter further processing, packaging, inventory management, and distribution, but she had struggled to respond effectively to her Portland chef customers' desires, given her relatively small size in the wholesale beef supply chain.
>
> Carman Ranch's market-ready cows destined for wholesale channels[58] now travel from Wallowa to Dayton, Oregon, approximately 350 miles on the hoof, for slaughter at **Dayton Natural Meats**. Boxed sub-primal beef cuts that don't require further processing are transferred to a cold storage warehouse managed by **B-Line Sustainable Urban Delivery** in the Central Eastside Industrial District of Portland, with auxiliary storage as needed at **J&D Refrigerated Services** in Clackamas. Cuts requiring further processing (mostly trim packaged in thousand-pound totes) are

[57] The ranch also produces pastured pork and chickens, and a small selection of specialty products.

[58] In Carman Ranch's whole animal program, live animals (both grassfed cows and pastured pigs) are sold to customers prior to slaughter. Animals are then harvested in the field by a mobile processor, processed and packaged for delivery by a custom-exempt processor, Valley Meats, in Wallowa. Delivery to her mostly Portland-based clientele is done by Cory and her family.

transferred from Dayton directly to **Fulton Provisions**, in northeast Portland east of Interstate-205, for grinding into bulk hamburger and hamburger patties according to her restaurant and foodservice customer specifications (usually for either one-third pound or one-quarter pound patties). A portion of fresh cuts is also transferred from B-Line to **Ponderosa Provisions**, in Aloha, for vacuum sealing and labeling for retail sale. These cuts are primarily sold via the ranch's customer buying club and two large farmers' markets (Portland and Hillsdale). In addition, custom value-added processing for sausage, pastrami, and other specialty products, as well as retail processing of the ranch's pastured pork, is done at **Century Oak Packing**, a meat co-packer located in Mount Angel. Finally, urban distribution to wholesale clients is done by commercial scale cargo bicycle in the downtown core by B-Line, and to foodservice clients in a ranch-owned van by Carman's **operations staff**.

We heard from producers participating in wholesale supply chains that **last mile warehousing and logistics** are a particular (and product-category agnostic) pain point, especially for rural producers. As in the Carman Ranch situation described above, many complain of the difficulty coordinating the myriad details required to manage multiple partners from afar, necessitating frequent trips to town and time spent while there coordinating operations, rather than meeting with current and potential customers to grow their businesses.

Urban producers and entrepreneurs face a similar bottleneck, in that **self-distribution** often requires energy and resources sufficient to stunt growth. A case study from Portland-based **Bowery Bagels** is enlightening:

Bowery Bagels has become a fast-growing specialty producer in Portland because of the excellent taste and texture of its popular New York-style bagels, its experimental culinary flavor combinations that keep adventurous urban eaters engaged, and its dependable product quality and consistency. Flour for the bagels is sourced from Shepherd's Grain, a farmer-owned co-op of Oregon and Washington "no-till"[59] wheat farmers.

The Northwest-sourced bagels have been by picked up by regional retailer New Seasons Market, with fifteen Portland metro area locations, as well as a plethora of coffee shops, cafés, and small retailers. The bagels are made fresh each morning, so deliveries must be made daily, and, given the customer list, require drops to **114 addresses** between 2 a.m. and 7 a.m. on weekdays. Figure 5.3 below shows delivery locations in the Portland metro area in March 2015. Owner Michael Madigan says he has been as focused on managing distribution—drivers, stops, fulfillment logistics, etc.—as on building a bagel business. In fact, the issue of last mile distribution has artificially limited the growth of his company, says Madigan. He can make a lot more bagels, but he can't get them efficiently delivered to any more accounts.

[59] For background on no-till agriculture, see "Farmers Put Down the Plow for More Productive Soil," The New York Times, March 9, 2015.

The Bowery Bagels story seemed to play out over and over again for the founders of local, value-added businesses with we spoke—**those with good growth often became hampered by their own success** due to a lack of efficient, cost-effective local distribution, and were distracted from their core business development because distribution problem solving required such a significant share of their focus. It seems to be a particularly tight spot for producers committed to differentiated regional sourcing because their profit margins are even leaner, and they may also be helping coordinate to solve distribution for supply partners as well.

Lack of access to **processing facilities** was another concern that rose to the top of the general list of infrastructure pain points in our conversations, especially among beef and chicken producers, and among value-added

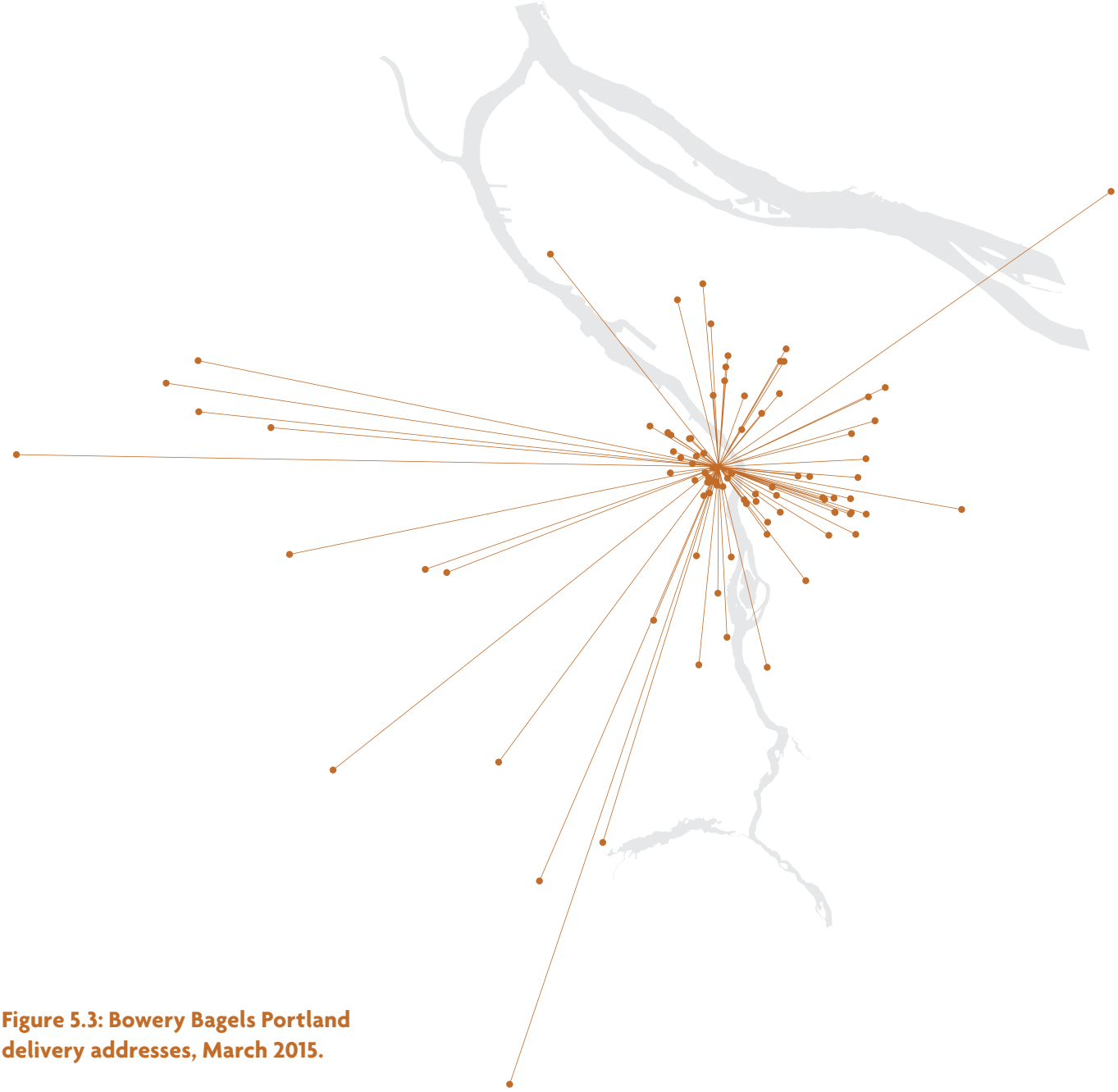


Figure 5.3: Bowery Bagels Portland delivery addresses, March 2015.

producers seeking **"right-sized" production space or co-packing**. Much more detail on category-specific challenges is provided in the chapters covering beef, chicken, and small grains and legumes. However, it is worth noting here that the type of food production spaces and equipment needed was **diverse**: pasteurized bottling lines for beverages, production bakery kitchens designated exclusively gluten-free, climate-controlled spaces for pickling and fermentation, custom facilities and equipment for the production of cured meats, bean-to-bar chocolate, etc. Portland is a center of artisan food innovation, and once entrepreneurs have perfected their recipes and found initial success in wholesale channels, they may quickly grow out of available shared-use commissary kitchen spaces. While the focus of this report is primarily on whole and minimally processed food products that both grow in Oregon and are important to human health and nutrition, it is important to acknowledge that producers can capture higher margins with value-added products, and that artisan products, including those from other areas (wine, spirits, beer, chocolate, coffee, etc.) can help financially balance business models.

Finally, one issue emerged from the primary research that went well beyond hard-asset infrastructure: few Ag of the Middle producers and entrepreneurs interviewed seem to have experience with sales and marketing, and many seem to struggle with **market development**. Producers may have been literally born into their work by virtue of growing up on a multi-generation family farm; new and beginning farmers may have begun farming either because of a passion for the products and production or for the perceived quality of the lifestyle. Only in relatively rare cases did we find producers who had either an interest in or experience with the sales and marketing function, or who had come to their business following an assessment of the marketplace and with a clear notion of their target customer and market opportunity (however, the incidence of such market research seemed slightly more prevalent with entrepreneurs in the specialty product category).

As with operations, Ag of the Middle producers are often cobbling together resources for at least a logo and product label, and perhaps some basic sales collateral and/or a website. Often, they simply go without brand strategy, marketing communications, or more robust strategic planning.

5.4. Summary

Important overarching facets of infrastructure to support the regional food system in Oregon include the following:

- We found significant gaps in infrastructure to serve domestic, differentiated, Ag of the Middle production across all product categories, and in both first and last mile activities. Key overarching pinch points include:
    - Last mile warehousing and logistics for both rural producers accessing urban markets, and urban-based artisan entrepreneurs.

    - Lack of access to processing facilities, especially among beef and chicken producers, and among value-added producers seeking "right-sized" production space or co-packing.

- Support for market development, including sales and marketing strategy and execution, both digital and via channel partners such as retailers and foodservice operators, and business planning and budgeting.

Most factors of infrastructure are unique to the product category in which they operate. Beef requires facilities and equipment for slaughter, cut and wrap, further processing, and packaging, but vegetables require washing, cooling, slicing, freezing, or canning; grains and seeds must be sorted, cleaned, hulled, milled, etc., and so on for each category. All have unique regulatory and food safety requirements as well.

From here we dive into six product categories for a more actionable, in-depth look at the infrastructure dynamics affecting their domestic development. First up is chicken.

6

Chicken


Photo courtesy Carole Topalian

6.1. Executive Summary

In recent years, concerns for food safety, health, animal welfare, and the environment have combined to increase interest in differentiated chicken. These attributes, often lumped together as "sustainable" by consumers, include local, from smaller-scale farms, antibiotic-free, free-range, and pasture-raised. Consumers have also demonstrated a willingness to pay for these attributes, with retail prices for "conventional" and "alternative" versions of whole chickens observed to range from $1.29/pound to nearly $6.00/pound.

A review of Oregon retailers, restaurants, hospitals, and educational institutions suggests there is potential demand for over 5 million broilers (over 20 million pounds of raw, whole, or cut-up chicken) that offer some combination of local, antibiotic-free, free-range, or pasture-raised. This represents about 6 percent of the chicken that is consumed in Oregon each year. The approximate breakdown by channel is as follows:

Retail:	80%	(~16 million lbs.)
Restaurants:	9%	(~1.7 million lbs.)
Hospitals:	4%	(~850,000 lbs.)
Schools and Colleges:	7%	(~1.6 million lbs.)

It is important to remain aware that large commercial entities such as Foster Farms and Draper Valley already offer at least one of the desired attributes. Although the market is not wide open, Oregon may have capacity to serve in-state demand for alternative chicken. A total of 487 Oregon farms, many concentrated in the Willamette Valley, reported sales of nearly 23 million broilers in 2012. This is enough chicken to satisfy about 28 percent of Oregon consumption. However, almost all chickens produced are currently shipped for processing and marketing out of state. Of all farms reporting sales of broilers, 95 percent likely sold fewer than one thousand birds, and less than 1 percent of chickens raised are marketed to Oregon buyers.

Currently, we could only find one midsized Oregon chicken farm and no midsized Oregon chicken brands targeting local markets. As such, there are may be opportunities to develop profitable enterprises around midscale production, processing, and marketing of chicken. Primary research conducted with Oregon producers revealed that expansion of existing small businesses or the launch of new businesses may require investment in processing facilities. Characteristics and costs of various processing facility options are reviewed in this chapter. However, a successful effort to develop midscale chicken in Oregon will likely hinge on factors beyond simple processing capacity, including:

- Ability to target specific end markets and be price competitive
- Finding an appropriate basis for differentiation
- Organizing production
- Access to skilled management
- Access to labor

The chapter concludes with an in-depth analysis of the price competitiveness (or lack thereof) of pastured poultry versus conventional, and alludes to opportunities to develop profitable small/midscale poultry enterprises.

6.2. Introduction to the Industry at the National Level

US consumption of chicken (now eighty-three pounds per capita) has increased every year since 1965, and since 1993 has exceeded consumption of either beef (fifty-four pounds) or pork (forty-six pounds).[60] This "consumption" figure represents the retail weight of chicken, including bones and other parts that may not be eaten. USDA Economic Research Service estimated the edible weight of chicken consumed by Americans at fifty-seven pounds in 2012.[61]

The National Agriculture Statistics Service estimated the national farm-level value of chicken (broilers) produced in 2013 at $30.7 billion.[62] The National Chicken Council estimates that 95 percent of the 8.5 billion broilers produced annually are raised under contracts with large processing companies.[63] The bulk of the remaining 5 percent are raised on farms that are company owned. Only a fraction of broilers are raised and marketed directly by farmers.

6.3. Segmentation, Key Issues, and Trends

The Economic Research Service offers the following description of the broiler industry:

> "Most U.S. broiler production is under contract with a broiler processor. The grower normally supplies the growout house with all the necessary heating, cooling, feeding, and watering systems. The grower also supplies the labor needed in growing the birds. The broiler processor supplies the chicks, feed, and veterinary medicines. The processor schedules transportation of the birds from the farm to the processing plant."[64]

In this system, broilers are raised indoors in barn-like structures that each may house up to twenty-five thousand birds.

In contrast, a 2007 report for the Agriculture of the Middle project describes midsized and smaller scale farmers or farmer cooperatives that raise chicken for direct or specialty markets:

> "They own the birds and slaughter either on-farm or in small, locally-owned processing facilities. These birds are sold directly by the farmers to consumers, retail stores, restaurants, and other outlets that are scaled appropriately. In this model, the farmer typically buys chicks from

[60] "Per Capita Consumption of Poultry and Livestock, 1965 to Estimated 2015, in Pounds," National Chicken Council, 2015.

[61] "Economic Data," US Poultry and Egg Association, 2015.

[62] "Poultry—Production and Value 2013 Summary," USDA, NAAS, 2014.

[63] "Broiler Industry Key Fact,"National Chicken Council, 2012. See

[64] "Background," USDA, ERS, 2012.

a hatchery or feed mill and provides all the feed, lighting, housing, expertise, and other requirements for raising the birds. Farmers maintain control over the bird and its production. For processing, farmers can either conduct their own slaughter or work with a facility that is willing to provide processing."[65]

In recent years, a number of issues have coalesced to raise concerns about conventional or "industrial" chicken and increase interest in alternative production models. These include:

- The quality and nutritive value of foods
- The incidence of salmonella, e-coli, and other food-borne illnesses
- Routine use of antibiotics in the livestock industry
- Animal welfare and the conditions under which chickens are raised and slaughtered
- The environmental impacts of concentrated animal feeding operations

These concerns have created opportunities for chicken producers to differentiate their products and access potentially profitable niche markets by marketing broilers with a variety of characteristics and claims, sometimes combined under the heading "sustainable." These include:

- Heritage poultry varieties
- Pasture-raised (typically small numbers of chickens raised in open-air fenced enclosures)
- Free-range (typically large numbers of birds raised in closed barns, but without cages)
- No antibiotics used (commonly known as "antibiotic-free" and shortened to "ABF")
- Organic certified
- Animal welfare certified (Animal Welfare Approved, Certified Humane, Food Alliance, etc.)

While advocates like Health Care Without Harm[66] and institutional purchasers like Bon Appétit Management Company[67] have promoted or made commitments to purchasing more sustainably produced chicken, availability and price remain challenges for procurement managers.
The price difference for conventional and alternative chicken can be significant, as demonstrated by a snapshot of Portland retail prices in September 2014:

- Conventional chicken on sale at a major grocer for $1.29/pound **(Foster Farms)**;
- Free-range, ABF chicken available at New Seasons Market for $1.99/pound **(Draper Valley)**; and

[65] "Poultry of the Middle in the US," The Agriculture-of-the-Middle Initiative, 2007.

[66] "Purchaser's Guide to Sourcing Sustainable Poultry," Health Care Without Harm, (n.d.).

[67] "Animal Welfare," Bon Appétit Management Company, (n.d.).

- Pasture-raised chicken available direct from Kookoolan Farms in Yamhill, Oregon, at $5.89/pound.

Despite higher prices overall for differentiated products, midsized and smaller-scale farmers pursuing niche markets must earn a margin that enables profitability in spite of typically higher per unit production, processing, and marketing costs. The Agriculture of the Middle report describes the challenges:

> "Typically, as small and medium-sized poultry producers grow, there are two tasks that are essential to their set-up, operations, and survival. These companies must seek out a product/niche that will distinguish their company. They must also create for themselves the infrastructure needed to get their product from farm to consumer. The infrastructure needed includes all of the resources that integrated companies own: access to genetics, hatcheries, feed, processing facilities, distribution, marketing, sales staff, and more."[68]

In addition, increasing interest in ABF chicken on the part of commercial buyers, including mainstream restaurant chains like Chipotle,[69] Chick-fil-A,[70] and more recently McDonald's and Costco, [71] is driving change in the industry and making that product more available and more affordable. This was demonstrated with a 2014 announcement by Perdue,[72] the third largest US chicken producer, on a phase-out of antibiotics important for human use in their facilities.

6.4. Demand for Chicken in Oregon

Understanding market demand is critical to evaluating potential investments to increase production and profitability of local and more "sustainable" chicken.

6.4.1. Consumer Spending on Chicken

According to the Bureau of Labor Statistics[73], the average household (2.6 persons) in the western US spent $7,180 on food at home (59 percent) and away (41 percent) in 2013. This includes $169 spent on all types of poultry for at-home consumption. Agricultural Marketing Resource Center[74] figures show that production and sale of poultry for meat in the US is dominated by chicken (82 percent) and turkey (18 percent).

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68 "Poultry of the Middle: 'Implications for Sustainable Producers and Scaling Up,'" The Agriculture-of-the-Middle Initiative, 2007.

69 "Chipotle Sets the Record Straight on Antibiotics, Hormones," Meat and Poultry, 2013.

70 "Chick-fil-A to Serve Antibiotic-Free Chicken," Elizabeth Landau, CNN, 2014.

71 "America's Hunger for Antibiotic-Free Chicken Is Becoming a Costly Headache for Chicken Suppliers," P.J. Huffstutter and Lisa Baertlen, Reuters, 2015.

72 "Perdue Cuts Way Back on Use of Antibiotics in Chicken," Bruce Horvitz, USA Today, 2014.

73 "Region of residence: Annual expenditure means, shares, standard errors, and coefficient of variation," Consumer Expenditure Survey, 2013.

74 "Commodity Poultry Profile," Agricultural Marketing Resource Center, 2012.

The National Chicken Council[75] estimates that the domestic market for chicken is divided between retail (55 percent) and foodservice (45 percent, of which 56 percent is for fast food), with 52 percent of chicken sold fresh (whole or parts) and 48 percent further processed.

In December 2013, the USDA Economic Research Service[76] marked the composite price per pound for broilers at wholesale at $0.73 and the retail price at $1.97 (meaning that the wholesale price could be 37 percent of the final retail price).[77]

A number of sources indicate that foodservice ingredient costs average 30 percent of the final retail price, but can range lower or much higher depending on the type of establishment. Schools and hospitals may be seeking to keep food costs closer to 20 percent. Fine dining establishments may be comfortable with food costs reaching 40 percent or more, with a priority placed on high quality ingredients.

Using population data and the figures above, it is possible to estimate the consumer market for chicken in Oregon, at the county level, or for municipalities. These estimates are displayed in the chart below.[78]

Geographic Unit	Total Chicken "Consumed"	Total Spending: Chicken at Home	Estimated Spending: Fresh Chicken At Home	Implied Wholesale Opportunity (37%)	Estimated Spending: Fresh Chicken in Foodservice	Implied Wholesale Opportunity (20–40%)
Oregon (pop. 3,919,020)	327M lbs.	$255M	$133M	$49M	$88M	$17M–$34M
Multnomah Co. (pop. 756,530)	63M lbs.	$49M	$25.6M	$9.5M	$17M	$3.4M–$6.8M
Jackson Co. (pop. 206,310)	17M lbs.	$13.4M	$6.98M	$2.6M	$4.65M	$0.9M–$1.8M
Bend (pop. 79,109)	6.6M lbs.	$5.14M	$2.74M	$1M	$1.83M	$400K–$800K
La Grande (pop. 13,048)	1.1M lbs.	$848K	$441K	$163K	$294K	$59K–$118K

Table 6.1: Estimated Consumer Market for Chicken in Oregon.

The figures above are rough and very conservative for foodservice. These estimates account only for the resident population, and do not take into account spending by tourists, business travelers, or others who may be present or pass through. Further, consumer spending figures reflect household expenditures and thus do not account for purchases of chicken by entities such as schools, hospitals, nursing homes, or prisons. (These purchases are addressed in more detail below, where information is available.)

[75] "How Broilers Are Marketed," National Chicken Council, 2011.

[76] "Overview: Meat Price Spreads," USDA, ERS, 2015.

[77] Note: The ERS does not produce a farmgate price estimate since the large majority of producers are contracted to large poultry brands.

[78] For the purposes of this report, the estimates for wholesale opportunities are limited to fresh chicken (whole/parts). This is based on an assumption that the scale of production of alternative chicken must be increased before further processing of those chickens will be viable.

It should also be reiterated that the large majority of chicken consumed comes from lowest-cost commodity producer/processors. This has bearing on interpreting the scope of the implied wholesale opportunities referenced above. In reality, the opportunity for higher priced chicken with special attributes (pasture-raised, etc.) is only a fraction of the estimates provided—likely well under 10 percent.

6.4.2. Market Channels

Chicken makes its way from farm to market through a number of channels both direct and wholesale.

6.4.2.1. Direct Market

A growing number of small-scale farmers in Oregon are raising broilers. A good portion of that increase is likely due to the 2011 passage of the one thousand bird "On-Farm Sale Exemption," which allows small poultry producers without a state-licensed processing facility to process and sell their own fresh or frozen birds to consumers who come to the farm to make their purchase.

Farmers that do operate or access a state-licensed processing facility have additional opportunities to sell to consumers through farmers' markets, or direct to retailers and restaurants.

The primary limitations on growth of direct sale chicken are inconvenience and cost. Only a limited number of consumers will be willing or able to travel to a farm or farmers' market to make purchases. Birds are typically sold whole and may be frozen, adding to the inconvenience. A four-pound bird may also cost over twenty dollars, as much as three times the cost of a conventional bird sold precut in pieces in a supermarket.

Higher-end restaurants and grocery retailers are interested in procuring local, pasture-raised birds from farmers, but need assurances for quality, consistency, and predictable availability. Farmers selling to restaurants and retailers must also be able to manage without receiving the full price paid by consumers at the farm or farmers' markets. Currently, only a handful of Oregon farmers have both access to state-licensed processing and sufficient volume to serve restaurants and retailers successfully.

6.4.2.2. Processing/Manufacturing

There are few examples of food processors/manufacturers deliberately sourcing Oregon-grown chicken as an ingredient. This is due in major part to the lack of access to USDA-licensed poultry processing necessary for sale of finished products across state lines. The most notable example is Pacific Natural Foods (PNF), which has vertically integrated to ensure supplies for its line of packaged broths and soups. PNF helped restart a shuttered hatchery in Oregon to supply chicks for its own farm, and now raises a growing percentage of its own chickens and turkeys. PNF also owns Dayton Natural Meats, the only USDA-licensed poultry processor in Oregon, which handles about ten thousand birds a week for PNF's use. PNF managers report that

about 80 percent of their ingredients are certified organic, that 45 percent of their ingredients come from local sources, and that they would like to increase both percentages.

6.4.2.3. Retail

US Census County Business Patterns data indicate there were 763 grocery stores and 56 independent meat markets in Oregon in 2012. Many grocery stores are outlets of major chains, like Safeway and Kroger, which are likely too large to integrate smaller local chicken suppliers. However, there are also about 80 independent or natural food stores, including New Seasons Market (15 stores), Market of Choice (9 stores), Whole Foods Market (8 stores in Oregon), Zupan's (4 stores), and about a dozen cooperative grocery stores (such as People's Food or Oceana Natural Food), that may be interested in relationships with local suppliers.

One local multi-store retailer sells between thirty-five thousand and fifty thousand birds per week. Those birds come primarily from Draper Valley Farms (based in Washington), which is reportedly the only regional supplier capable of meeting the store's requirements and volume demand. Attributes sought include free-range birds, raised without antibiotics, Non-GMO Project Verified, fresh (not frozen) and preferably air-chilled (not water chilled) for better flavor. The stores buy both whole birds and parts.

In the past, the retailer has bought limited numbers of fresh, pasture-raised chickens from Kookoolan Farms (Yamhill, Oregon) and Botony Bay Farms (Brush Prairie, Washington) seasonally. The capacity of those farms to supply birds is the major limit on the relationship.

The store's meat manager describes a vision for procurement in the future in which stores would offer customers three tiers of options for chicken:

- A standard product from Draper Valley Farms, representing 60–70 percent of volume.
- An exclusive private label product, representing 30–40 percent of volume. Product in this line would come from source-identified farms that are members of a local or regional marketing group (like Country Natural Beef or Umpqua Valley Lamb). Chickens would ideally be pastured in season, and raised free range in barns during winter months.
- The store would also continue to support small local farms by offering branded whole birds, fresh in season.

Extrapolating this retailer's sales volume and vision of having about a third of chicken from identified local/regional farms across eighty independent and natural food stores, suggests there could be an annual market for as many as 4 million local ABF birds (about 16 million pounds total).

6.4.2.4. Restaurants

US Census County Business Patterns data indicate there were 3,974 full-service restaurants (not including limited service "fast food") and 123 catering

companies in Oregon in 2012. The top 10 percent may be considered "fine dining" and more likely to be engaged in procurement of local products (though primarily through wholesalers). However, it is clear that interest in local is widespread across the industry.

A 2014 National Restaurant Association survey on menu trends resulted in the following top three responses:

1. Locally sourced meats and seafood
2. Locally grown produce
3. Environmental sustainability

An earlier survey of members of Chefs Collaborative, a national network of more than one thousand chefs that support sustainable cuisine, also found significant support for local foods:

- 90 percent use locally grown food on their menus and in advertising
- 81 percent have purchased ingredients directly from farmers
- 34 percent purchase more than 50 percent of food from local sources

Even some fast casual restaurants, such as the regional Burgerville chain, are promoting local ingredients.

A 2008 feasibility study[79] for pasture poultry production and processing in Washington's Puget Sound region estimated restaurants would purchase twenty birds per week. Using that estimate for 397 Oregon restaurants (top 10 percent) suggests a market for 413,000 birds (about 1.7 million pounds total). This estimate is likely conservative.

6.4.2.5. Hospitals

Health Care Without Harm (HCWH) is an international environmental health organization that supports sustainable food procurement at hospitals and healthcare facilities, including sourcing of antibiotic-free chicken. A 2008 report[80] by HCWH indicated that 42 percent of 112 hospitals surveyed were buying some quantity of antibiotic-free poultry, and that another 47 percent had plans to start sourcing hormone- and antibiotic-free meat products.

A contributor to the report, the Oregon Center for Environmental Health, documented four Portland-area hospitals purchasing a total of 129,720 pounds of chicken in 2007, with 10–20 percent (13,000–26,000 pounds) from antibiotic-free sources.

Follow-on inquiries about food procurement by Oregon Physicians for Social Responsibility in 2009 and 2012 resulted in six detailed reports of chicken purchases from five Portland-area hospitals. Combined, the five institutions

[79] "Pasture Poultry Production and Processing Feasability in the Puget Sound Region," Bruce Dunlop, Cascade Harvest Coalition, 2008.

[80] "Menu of Change: Healthy Food in Health Care," Health Care Without Harm, 2008.

represent about 1,850 hospital beds and reported purchasing about 260,000 pounds of whole chicken and cut-up chicken parts annually (not including cooked, breaded, or other processed chicken).

Extrapolating from those five institutions to Oregon's 33 private hospitals and 6,008 total hospital beds, this suggests hospitals could represent a market for about 210,000 ABF birds (a total of 845,000 pounds).

With an additional 12,403 beds in Oregon's licensed nursing care facilities, there is potential for the health care sector's demand to be even greater.

Conclusions should be tempered with the knowledge that price remains a major consideration for foodservice in healthcare. If ABF chicken is available from large, conventional suppliers, the added value of local products from smaller-farm suppliers may not be enough to justify paying a price premium.

6.4.2.6. Schools and Colleges

School Food FOCUS is a national collaborative that is working with fifteen large school districts across the US (including Portland Public Schools and the Beaverton School District in Oregon) to make school meals nationwide healthier, regionally sourced, and sustainably produced, and has also made antibiotic-free chicken a priority.[81] Reported purchasing of chicken in 2011–2012 by the fifteen member districts totaled approximately $16 million.

In Oregon, approximately 24 percent of school food budgets are spent on local food—the highest percentage in the nation (USDA, 2014). Two large urban school districts (Portland Public Schools and Beaverton School District) have asked Ecotrust to help them procure regionally produced chicken raised without antibiotics. Schools, with limited budgets and limited ability to prepare fresh foods, offer an interesting procurement challenge.

In the 2013–14 school year, Portland Public Schools (PPS) purchased more than 320,000 pounds of chicken, of which just over 13,000 pounds was purchased locally. Procurement staff report that the district prefers to source dark meat, which is harder to overcook and holds well in warmers. They prefer drumsticks, which are lower-cost and a convenient means to meet a required two-ounce protein requirement for meals (one drumstick from a three to three-and-a-half pound bird contains approximately one ounce of lean meat). In 2013, PPS served chicken raised without antibiotics sourced from Oregon and Washington twice, spending $23,462 to provide two drumsticks with each meal—about one dollar per serving (estimate: two dollars per pound). Portland Public says it would consider serving local drumsticks monthly if costs were lower. While thighs are potentially more expensive, they have higher yield, less waste, and can also be used in more menu items. If boneless thighs (whole muscle only) were available at the right price, local chicken could be served weekly.

[81] "Collaborative Across the Plate: Hatching New Ideas for Chicken," School Food Focus, (n.d).

Beaverton School District reports that it is not currently sourcing any local, antibiotic-free chicken, but would be willing to feature it on menus two to four times per month depending on affordability. Beaverton officials quoted one dollar per serving (two drumsticks) as the maximum they would consider, saying a price of fifty cents per serving would be ideal.

A case study[82] published by School Food FOCUS describes procurement of over 500,000 pounds of fresh, local drumsticks by St. Paul and Chicago Public School Districts, with costs quoted as low as twenty cents per serving (estimate: eighty cents per pound). Jeffco Public Schools in Colorado has also reported serving local ABF drumsticks once a month at a cost of forty-four cents per pound.

Portland Public Schools has enrollment of about 46,000 students, serves 21,000 lunches daily, and provided 11,500 servings of chicken in each of the two lunches in 2013 referenced above.

Extrapolating to the 567,000 students enrolled in districts across Oregon suggests 141,750 total servings of chicken would be required each time chicken was served. If local ABF chicken was featured twice per month during the school year, that suggests a need for 2.6 million servings equating to 5.2 million drumsticks (2.6 million birds for drumsticks or about 300,000 for 1.2 million pounds of equivalent).

Extending that same scenario to the approximately 190,000 students enrolled in Oregon universities and colleges suggests a need for at least another 400,000 pounds of chicken per year.

6.4.3. Demand Summary

Combining the estimates provided above for retail, restaurants, hospitals, and educational institutions suggests there is potential demand in Oregon for over 5 million broilers (over 20 million pounds of raw, whole, or cut-up chicken) that offer a combination of desired attributes including: local, antibiotic-free, free-range, or pasture-raised. This represents about 6 percent of the chicken that is consumed in Oregon each year.

The approximate breakdown by channel is as follows:

Retail:	80%	(~16 million lbs.)
Restaurants:	9%	(~1.7 million lbs.)
Hospitals:	4%	(~850,000 lbs.)
Schools and Colleges:	7%	(~1.6 million lbs.)

As noted above, it is important to keep in mind that large commercial entities already offer at least one of the desired attributes and that the market is not wide open. The next section explores chicken production in Oregon and the state's ability to meet this demand.

[82] "Why Can't Schools Simply Cook a Chicken," School Food Focus, (n.d.).

6.5. Oregon Chicken Production

Oregon is not considered a major producer of chicken. The 2012 USDA Census of Agriculture[83] shows there are a total of 578 farms in Oregon raising broilers or other meat type chickens. The number of farms raising meat chickens has increased 45 percent since 2007 (from 395).

A total of 487 Oregon farms reported sales of broilers in 2012, with a combined total of 22,789,036 birds sold. (This is actually a 7 percent decline since 2007—1.8 million fewer birds sold.) Oregon Agriculture Information Network data show the farmgate value of broilers sold in 2012 as $68 million or an average of $2.98 per bird.

All told, Oregon farmers produce enough broilers to satisfy 28 percent of Oregon chicken consumption. However, as will be discussed in more detail below, almost all chickens produced in Oregon are shipped for processing out of state, with a good percentage of final products likely marketed out of state as well.

Oregon chicken farms are concentrated in Clackamas (77), Yamhill (57), Marion (45), Linn (39), Lane (34), and Washington (29) counties. These six counties contain 58 percent of farms reporting sales of broilers. Map 6.1 shows the value of chicken broiler sales by county.

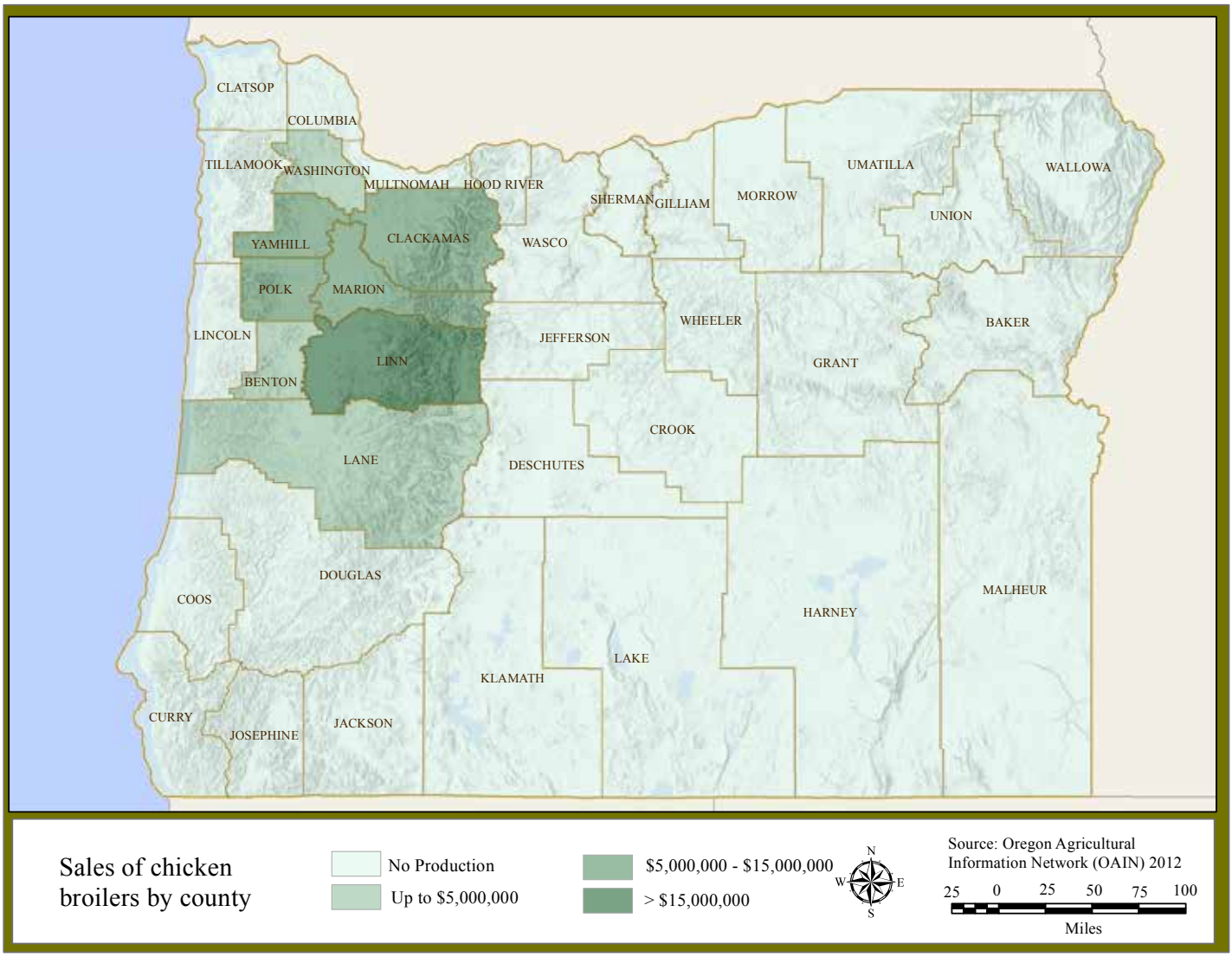
Of all farms reporting sales of broilers, 95 percent sold fewer than 2,000 birds (463 farms). Most are likely operating under the 1,000-bird processing exemption and so represent fewer than 450,000 birds total (1.8 million pounds at an average retail weight of 4 pounds per bird or 0.5 percent of Oregon consumption).

Four farms reported sales between 2,000 and 15,999 birds. These operate under the federal 20,000-bird processing exemption[84] and represent fewer than 64,000 birds total (256,000 pounds or less than 0.1 percent of Oregon consumption).

No farms reported sales between 16,000 and 99,000 birds.

[83] "Poultry—Inventory and Sales," 2012 Census of Agriculture—County Data, (n.d.).

[84] Large poultry operations are required to have a Food Safety and Inspection Service (FSIS) inspector present, and have continuous bird-by-bird inspection, during slaughter and processing. Businesses/farms that slaughter or process less than twenty thousand birds/year can qualify for an exemption from this regulation although the poultry cannot be distributed across state lines.



Map 6.1: Value (farmgate sales) of chicken broiler operations by county, 2012.

Four farms reported sales between 100,000 and 499,999 birds. There were also 16 farms reporting sales over 500,000 birds. These 20 farms can be assumed to be contracted to large regional brands such as Foster Farms, and together produce the remaining approximate 22.3 million birds raised (89 million pounds or 27 percent of Oregon consumption).

Given the segmentation of the broiler industry in Oregon into very small or very large farms, it is worth examining how farms at the two ends of the spectrum operate.

6.5.1. Large-Scale Producer/Processor Profile

A 2005 OSU Oregon Agricultural Commodities[85] study characterized the state's poultry industry, noting that most broilers grown in Oregon are processed in Washington. Noted regional brands include Foster Farms (California, Oregon, Washington), Draper Valley (Oregon, Washington) and Petaluma Poultry (California).

Foster Farms is headquartered in California,[86] operates thirteen processing plants, and has annual sales of $2.4 billion. Foster Farms reports that it sources broilers from eighteen independent farmers in Oregon,[87] which are processed primarily in Kelso, Washington.[88] Foster Farms does offer an organic product line, and claims that it does not use antibiotics for growth promotion,[89] does not use medically important antibiotics, and that it is committed to expanding antibiotic-free production. Foster Farms is also certified by the American Humane Association.

Draper Valley Farms and Petaluma Poultry were purchased in 2011 by Perdue,[90] as part of the acquisition of the Coleman Natural brand. Perdue is the third largest poultry producer in the US, with annual sales of $3.1 billion. Perdue is also now reportedly the leading producer of organic and no-antibiotics-ever chicken,[91] and recently announced the elimination of antibiotics from its hatcheries.[92] Draper Valley reportedly sources chicken from about 25 Oregon and Washington farmers,[93] which are processed in Washington. Petaluma's production and processing[94] appears limited to California. Draper Valley and Petaluma both offer organic product lines and antibiotic–free "free-range" lines with birds that have outdoor access. Draper Valley also offers an antibiotic–free "natural" line with birds raised indoors. Both companies make "humanely raised" and "sustainably farmed" claims, but are not third-party certified.

6.5.2. Small Direct Market Producer Profile

In Growing Your Range Poultry Business[95] (available from ATTRA) most small poultry producers are described as earning from two dollars to three dollars per bird and making a small supplementary income. They are advised:

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85 "Oregon Agricultural Commodities," Oregon State University Extension Service, 2005.

86 "Top 100," Meat and Poultry, 2013.

87 Foster Farms.

88 Foster Farms.

89 Foster Farms.

90 "Perdue Farms Purchases Draper Valley Assests," Perdue, 2013.

91 Sustainable Food News.

92 "Perdue Foods Reaches Milestone in Reducing Antibiotic Use, Sets Standard for Responsible Use," Perude, 2014.

93 "Draper Valley Farm" Helena Schweigert, Life Source Natural Foods, 2001.

94 Petulma Poultry.

95 "Growing Your Range Poultry Business, Livestock and Pasture," ATTRA.

"labor for a 1,000-bird-per-year enterprise is 20–22 hours per week over a four month production schedule, and the farmer can expect hourly earnings of about $10 per hour." A larger-scale 5,000-bird enterprise "would require 35–42 hours of work per week over a six-month production schedule. With a net income of $18,000, an experienced farmer could expect to earn about $12–$18 per hour."

The guide also advises that "producers who process on-farm and direct market often see a real limit to the amount of birds they would even want to produce since it is a very labor-intensive enterprise," suggesting that one thousand birds is a practical limit for most farmers with diversified operations.

Farmers attempting to raise and market chicken on a larger scale must find access to commercial processing or invest resources to develop their own processing capacity. A 2011 High Country News article[96] profiling several small Oregon chicken farmers and their challenges with processing makes clear this can be difficult.

6.5.3. The Missing Middle

A major challenge to increasing production of alternative chicken in Oregon is a lack of midsized farms suitable to develop a brand and serve local and regional markets. Oregon simply does not have a midsized poultry company within the range between White Oak Pastures in Georgia (that processes 200,000 birds/year) or TFC Poultry in the upper Midwest (that processes 1.4 million birds/year).

What would be necessary to recreate the missing middle? Can existing small poultry producers can grow into that space or aggregate production to serve that role?

[96] "Small Poultry Farmers Grapple with Lack of Slaughterhouses," Carla A. Wise, High Country News, 2011.

6.6. Oregon Poultry Processing

Processing capacity is frequently referenced as an infrastructure gap and a barrier to the development of more midsized farm and food businesses. Federal law requires that poultry be processed at a federally inspected facility to be sold as human food. However, there are exemptions that allow processing of birds sold within the state of Oregon under a state license or even without a license:

Very small producers are allowed to process up to one thousand of their own birds for sales direct to consumers, at the farm, with minimal facilities and in open-air conditions, without meeting the facilities requirements for a state license.
Producers with a state license may process up to twenty thousand of their own birds. Within that limit, those with an accompanying "small enterprise exemption" may also buy birds, process them, and sell them back to the original owner for marketing.
Multiple producers can also share access to a state licensed mobile processing unit, processing up to twenty thousand birds per farm per year.

Growing Your Range Poultry Business[97] and case studies from the Niche Meat Processor Assistance Network[98] and other sources suggest processing infrastructure development options at a variety of scales.

Production Unit	# of birds	Processing Facility	Low Cost	High Cost
Single Farmer	<5,000	Basic open-air on-farm	$5,000	$10,000
Multiple Farmers	<5,000	Trailered open-air on-farm unit	$8,000	$15,000
Single Farmer	>5,000	Larger contained on-farm	$20,000	$40,000
Multiple Farmers	<25,000	Basic contained mobile unit	$50,000	$70,000+
Multiple Farmers	>25,000	Larger contained mobile unit	$70,000	$100,000+
Any	30,000-50,000+	Higher capacity built facility	$75,000	$250,000+

Table 6.2: Poultry infrastructure at a variety of scales.

A closer examination of these options and currently available processing capacity follows.

[97] "Growing Your Range Poultry Business, Livestock and Pasture," ATTRA, (n.d).

[98] "Niche Meat Processor Case Studies," Extension, 2014.

6.6.1. On-Farm Processing Under the One Thousand Bird Exemption

Growing Your Range Poultry Business[99] estimates on-farm processors can handle 10 birds per person per hour from kill to chill, excluding set-up and cleanup time and packaging.

Cascade Pacific Resource Conservation & Development (RC&D) has established a model small poultry operation at the Berggren Demonstration Farm[100], including an on-farm, open-air processing system. Costs for processing equipment broke down as follows:

Table 6.3: Costs for equipment at Cascade Pacific RC&D

Item	Cost
Featherman 'Set-Up Special' (Killing cones, stand, scalder, plucker)	$3,580
Propane tank for scalder	$18.99
Plastic waste water barrel	$10.95
Sump pump & plumbing fittings	$159
Boxes for holding birds	$16 for materials
Steel top for eviscerating table (custom)	$290
Folding table	$40
EZ-Up canopy	$110
Knives (6)	$12.95 each
Chill tanks/coolers (2)	$120 each
Vacuum sealer	$120
Scale	$300
TOTAL	**$4,803.64**

Cascade Pacific RC&D also advises that farmers interested in processing will also need:

- **Certified potable water supply:** Estimate five gallons of water per bird used while processing.
- **Cooling methods:** Ice, a refrigerator, and a freezer as needed.
- **Hand-washing/sanitation methods:** a three-bucket sanitizing system (wash/bleach/rinse) for tools; soap, warm water, and paper towels for hand washing.
- **Waste disposal methods:** There will be offal and wastewater (from the scalder and evisceration process). At Berggren Farm offal is composted and wastewater is pumped onto fields.
- **Insurance:** Check whether poultry processing is an activity covered under your policy.

Cascade Pacific RC&D has a truck and trailer and can transport its on-farm processing set-up to other locations. They charge a modest rent of $25 for 24

[99] "Growing Your Range Poultry Business, Livestock and Pasture," ATTRA, (n.d).

[100] "Mobile Poultry Processing Unit," Berggren Demonstration Farm (n.d.).

hours, plus a subsidized mileage rate of $0.25 round trip. Renters must also complete an initial training ($20) and pay a $250 deposit for damage/cleaning.

6.6.2. Processing Under a State License

There are options for state licensing of both mobile and fixed slaughter and processing units.

6.6.2.1. Mobile Slaughter and Processing Units

Two Oregon farmers have collaborated to introduce the state's first licensed mobile poultry processing unit. Oregon Mobile Poultry Processing,[101] based in Philomath, offers custom and state-licensed poultry processing in the Willamette Valley. The unit is contained in a 33-foot trailer, with a fold-down metal platform that creates a 128-square-foot "kill floor" outside the trailer. This helps keep the interior processing space clean. The owners estimate they have the capacity to process as many as 500 birds per day. Cost to process birds appears to vary depending on number, but should be close to $3.50 per. Costs to build the Oregon Mobile Poultry Processing unit were not disclosed. However, case studies from other states and prefabricated units available for sale suggest that mobile units can range from a low of $8,000–$10,000 for an open air system on a 10-foot trailer, to $50,000 for a basic enclosed system in a 23-foot trailer, to $70,000–$100,000 for a higher capacity enclosed system in a 32-foot trailer.

Growing Your Range Poultry Business[102] suggests that mobile processing units offer a way for producers to start small and share equipment costs, while ironing out production problems and developing markets. Thus they can be a step towards preparing an individual or group to make the investment to build a brick and mortar processing facility, when justified by proven market demand for higher volumes of product.

6.6.2.2. Fixed Slaughter and Processing Units

Farmers who raise from five thousand to twenty thousand birds each year may find it cost effective to build processing facilities that meet state licensing requirements.

In 2013, the **Oregonian**[103] reported there were twenty state-licensed poultry processors. These included a number of farms processing only their own birds, such as Walker Farms in Siletz (4,000 birds/year), Kookoolan Farms (9,000 birds/year), and Afton Fields Farm (10,000 birds/year). With these smaller volumes, owners and their families likely provide a significant portion of the processing labor required.

Only a handful of state-licensed facilities in Oregon actually offer processing to independent farmers. These include:

[101] Provenance Farm.

[102] "Growing Your Range Poultry Business, Livestock and Pasture," ATTRA, (n.d).

[103] "Small Oregon Chicken Farmers See Surge in Demand with Salmonella Outbreak Tied to Foster Farms," Lynne Terry, The Oregonian, 2013.

- B&K Natural Farm near Sutherlin. $3.50 per chicken.
- Harrington's Poultry in Boring. $3.50 per chicken <5pounds; $4.50-$5.50 for larger birds.
- Mineral Springs Poultry near Willamina. $3.48 bagged whole or $4.08 cut and wrapped on a tray.
- Scio Poultry Processing near Scio. $5.25 per chicken <7pounds; $5.85 for larger birds.

Costs to construct processing facilities vary depending on size and processing capacity.

At Afton Field Farm, Tyler Jones built his own simple state-licensed butchering shed,[104] with concrete floors, large windows, and a clear plastic roof. He estimates he spent between $20,000 and $25,000 on building materials and equipment for the shed.

However, costs for a state-licensed on-farm processing facility could easily reach $40,000, and costs for a stand-alone processing facility serving multiple farmers could easily top $100,000.

6.6.3. Processing Under a USDA Federal License

Dayton Natural Meats is currently the only USDA-licensed poultry plant in Oregon[105] and processes ten thousand birds a week—almost exclusively for its parent company, Pacific Natural Foods.

Scio Poultry Processing did offer USDA processing briefly, but reverted to a state license in 2011 due to lack of demand for higher cost USDA processing on the part of client farmers. Bernard Smith of Full of Life Farm in St. Paul, Oregon, was quoted in **High Country News** saying that processing his 4,000 broilers under USDA license at a cost of $1.50 per pound priced him out of the market, and left him with 2,500 chickens in the freezer that could not be sold at a profit.

In 2013, Little Farms Inc. (Goldendale, Washington) built a new facility that complies with USDA requirements for $110,000 (not including the cost of the land).[106] That facility is capable of processing two hundred birds per day, but is reportedly underutilized. It currently also operates under a state license as owners do not see enough demand for USDA processing.

A 2003 small-scale poultry-processing guide[107] available from ATTRA offers a case study of a 2,500 square foot plant capable of processing 500 birds per day constructed at a cost of $120,000 (not including cost of land) and suggests that a plant capable of processing as many as 5,000 birds per day could be

[104] Photos of Processing, Afton Field Farm.

[105] "Q&A with Chuck Eggert," Hannah Wallace, Oregon Business, 2014.

[106] "Pluck 'N Grit: Getting a Small Poultry Processing Facility Off the Ground," Honest Meat, 2013.

[107] "Small Scale Poultry Processing," ATTRA, 2013.

constructed for less than $500,000. The guide estimates that experienced crews in a small processing plant can process 15-plus birds per person per hour, excluding setup and cleanup time and paperwork.

6.7. Support Infrastructure for Poultry

Beyond processing capacity, it is important to consider other support infrastructure necessary for production and marketing of chicken. Oregon faces a number of infrastructural challenges to the development of midscale chicken production and the development of local and regional chicken brands.

6.7.1. Hatcheries to Supply Chicks

Many commercial chicks come from hatcheries in the midwestern and southern states, where chicken production is centralized. However, Oregon does have a few independently operated hatcheries. Many, such as Winn's Livestock and Hatchery (Corvallis, Oregon), appear focused on supplying small numbers of specialty poultry to backyard enthusiasts and for show. However, Jenk's Hatchery in Tangent, Oregon, is a family-owned company that supplies Cornish Cross and Red Ranger chicks for small farmers. Cornish Cross chicks range from $1.35 to $1.15 apiece (for less than 50 and greater than 100 chicks), with additional price breaks for orders over 350. Red Rangers are $2.45 to $2.10 apiece.

The relatively high cost of chicks raised in Oregon is a concern. A 2008 feasibility study[108] for pastured poultry in Puget Sound estimated a $1.08 chick purchase representing 14 percent of expenses (not including labor) to deliver a bird for processing.

6.7.2. Feed Suppliers

Feed is the largest input cost for chicken. A single chicken can consume 10 pounds of feed[109] over a 7-week rearing period, more for slower growing varieties. The 2008 feasibility study[110] referenced above estimated feed costs between $0.20 and $0.30 per pound, with the cost of feed at the higher end of the scale representing 60 percent of expenses (not including labor) to deliver a bird for processing. Prices for Organic Certified or Non-GMO Verified feeds will be even higher.

CHS/Kropf operates a feed mill in Harrisburg, Oregon, which manufactures and distributes bulk and bag conventional and organic feeds. Other local companies include Haystack Farm and Feed, Cascade Feeds, Union Point Custom Feeds, Rogue Quality Feeds, and others. Ingredients for feeds from these companies may or may not come from Oregon farms.

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[108] "Pasture Poultry Production and Processing Feasability in the Puget Sound Region," Bruce Dunlop, Cascade Harvest Coalition, 2008.

[109] "How Much Will My Chicken Eat?" Jacquie Jacob and Tony Pescatore, University of Kentucky, Cooperative Extension Service, 2012.

[110] "Pasture Poultry Production and Processing Feasability in the Puget Sound Region," Bruce Dunlop, Cascade Harvest Coalition, 2008.

6.7.3. Poultry Barns and Cold Storage

One challenge for smaller-scale chicken producers is that pastured poultry is a seasonal product, with production and fresh chicken available from April to October. Other times of the year, farmers either sell frozen product or have no inventory.

A 2005 OSU Oregon Agricultural Commodities[111] study noted freezing capacity for chicken products in Oregon is quite limited. US Census County Business Patterns data[112] shows there were only twenty-one companies offering refrigerated storage services in Oregon in 2012. Food safety requirements for segregation of products will further limit access to those facilities by poultry farmers.

Costs to build dedicated cold storage facilities may have to be considered. The alternative is construction of climate controlled poultry barns to enable year-round production. This offers benefits for processors, who can then operate throughout the year, and to some end consumers, who may prefer fresh product. However, there may be marketing challenges if the use of poultry barns is perceived as a recreation of the existing commodity production system.

6.7.4. Distribution

Smaller local or regional chicken producers are unlikely to see their products carried by large broadline distributors such as Food Services of America or SYSCO. Once some scale is achieved, there may be opportunities to work with associated businesses, such as Fulton Provision Company (owned by SYSCO). However, there are some smaller, specialty distributors that may offer more immediate support. These include companies like SP Provisions, Nicky USA (which has actually bought land and a USDA-licensed mobile processing unit to be able to raise, process, and distribute its own small animals), Eat Oregon First, and Corfini Gourmet (based in Washington).

6.8. Rebuilding the Missing Middle: Two Paths

There appear to be at least two paths to developing midscale production and marketing businesses in Oregon to meet demand for high quality, differentiated, local chicken. The first is a bottom-up farmer entrepreneur model exemplified by Greener Pastures Poultry—a once lauded but now closed Oregon company. The second is a top-down processing and marketing business exemplified by a proposal outlined by Pacific Natural Foods, which uses a hub and spoke approach to coordinate production of birds by a large number of small, independent farmers.

6.8.1. Farm Entrepreneur Model: Greener Pastures Poultry

Aaron Silverman started raising chickens as a side business on his twenty-acre vegetable farm outside Corvallis. He had relationships with chefs, was already selling produce to restaurants, and was hearing significant demand for

[111] "Oregon Agricultural Commodities," Oregon State University Extension Service, 2005.

[112] "2012 County Business Patterns (NAICS)," CenStats, US Census, 2012.

pasture-raised chicken. He started with two thousand birds, processing them on-farm. Then in 2001 as the business started to grow, he leased a shuttered 1950s-era, red-meat processing plant, put $20,000 into renovating the building and $40,000 into equipment, and launched Greener Pastures Poultry (GPP). The facility was not ideal for poultry processing, but could handle as many as 500 birds a day. Aaron increased his own production to 13,000 birds, and began coordinating with three other farmers to supply birds. He processed two days a week during the field season, stockpiling product and selling frozen chickens in the winter. Sales to restaurants, at a farmers' market, and then to New Seasons Market reached 20,000 birds. However, the business was only marginal at that level. Aaron estimated that GPP needed to be able to process at least 120,000 birds a year to be sustainable, but doing so would require opening a USDA-licensed processing plant. GPP closed its doors in 2006 when Aaron was unable to identify and attract a manager with the skill and experience to operate a USDA plant, and then, as a result, could not secure the funding to build it. Before the closure, GPP was studied intensively as a model for new farm businesses, including in this report by Washington State University.[113]

In an interview after the closure, Aaron cited a number of lessons learned from the experience, including:

- There is significant demand for pastured poultry.
- However, as a small business owner trying to raise chickens, coordinate production by other farmers, manage processing and packaging, as well as market and deliver product, he exhausted himself. He needed more ability to delegate parts of the enterprise.
- It was extremely difficult to attract and retain employees in the processing plant when operating only seasonally. This added recruitment and training costs, and required more constant oversight.
- The gap from twenty thousand birds processed under state license to the number of birds necessary to justify a USDA-licensed facility is very large.

(Note: With an enterprise of this type, ability to manage manure and processing wastes may also become important. On very small, diversified chicken farms, wastes can be composted, used as fertilizer, and provide an economic benefit. As the number of chickens surpasses the acreage available to absorb nutrients safely, disposal of manure and waste becomes a cost and environmental risk.)

6.8.2. Processing and Marketing Business Model: Pacific Foods

Chuck Eggert, the owner of Pacific Natural Foods and Dayton Meats, has proposed a different approach to the challenge. Chuck envisions a system more like the 1950s, when a large percentage of chickens were still raised on small family farms. Those farm families might have raised fewer than one thousand birds over the course of a year for their own consumption and for

[113] "Marketing Quality on Creative Growers' Farms," Rural Roots and the University of Idaho Research Team, 2005.

supplemental income. With a distributed network of independent small farms clustered around central processing nodes, which are in turn owned by a processing and marketing company, Chuck believes he can deliver a small, but reliable income to farmers, better quality of life for a growing number of chickens, and a unique, high-quality product in volume for wholesale. Under this system, an independent small farm, like Champoeg Farms (outside St. Paul, Oregon), would allocate land and invest in mobile broiler houses to move with the chickens from pasture to pasture. A second stage investment in small poultry barns could allow production to continue in winter months. The expectation would be that farmers could sell between one thousand and five thousand birds to the central processor in a season. **(Estimate: That effort might be expected to generate a profit of $1,000 to $2,000 per one thousand–bird unit.)** The processor might also provide chicks and feed, and specify production standards (humane treatment, no antibiotics, organic for some markets, etc.). For a plant that processes 120,000 birds per year, if each participating farmer raised 5,000 birds/year, there would need to be twenty-four growers in the cluster. Production schedules could be established to enable harvest of flocks in units to keep the plant in operation.

6.8.3. Analysis

Both paths are likely achievable.

The farmer-entrepreneur model requires a deeply committed individual, significant personal risk, and access to labor, management skills, and capital at key junctures. There is a learning curve, but the profitable growth of the enterprise directly benefits the farmer.

The processing and marketing business model brings with it management experience, and potentially easier access to staff, facilities, and resources. There is however a significant social challenge, organizing and coordinating the activities of many small farmers, and the revenue to individual farmers is modest.

6.9 Conclusions

Expectations coming into research for this report were that there was a shortage in regional supply of antibiotic-free chicken, and that processing capacity was a gap to be overcome to resolve that supply challenge. We found that there is robust demand for antibiotic-free chicken, and restaurateurs and retailers are interested in procuring more pasture-raised chicken. However, it appears that established large regional chicken producers like Foster Farms and Draper Valley are already well underway to meet demand for antibiotic-free, and offer free-range chicken, which addresses at least some of the impulse towards pasture-raised. This may be enough to satisfy much of the need that is currently being expressed.

There are likely opportunities to develop profitable enterprises around midscale production, processing, and marketing of chicken. However, processing capacity is not the only challenge and is likely not the largest challenge that will be experienced building those enterprises. Expansion

of existing small businesses or the launch of new businesses may indeed require investment in processing facilities, but a successful effort to redevelop "poultry of the middle" in Oregon will also likely hinge on factors beyond processing capacity, including:

- Ability to target specific end markets and be price competitive: There is likely a midpoint price opportunity to be struck between commodity broilers at retail at $1.29–$1.99 per pound and farm-direct broilers sold for closer to $6.00 per pound. It would be beneficial to further explore the potential and price sensitivity of markets for that midrange product. A case study below takes a deeper look at production costs, wholesale and retail costs, and consumer willingness to pay.

- Finding an appropriate basis for differentiation: With large-scale brands now marketing organic, free-range, and antibiotic-free chicken, smaller scale entrants to the market will increasingly have to differentiate based on other factors including product quality, authenticity (small farm story), and other production methods (pasture rearing, non-GMO feeds, higher levels of animal welfare, etc.). It remains to be proven what combination of attributes will have sufficient market appeal to justify a premium price.

- Organizing production: It is not clear that any of the existing small chicken farms are interested in and capable of growing significantly, or that groups of smaller farmers have discussed the development of cooperative marketing ventures. Coordination of multiple farms seems likely to be necessary to supply volumes to justify any meaningful investment in processing capacity.

- Access to skilled management: The number of people qualified to operate a USDA-licensed poultry processing plant is small.

- Access to labor: Farm work and meat processing are low paid, and can be strenuous, repetitive, unpleasant, and dangerous. Both farm and processing facility managers report challenges recruiting and retaining workers—especially if operations are seasonal.

6.10 Case Study: Toward a Profitable Supply Chain for Pastured Poultry

Given the variety of challenges faced by small and midsized poultry producers in Oregon, we further examined opportunities to develop profitable pasture-based production models. Although midscale production would have been more relevant to this report, "poultry of the middle" doesn't currently exist. Input data was available for pasture-based models of less than one thousand birds per year however, so we present this market analysis as an illustrative case study.

We conducted an in-depth analysis of the price competitiveness of pastured poultry, including production costs, wholesale/retail prices, and consumer willingness to pay. Results of that analysis are outlined below. In all cases, production costs for pastured poultry were found to greatly exceed those

of conventional chicken, meaning that producers must charge a significant premium on their product to break even. Efforts that focus on identifying more local and affordable types of feed, sources of chicks, and options for processing of birds (since these constitute the largest portion of production costs) are likely to benefit small poultry producers most and create opportunities for them to scale.

6.10.1. Introduction

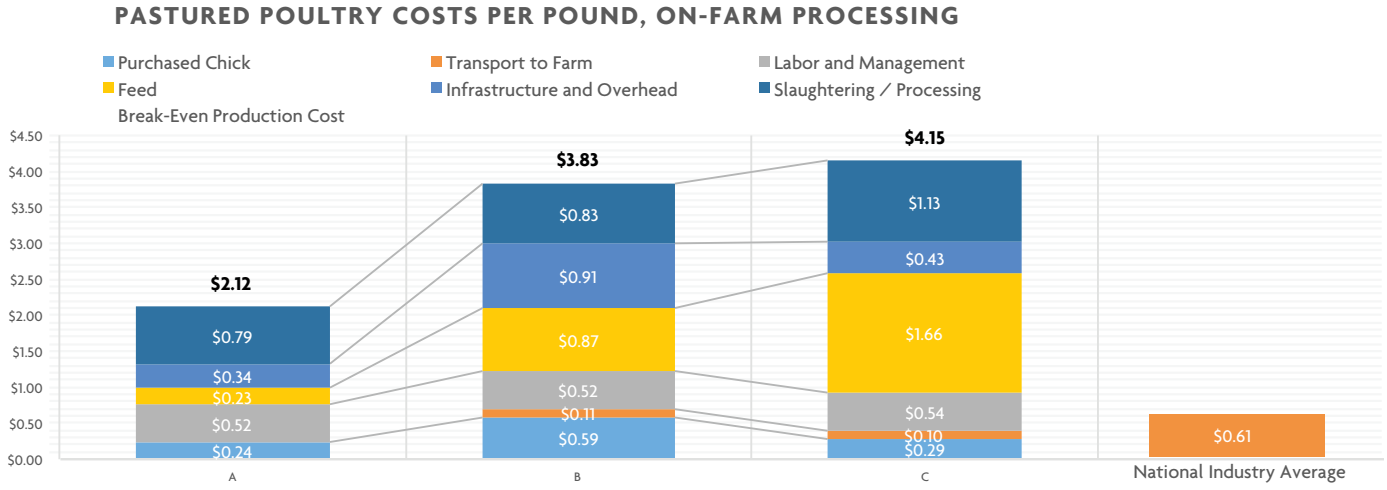
Consumers have demonstrated a willingness to pay a premium for attributes such as "free-range," "antibiotic-free," and "organic." However, such methods of growing poultry also bear with them higher production and processing costs in comparison to conventional production methods. As a result, the higher retail prices do not always ensure a sufficient income to the producer. To explore the potential for profitability in differentiated niches, we posed three top-level questions surrounding the production and marketing of pastured poultry:

1. What does it really cost to produce? What are the major factors that influence the cost?
2. What are realistic wholesale/retail margins? How are prices passed on from producer to consumer?
3. What are consumers willing to pay (WTP)? How do specific characteristics such as organic certification, no GMO feeds, and no antibiotics, influence consumers' WTP?

6.10.2. The Real Cost of Production

Figure 6.1 (below) presents three alternative estimates of per-pound production costs for pastured poultry, assuming on-farm processing. All three studies assume production scale of one thousand birds. These three estimates are compared to the national industry average farm gate price per pound for poultry as reported by National Agriculture Statistics Service (NASS) (NASS, 2015). Conventional chicken is processed predominantly off-farm; these four studies are thus not directly comparable at a disaggregated level.

Figure 6.1. Production costs per pound, pastured poultry with on-farm processing



The three studies presented in Figure 6.1 (above) rest upon different assumptions about the cost of purchasing chicks, feeding until maturity, and slaughtering/processing, as well as the post-processing ("dressed") bird weight, and mortality rate during the growth period.[114] Table 6.4 (below) highlights the principal assumptions of these three studies.

Four assumptions vary most dramatically: cost of purchased chicks, cost of feed, dressed bird weight, and mortality rate of the birds. It is not clear why the cost of purchased chicks is so much higher in Study B than Studies A or C: it may be due to regional or local price differences. Feed costs vary most dramatically. The cost of feed varies depending on its product attributes: for instance, organic certified feed produced without the use of GMO crops currently commands a market premium over conventional feed. [115]

Dressed bird weight assumptions also differ markedly, from a low of 3.75 pounds in study B to 5.0 pounds in study A. It is not clear why the dressed bird weight varies so dramatically. The difference may lie in the quantity of feed given to the birds.[116] Birds also differ in weight depending on their variety. A recent comparison of Cornish Cross (CC) and Cornish Cross Slow (CCS) hens (Painter at al., 2015) found that the average carcass weight of CC hens was 4.71 pounds while the average carcass weight of CCS hens was 3.5 pounds Clearly the dressed bird weight depends on the type of bird. The industry statistics provided by NASS (NASS, 2015) distinguish between light, medium, and heavy slaughter chickens. In 2013, light slaughter chickens averaged 3.28 pounds per bird live weight nationally; medium slaughter chickens averaged 5.92 pounds per bird, and heavy slaughter chickens 8.08 pounds per bird.

Mortality rate of birds ranges from 8 percent to 15 percent. In general, more experienced producers attain lower bird mortality rates. Ten percent is considered a desirable mortality rate (Kansas Rural Center, 2003). Data from small-scale producers collected by Heifer International (Fanatico, 1999)

[114] Study A represents the generic example given in the enterprise budget for pastured poultry developed by the Center for Integrated Agricultural Systems (CIAS) at the University of Wisconsin (Luening and Schuster, 2003a). Study B represents the budget example given for pastured poultry by the Kansas Rural Center (2003). Study C represents a modification of the CIAS budget to reflect the assumptions of several other studies (Kansas Rural Center, 2003; Roaring Fork Valley, 2014; Painter et al., 2015). All dollar cost estimates are updated to 2014 USD using the Producer Price Index (PPI) for commodity slaughter chickens (Bureau of Labor Statistics, 2015).

[115] Study A provides no information about the composition of feeds; it appears to be conventional feed. Study B uses a composite feed made of corn, soybeans, fishmeal, and other ingredients (see Table 6.4 below). Study B gives no information about the GMO or organic content of its feeds; it is assumed they include GMO ingredients and are not organic certified. Study C uses a locally sourced, non-GMO feed from Colorado.

[116] Study A uses standard Cornish Cross hens, a bird bred for size and fast growth, and assumes that the dressed weight is 5.0 pounds. Study B assumes the same birds, but makes the conservative assumption that the dressed weight is 3.75 pounds. Study C, a modified version of Study A, uses the assumption of 4 pounds per bird, borrowed from a study conducted in Colorado (Roaring Fork Valley, 2014) for which bird variety data is not available.

indicate mortality rates as low as 3 percent; however, mortality rate may rise with batch size due to crowding and less supervision.

Study Index	State	Year	Purchased Chick (2014$)	Feed $/ton (2014$)	Feed Type	Slaughtering $/bird (2014)	Processing Facility	Post-processing (dressed) bird weight	Mortality Rate
A	WI	2003	$1.20	$130	No information given; assume non-certified commodity feeds	$3.96	On-farm	5.00	8.00%
B	KS	2003	$2.22	$459	Composite feed including corn, soybeans, fish meal, nutri-balancers, aragonite, and kelp	$3.09	On-farm	3.75	15.00%
C	WI	2014	$1.15	$770	Assumption from Study D (below): locally sourced, non-GMO, reflective of Colorado (Roaring Fork Valley) prices	$4.28	On-farm	4.00	10.00%

Table 6.4: Key Assumptions of Pastured Poultry Production Cost Studies, On-Farm Processing

Scale matters for production costs. Both the Wisconsin study (Luening and Schuster, 2003a) and the Kansas study (Kansas Rural Center, 2003) assume an operation producing one thousand birds. In the case of the Kansas study, the birds are raised in five batches of two hundred birds each; in the Wisconsin study they are raised all at once. Smaller-scale studies often arrive at much higher average production costs. For instance, the Washington State study (Painter et al., 2015), which assumes an operation of seventy-five birds, derives a break-even price (production cost) of $5.20/pound for Cornish Cross hens, and $7.87/pound for Cornish Cross Slow hens. A study conducted by Heifer International in the US Southeast, by contrast, found per-pound production costs for small-scale pastured poultry (at seventy-five birds/batch) of as low as $1.75/pound in 2014 US dollars (Fanatico, 1999). The Heifer International studies, however, did not include labor costs, or the amortized costs of buildings including insurance, taxes, or other components of infrastructure or overhead costs, explained below. Infrastructure and overhead costs are two cost items that are not discussed extensively in this study, but are nonetheless significant in determining the costs of production.[117]

[117] There are three main components to these costs: fixed costs of buildings and equipment, variable operating costs of utilities and supplies, and labor costs. Fixed costs are calculated using what CIAS (2003) (Luening and Schuster, 2003b) call the "DIRTI" five: Depreciation, Interest, Repairs, Taxes, and Insurance. These five cost categories are used to calculate a Capital Recovery Factor (CRF), which is applied to the cost of the building or equipment, net of salvage value, to arrive at a per-year amortized cost estimate. Variable operating costs include utilities (electricity, water), bedding and other supplies, fuel, transport, medical, legal and accounting, and marketing. Labor costs can be paid directly as a wage, or imputed to cover the opportunity costs of family labor or other types of non-hired labor. Sometimes an imputed management fee is factored in as a percentage of revenues; the management fee thus depends on the expected price of the product (Luening and Schuster,

6.10.3 Wholesale and Retail Markups

What kinds of wholesale and retail prices are implied by the production costs in Figure 6.1 and Table 6.4 above?

Figure 6.2: below provides a range of possibilities based on the studies explained above. We assume a fixed dollar markup between industrially produced and pastured chicken.[118],[119]

Figure 6.2: also contains the national industry average farm gate price per pound of broiler chickens, $0.61/pound, as reported by NASS (NASS, 2015). Most industrially grown broiler chickens are produced on contract. The grower is provided with chicks, feed, fuel, and management supervision by an integrated poultry company, called an "integrator" in industry parlance. The grower supplies land, labor, housing, equipment, and operating costs. The integrator then purchases the broilers from the grower at a fixed price per pound of live (preprocessed) bird weight. This price is generally very low: for example, an Oklahoma State study gave $0.06/pound as an example (Doye et al., 2008). Broilers are produced in large-scale grow houses—the Oklahoma State example assumes a grow house capacity of 26,400 birds (Doye et al., 2008).

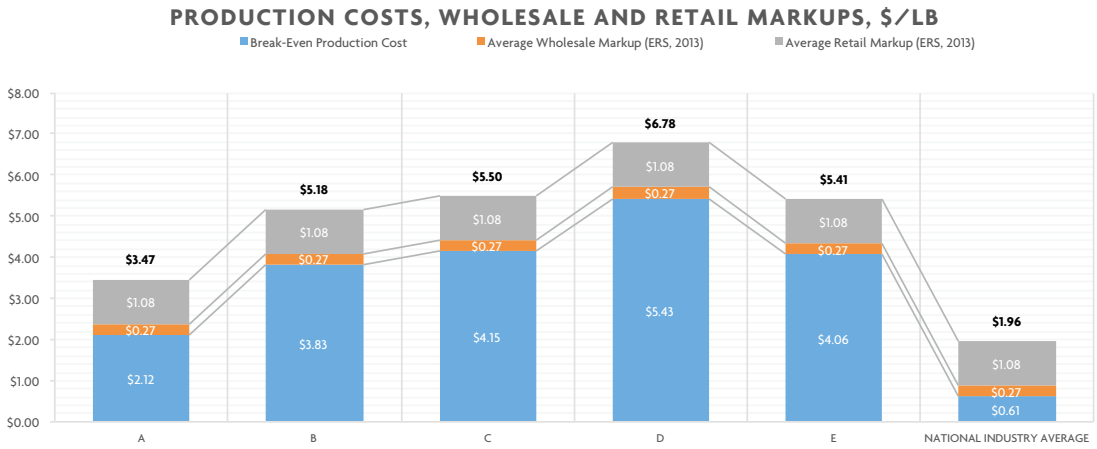


Figure 6.2: Pastured Poultry: Farm Production Costs, Wholesale and Retail Markups, dollar/pound.

2003a). The local farm wage is usually assumed to be the opportunity cost of family labor (Luening and Schuster, 2003b). Infrastructure and overhead costs vary considerably across farms, at different scales, and in different regions of the United States.

[118] Were we to assume a percentage markup, the retail prices of pastured poultry would become much higher (over thirteen/pound for Study C, for example).

[119] We estimate the wholesale markup by subtracting the average national farmgate prices received for slaughter chickens, as reported by NASS (NASS, 2015), from the average wholesale prices for slaughter chickens (broilers) reported by the USDA's Economic Research Service (ERS) historical time series data on price spreads (USDA, 2014). We use 2013 wholesale prices, since those are the latest data available. The same ERS data series (USDA, 2014) reports average retail prices and retail-wholesale price spreads for broilers. We use the 2013 data on average retail price spreads as our assumptions for Figure 6.2: above.

Figure 6.2: also contains estimates from two off-farm processing budgets, one from Colorado (Study D) (Roaring Fork Valley, 2014) and one from Kansas Rural Center (Study E) (Kansas Rural Center, 2003). These two budgets show that off-farm processing does not necessarily entail cost savings for the pastured poultry grower; it may even increase those costs (Study D), especially if the processing facility is located far from the farm, increasing transport costs. Assumptions from Studies D and E are given below in Table 6.4:.

Study Index	Location	Year	Purchased Chick (2014$)	Feed/ton (2014$)	Feed Type	Slaughtering $/bird	Processing Facility	Post-processing bird weight	Mortality Rate
D	CO	2014(?)	$1.15	$770	Locally sourced, non-GMO	$4.75	Off-farm, USDA inspected; processing covers slaughtering, cleaning, eviscerating, and packaging	3.85	-
E	KS	2003	$2.22	$459	Composite feed including corn, soybeans, fish meal, nutri-balancers, aragonite, and kelp	$3.94	Custom, off-farm processing	3.75	15.00 percent

Table 6.4: Key assumptions of pastured poultry production cost studies, off-farm processing

Retail Prices and Consumer WTP

Does reality match the projections given in the previous section? What is the actual retail price per pound of pastured poultry? What are consumers willing to pay for it?

Table 6.5 below provides five sample online retail price quotes for pastured poultry of various types, sourced from five different US states and regions (California, Virginia, Minnesota, New Jersey, and South Carolina). Online retail prices for pastured poultry range from $2.85 per pound in Virginia to $6.80 per pound in New Jersey. All prices refer to whole chickens only; prices of individual cuts, such as thighs, drumsticks, or boneless skinless breasts, tended to be higher. Each source cites slightly different, though overlapping, production systems. Two were certified organic; three claimed no antibiotics; four claimed non-GMO feeds. One (D'Artagnan) claimed to source from Amish and Mennonite family farms.

Business Name	Location	Production System	Price ($/lb.)
Grass Roots Meats/Petaluma Poultry (Grass Roots Meats, 2013)	California	Organic, free-range: no GMO feeds, no antibiotics	$4.99
Polyface Farm Buying Club (Polyface Farm, 2015)	Virginia	Pastured, no GMO feeds	$3.65
Local Harvest/Prairie Pride Farm (Local Harvest, 2015)	Minnesota	Pastured, no GMO feeds, no antibiotics	$6.49–$6.65
D'Artagnan (D'Artagnan, 2015)	New Jersey	Organic, free-range; non-GMO feeds, no antibiotics	$5.75–$6.80
Free Range Chicken (Free Range Chicken, 2015)	South Carolina	Free-range	$2.85–$3.08

Table 6.5: Pastured poultry for sale online: retail prices, dollar/pound whole chicken

6.10.5. Conclusion

Production costs for pastured poultry differ dramatically by feed type, scale of production, bird mortality rate, and average dressed bird weight. In general, "four dollars a pound" appears to be a reasonable rule of thumb in evaluating average per-pound production costs for small-scale (one thousand birds) pastured poultry. "Five to seven dollars a pound" appears to be a reasonable range of estimates in evaluating average retail prices. In all cases, production costs for pastured poultry greatly exceed those of conventional chicken. Not surprisingly, the retail price of pastured poultry also differs dramatically. Differences in production systems, certifications, feed types, and processing methods may also be compounded by systematic regional differences in production costs, labor costs, wholesale and retail markups, and consumer behavior. In particular, costs for feed, purchased chicks, and processing of birds constitute a large portion of production costs and are key determinants of the final price at retail. Efforts to address the high cost of these inputs are likely to benefit small producers and create opportunities for them to scale.

7

Beef

7.1. Introduction to the Beef Industry at the National Level

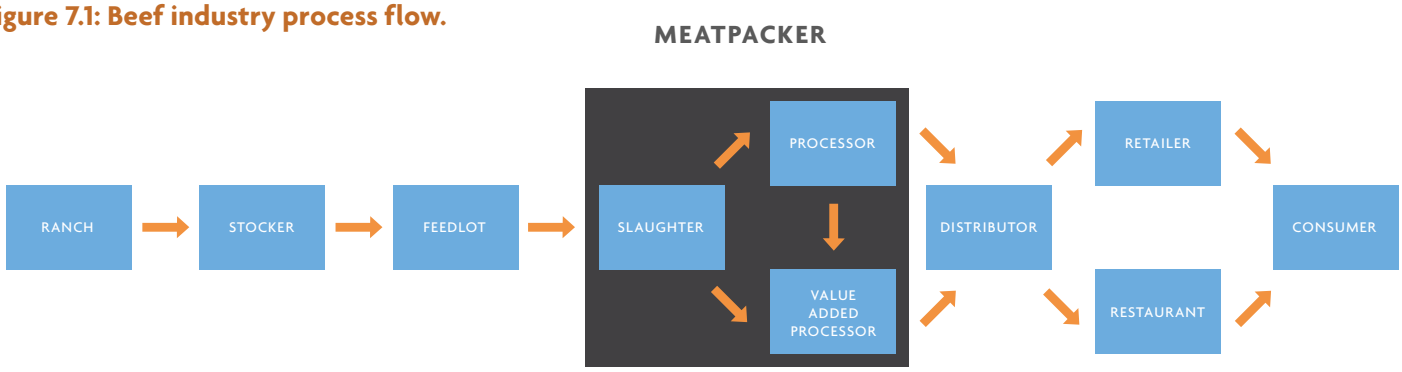
US consumption of beef[120] has been declining since the late 1970s. However, spending on beef is still higher than for other meats, and in 2013 per capita consumption was estimated at fifty-five pounds (retail weight).

Total US beef production[121] in 2012 was about 26 billion pounds. The National Agriculture Statistics Service estimated the value of beef cattle production in 2012 at $48 billion.[122]

7.2. Segmentation, Key Issues, and Trends

Over 90 percent of US beef is produced in a "conventional" system with three major stages.

Figure 7.1: Beef industry process flow.



In the first stage, producers managing "cow-calf operations" see new calves born in the spring, which weigh 70 to 90 pounds at birth. These calves stay with the mother cow on range or pasture until weaned after 6 to 8 months, at which time they weigh 500 to 600 pounds.

In the second stage, the calves are raised to weights of 600 to 900 pounds. The second stage may happen on the same farm/ranch, but weaned calves are often sold on to specialized "stocking" or "backgrounding" operations. Cattle in this stage still forage on grass or pasture, but often receive supplemental feeds over winter as forage quality declines.

In the final stage, "feeder" cattle are sold to feedlots, where they are kept for a period of 90 to 120 days and fed rations that may include a total of 1,800 pounds of corn and 1,200 pounds of sorghum, and/or other equivalent feeds. (Kuhl, Marston, and Jones 2002) Hormone treatments are used to enhance weight gain, including naturally occurring (Oestradiol, Progesterone, Testosterone) and synthetic hormones (Zeranol, Trenbolone, Melengestrol). Antibiotics or ionophores (an antimicrobial) are blended with feed to improve

[120] "Marketing Quality on Creative Growers' Farms," Rural Roots and the University of Idaho Research Team, 2005.

[121] Total Beef Production in the US from 2000 to 2012 (in billion pounds), Statista, 2015.

[122] "Meat Animals Production, Disposition, and Income Final Estimates 2008-20012," USDA, NRSS, 2014.

conversion efficiency and to manage the transition from eating grass to eating the "hot ration" of grain. Cattle are sent to slaughter when they reach a live weight of about 1,100 to 1,250 pounds.

The majority of cow-calf operators have fewer than 50 head. So the average producer may have fewer than 30 calves to sell each year, after accounting for replacement heifers, losses, and other factors, and those calves will be of both sexes and will weigh different amounts. This is problematic, because most cattle in transition between stages are sold though auction and small cow-calf operators are not able to offer cattle in uniform lots of sufficient size to receive best prices. According to the National Sustainable Agriculture Information Service (ATTRA 2006), buyers want feeder cattle grouped by weight and sex, and the optimum lot sizes are 50 to 55 head for a regular ring auction, and 240 head for a video auction.

There has been a significant consolidation in meatpacking. USDA figures show that since 2005, the four largest beef processors have purchased over 79 percent of steers and heifers brought to market. With consolidation, livestock slaughter facilities and processing have become larger and operate at greater speed. As a result of competition, many midsized and smaller slaughter and processing facilities have closed. Between 1998 and 2007, the number of USDA-inspected plants declined 18 percent and the number of state-inspected or custom plants declined 22 percent.
With fewer plants, independent cattle producers seeking to market their own beef have faced difficulty slotting animals for processing, as well as increasing costs to transport their animals, and often higher processing costs as well. Many large facilities have also simply refused to work with small producers due to difficulties segregating products and losses of efficiency processing small batches of animals.

Consumer interest in alternatives to "conventional beef" has been stoked by:

- Concerns for food safety:
  - Incidences of e-coli contamination and the "mad cow" disease scare.
  - Perceived and real risks from hormone and antibiotic treatments.
  - Campaigns by Physicians for Social Responsibility, Health Care Without Harm, and others to ban routine use of hormones and antibiotics in livestock.
- A belief that alternative beef products are healthier:
  - Research showing grassfed beef is lower in fat and may have higher levels of conjugated linoleic acid (CLA) and omega-3 fatty acids (ALA, EPA, and DHA), which may in turn have positive health benefits reducing risk of heart disease or cancer.[123]

[123] "Greener Pastures: How grassfed beef and milk contribute to healthy eating," Kate Clancy, Union of Concerned Scientists, 2006.

- Concerns for animal welfare:
  - Discomfort with conditions in feedlots, which may hold as many as 100,000 animals.
  - Well-publicized videos showing mistreatment of animals.
- Concern for the environment:
  - The positive effects of a grass-based system (less erosion, carbon sequestration) versus the chemical and energy intensive production of corn and other feeds for animals.
- Interest in unique, high-quality local foods and a desire to support local farm economies.

A 2008 survey of forty-two meat buyers representing distributors, retailers, and foodservice in California shows how one group of industry professionals ranked the importance of different attributes for niche marketing of meat.[124] Rankings are presented in Figure 7.2. Consistent size and shape, and year-round supply were top ranked attributes related to business opportunities (on a five-point scale). Taste, no hormones or antibiotics, health benefits, and humanely raised were the highest ranked value-added differentiators.

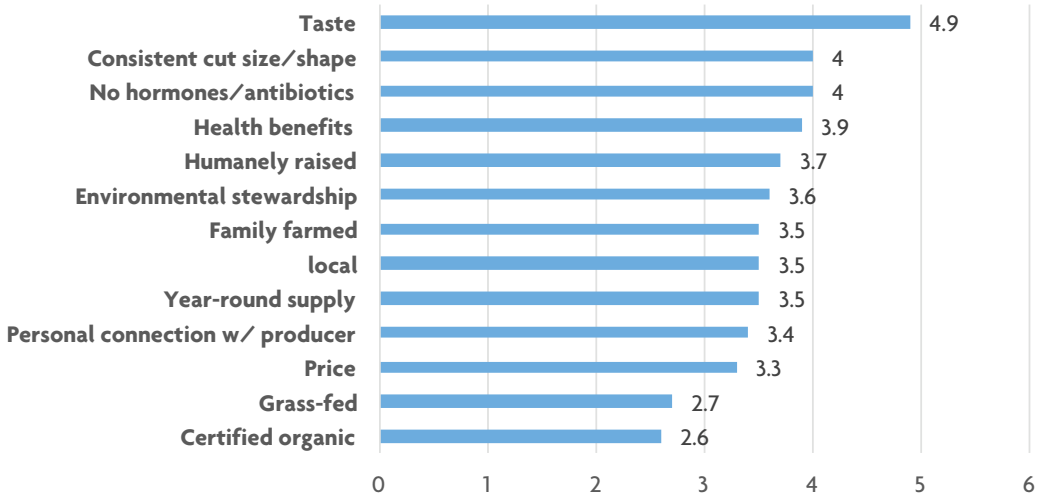


Figure 7.2: Importance of meat attributes according to wholesale meat buyers.

Alternatives to conventional beef discussed in this report include:

- Natural
- Organic
- Grassfed
- High animal welfare (Animal Welfare Approved, Certified Humane, Food Alliance, etc.)
- Local products from small and midsized farms offering one or more of the above attributes

[124] "Northern California Niche Meat Market Demand Study, " Lauren Gwin and Shermain D. Hardesty, University of California, Cooperative Extension, 2008.

7.2.1. Natural

As a marketing term, "natural" actually says very little about beef. The USDA has three requirements for use of "natural," which for beef all relate to handling of meat after the animal has been slaughtered—not to conditions under which the animal was raised:

1. The product must be minimally processed
2. It cannot contain any artificial ingredients
3. It cannot contain any preservatives

Most conventionally produced fresh beef meets these minimum requirements if it has not been packed with a marinade, tenderizer, or other ingredients. However, companies marketing branded beef (Coleman Natural, Niman Ranch, Laura's Lean Meats, etc.) typically have their own additional, internal program requirements. These can include:

- No use of hormone implants
- No antibiotics ("never ever"—with animals treated for health reasons sold conventionally)
- Limited antibiotic use ("not recently" —with antibiotics prohibited for a period prior to slaughter)
- No feed containing animal protein or fat (often with allowances for milk)

These companies may also make humane animal handling claims, though criteria for those claims may not be public or may not be clear. Verification of requirements and claims also often happens internally, without the involvement of an independent auditor, and sometimes only with submission of affidavits.

7.2.2. Organic

"Organic" is regulated by the USDA and requires a third-party audit. USDA certified organic beef must come from cattle raised in compliance with the standards from the last third of gestation to slaughter.

- Feeds must be certified organic. Vitamin and mineral supplements must be approved.
- Forage must be grown without the use of synthetic fertilizers, herbicides, or pesticides.
- Genetically modified (GMO) feedstock and forage are prohibited.
- Cattle must have access to pasture and in season 30 percent of their diet must come from foraging.
- Use of growth hormones or antibiotics is prohibited.
- Animals must also be slaughtered and processed under USDA certification.

It is not typically practical for cattle raised in the West on rangeland to be certified organic, particularly if cattle are grazed for any period of time on public land. The rangeland acreages are large, the drier climate means stocking rates are low, and in a public lands situation ranchers do not have the ability to guarantee that chemicals were not used for weed or fire suppression in areas

grazed. Access to irrigated organic pasture for better quality forage is limited. Supplies of organic feeds are also limited and quite expensive.

7.2.3. Grassfed

The USDA has published a definition of "grassfed," which applies to beef from cattle whose diet (with the exception of milk prior to weaning) is solely from forage and does not include grain or grain products. Cattle must have continuous access to pasture during the growing season. Hay, silage, crop residue without grain, and other roughage sources are acceptable feeds to supplement grazing. Process verification is also now required to approve new "grassfed" label claims.

However, there is still confusion in the marketplace about the term "grassfed." The USDA grandfathered a number of beef companies with existing "grassfed" label claims when it published its definition. As a result, there are a number of companies making "grassfed, grain-finished" claims—which are essentially a description of conventional beef production. These companies, like the natural beef producers above, often layer on internal requirements, including limits on use of hormone and antibiotic treatments.

The American Grassfed Association and Food Alliance also collaborated to publish their own standards for third-party certification of "grassfed" beef, which include strict limits on confinement of animals and explicit prohibitions on use of hormone and antibiotic treatments.

Managing a successful grassfed beef program can be challenging, particularly when producers are transitioning a conventional cow-calf operation. Cattle raised on forage grow more slowly and gain less weight than cattle finished in feedlots on grain. Grassfed beef is a seasonal product in the Pacific Northwest, with animals typically harvested in the fall at the end of the grazing season. So grassfed beef is sold frozen most of the year. Ranchers that overwinter cattle can harvest starting in late spring, but face additional feed costs and must have access to irrigated pasture for finishing. Ranchers used to selling stocking calves after 8 months may also face cash flow challenges holding over animals for another 12 to 18 months until they can be harvested, processed, and eventually sold to a consumer or commercial buyer.

Grassfed beef faces some consumer acceptance challenges, with perceptions that it can be dry, tough, or gamey. However, experienced ranchers tend to say these are not issues with good grazing and animal handling, or with meat placed in the hands of an experienced chef or home cook.

Domestic grassfed beef producers do also face competition with lower-priced import from countries that have lower land and labor costs.

7.2.4. High Animal Welfare

A 2014 survey of 5,900 US consumers by the American Humane Association reports that 95 percent of respondents described themselves as concerned about farm animal welfare. This and a number of other surveys show

consumers expressing willingness to pay premiums for humanely raised meat. A grain of salt is appropriate given competing studies showing promises failing to be fulfilled at the register.

There are conventional beef producers certified for animal welfare under one or another organization. It is common, however, to see animal welfare claims paired with natural, organic, or grassfed beef claims. Animal Welfare Approved, for example, is also the certifier for the American Grassfed Association label. There has also been a move by the Whole Foods Market natural grocery store chain to develop and promote its own standards and criteria for animal welfare, and to require audits of farms and ranches supplying meat for its butcher cases.

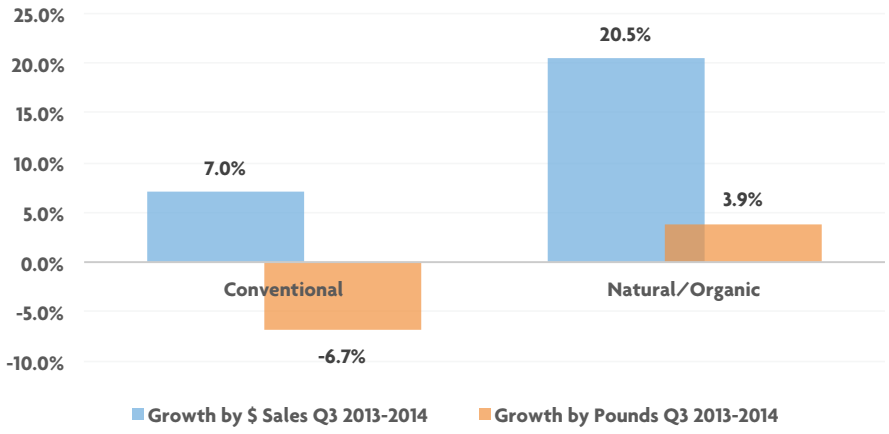
7.2.5. Local

The "local" segment of the market is represented by independent ranchers, often marketing direct to consumers or to commercial food buyers (retail, restaurants, food service), and by smaller regional brands (such as Painted Hills Beef).

7.2.6. Growth in Markets for Alternative Beef

The USDA Economic Research Service reported in 2012 that sales of alternative beef—including natural, certified organic, and grassfed—made up about 3 percent of the US beef market. ERS noted at that time that sales of alternative beef had grown at a combined rate of about 20 percent per year for the past several years.

Figure 7.3: Growth in conventional and natural/organic beef.



The graph above adapted from the National Cattlemen's Beef Association compares category growth for conventional and natural/organic beef. As of the third quarter of 2014, the association estimates that natural and organic beef now represents 6 percent of all US beef sales.

A 2008 niche meat marketing study noted that price premiums for niche meats (over conventional) depend on a variety of factors including the specific cut of meat, niche attributes, brand strength, and variability in conventional pricing

(with swings in the commodity market).[125] Premiums of 10–30 percent were observed to be common, and even higher for certified organic meats.

Price differences for conventional and alternative beef observed in Portland December 2014 include:

	Major Grocer	New Seasons Market	Deck Family Farm
Generic 80% lean ground beef	$4.46/lb.		
Natural 80% lean ground beef	$5.29/lb.	$5.49/lb. (Country Natural Beef)	
Grassfed 90+% lean ground beef	$6.99/lb.	$6.99/lb. (Country Natural Beef)	$6.75/lb.
Natural NY Steak	$8.99/lb.	$16.99/lb. (Country Natural Beef)	
Natural Rib Eye Steak	$11.49/lb.	$16.99/lb. (Country Natural Beef)	
Grassfed NY Steak	$17.99/lb.		$15.50/lb.
Grassfed Rib Eye			$21.50/lb.
Grassfed Tenderloin		$25.99/lb. (Unspecified NW)	

Table 7.1: Price differences for conventional and alternative beef observed in Portland, December 2014.

As with other products studied in this report, despite the potential to realize higher prices overall for differentiated products, midsized and smaller-scale farmers pursuing niche markets must earn a margin that enables profitability in spite of typically higher per unit production, processing and marketing costs.

7.3. Demand for Beef in Oregon

Understanding market demand is critical to evaluating potential investments to increase production and profitability of local and alternative beef.

7.4. Consumer Spending on Beef

According to the Bureau of Labor Statistics, the average household (2.6 persons) in the western US spent $7,180 in 2013 on food at home (59 percent) and away (41 percent) in 2013.[126] This includes $213 spent on beef for at-home consumption. The average price per pound paid for fresh beef at retail during that period was $4.43.[127] As noted above, US per capita consumption of beef is about 55 pounds.

In 2013, the split for sales of beef by weight was retail 39 percent (just under 5 billion pounds) and foodservice 61 percent (about 8 billion pounds). A look at BLS and industry reports on consumer spending suggests that dollars actually

[125] "Northern California Niche Meat Market Demand Study, " Lauren Gwin and Shermain D. Hardesty, University of California, Cooperative Extension, 2008.

[126] "Meat Animals Production, Disposition, and Income Final Estimates 2008-20012," USDA, NRSS, 2014.

[127] "Retail Beef Performance," FreshLook Marketing and USDA Market News, 2014.

spent on beef by consumers split a little differently, with 36 percent retail and 64 percent foodservice.

About two-thirds of beef in foodservice was purchased by restaurants (5.3 billion pounds), and of that total, 65 percent (3.5 million pounds) was purchased by limited service restaurants.

In September 2013, the USDA Economic Research Service listed fresh beef at the farm level at $2.64, wholesale at $2.96, and retail at $5.29.[128] This implies wholesale could average 56 percent of the final retail price.

A number of sources indicate foodservice ingredient costs average 30 percent of the final price, but can range lower or much higher depending on the type of establishment. Schools and hospitals may be seeking to keep food costs closer to 20 percent. Fine dining establishments may be comfortable with food costs reaching 40 percent or more with a priority placed on high-quality ingredients.

Using population data and the figures above, it is possible to form estimates of the consumer market for beef in Oregon, at the county level or for municipalities. **(See chart below.)** The estimates represent averages for all beef cuts. An estimated 60 percent of beef in the US is consumed in the form of ground beef. ERS reports show July 2014 retail prices for ground beef averaging $3.91/pound and a composite for all steaks of $7.00/pound.[129] Obviously, prices for premium steaks and roasts can go significantly higher. However, given that producers developing branded beef programs to target local and regional markets will have to find markets for all cuts, the average is worth considering.

Table 7.2: Implied wholesale opportunity for local beef.

Geographic Unit	Total Beef "Consumed"	Total Spending: Retail Beef for at Home	Implied Wholesale Opportunity (56)	Estimated Spending: Beef in Foodservice	Implied Wholesale Opportunity (20–40)
Oregon (pop. 3,919,020)	216M lbs.	$321M	$180M	$568M	$114M–$228M
Multnomah Co. (pop. 756,530)	42M lbs.	$62M	$35M	$110M	$22M–$44M
Jackson Co. (pop. 206,310)	11.3M lbs.	$17M	$9.5M	$30M	$6M–$12M
City of Bend (pop. 79,109)	4.4M lbs.	$6.5M	$3.6M	$11.5M	$2.3M–$4.6M
City of La Grande (pop. 13,048)	718K lbs.	$1.1M	$598K	$1.9M	$380K–$760K

The figures above are rough, and for foodservice likely conservative. These estimates account only for the resident population, and do not take into account spending by tourists, business travelers, or others who may be present or pass through. Consumer spending figures also do not account for purchases by entities such as schools, hospitals, nursing homes, or prisons that do not pass the cost of food directly to consumers. **(These purchases are addressed in more detail below, where information is available.)**

[128] "Overview: Meat Price Spreads," USDA, ERS, 2015.

[129] "Overview: Meat Price Spreads," USDA, ERS, 2015.

It should also be reiterated that the large majority of beef consumed comes from lowest-cost commodity producer/processors. This has bearing on interpreting the scope of the implied wholesale opportunities referenced above.

As noted above, industry figures are that natural/organic beef currently represents about 6 percent of the total beef sales.[130] Opportunities for local and regional beef producers to capture a share of that market or to push that percentage higher vary by marketing channel.

7.5. Market Channels

Beef makes its way from farm to market through a number of channels both direct and wholesale. A 2009 Oregon Department of Agriculture report on small-scale beef processing reported a representative of United Western Grocers saying there are two main beef suppliers to markets in Oregon. About 75 percent of products come from Tyson Fresh Meats. Another 24.5 percent comes from JBS/Swift (formerly ConAgra). About 95 percent of the meat is graded "select" (45 percent of that is black angus beef) and the rest is "choice."[131]

7.5.1. Direct Market—Custom Exempt

Ranchers with access to "custom exempt" slaughter and processing can sell "locker beef" directly to consumers—though technically they are selling whole live animals or shares of whole live animals (halves or quarters). Under state license, ranchers are not able to sell beef by the piece or by the pound.

As an example, Emerson Dell Farm in Wasco County offers customers halves or quarters at a "hanging weight" price of about $3.20/pound. A quarter share of a 715-pound to 825-pound beef carcass is $572 to $660. The resulting 85 to 90 wrapped packages containing approximately 100 to 120 pounds of meat fill half a 10-cubic-foot freezer.

Northeast Oregon Economic Development District conducted a beef marketing study in 2009 and determined that about 300 head of cattle were processed locally for bulk sales. They noted that significant work was involved for a rancher selling more than 5 to 10 head, and that there was competition for processing slots in the peak August–September season.[132]

Locker beef also requires a significant commitment on the part of the customer to make a large upfront purchase, and then store and make good use of a large quantity of meat, including less desirable cuts.

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[130] "Natural/Organic Share of Total Beef (Dollar, 4th Quarter 2014," Beef Retail Marketing, 2014.

[131] "Beef Processing: Is It for You?" Jerry Gardner, Oregon Department of Agriculture, 2009.

[132] "Product Development and Market Research for Beef and Lamb USDA Inspected Meat Products from Wallowa County," Northeast Oregon Economic Development District, Wallowa Resources, and USDA Rural Development, 2009.

There may be 10,000 head of cattle being produced for ranchers' own use or sold as locker beef in Oregon, representing 4,800,000 pounds of wrapped beef (at an average yield of 480 pounds per animal). If accurate, that figure represents 2 percent of the beef consumed in Oregon.

Given challenges at the ranch, processor, and consumer levels, it is difficult to imagine sales of locker beef increasing dramatically in the near future—though that would be a very desirable outcome. Regardless, there is an argument for promoting and educating consumers about the benefits of locker beef.

7.5.2. Direct Market—Under USDA License

Ranchers with access to USDA-licensed slaughter and processing are also selling individual cuts of meat direct to consumer at farmers' markets, thorough buying clubs, and even online. Producers using USDA processing also have the option of selling product to distributors, restaurants, retailers, and institutions.

Selling individual cuts of meat has its own challenges, including inventory management, more complicated pricing, and the need to find viable markets for all parts of the animal.

Ranchers are also often in locations remote from both processors and end markets, requiring travel to deliver animals for processing, to develop and maintain relationships with buyers, and in some cases to actually fulfill ongoing orders for meat. There is also a lot of work involved in developing sufficient scale to be able to engage the interest of retail and foodservice customers, and ultimately enter distribution.

The Oregon Department of Agriculture reports that approximately thirty-five thousand head of beef were slaughtered in Oregon under USDA inspection in 2008.[133] The entities contracting and end markets for those cattle are not fully known. One might assume at least half were marketed in state. That would suggest a total of 8.4 million pounds representing 3.9 percent of the beef consumed in Oregon.

7.5.3. Processing/Manufacturing

There are few examples of food processors/manufacturers sourcing beef raised and processed in Oregon to be featured as an ingredient in products. This requires traceability to the ranch and access to USDA-licensed processing necessary for sale of finished products across state lines. More common are cases where entities like Truitt Brothers Inc. have sourced from regional beef brands like Country Natural Beef, with cattle pooled from multiple states and processed in both Washington and Oregon.

7.5.4. Retail

US Census County Business Patterns data indicate there were 763 grocery stores and 56 independent meat markets in Oregon in 2012. Many grocery

[133] "Beef Processing: Is It for You?" Jerry Gardner, Oregon Department of Agriculture, 2009.

stores are outlets of major chains, like Safeway and Kroger, which are likely too large to integrate smaller local beef suppliers, but do carry natural and organic products from multiregional and national companies like Coleman Natural Meats.

However, there are also about 80 independent or natural food stores, like New Seasons Market (15 stores), Market of Choice (9 stores), Whole Foods Market (8 stores in Oregon), Zupan's (4 stores), and about a dozen cooperative grocery stores (like People's Food or Oceana Natural Food), that may be interested in relationships with local suppliers.

Average sales of fresh beef per grocery store nationally are reportedly $17,923 per week.[134] That implies that the 80 independent stores in Oregon could be vending $74.6 million worth of fresh beef annually. Dividing that total by the average $4.43 price per pound paid by consumers for beef in 2013, indicates throughput as high as 16.8 million pounds—or about 35,000 head of cattle. Given the product mix and target demographic for those stores, the average price per pound is likely higher and the throughput correspondingly lower.

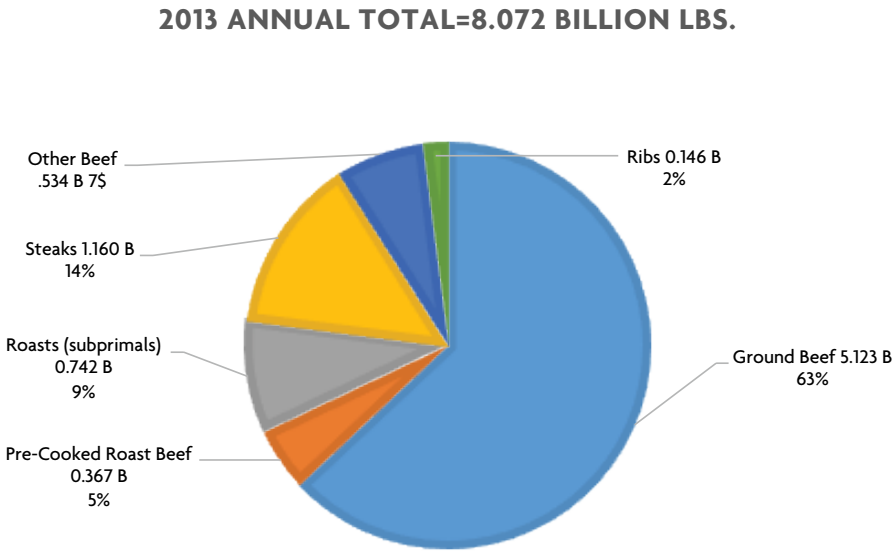
New Seasons Market does have a "Seasons Peak" grassfed beef line, for which it procures beef from twelve Oregon and Washington ranches. Whole Foods Market is known to buy from Country Natural Beef (formerly known as Oregon Country Beef, but now a multistate venture). Market of Choice features Painted Hills Beef, raised by seven ranchers in Wheeler County and processed in Washington.

7.5.5. Restaurants

US Census County Business Patterns data indicate there were 3,974 full-service restaurants (not including limited service "fast food") and 123 catering companies in Oregon in 2012. The top 10 percent may be considered "fine dining" and more likely to be engaged in procurement of local products (though primarily through wholesalers). However, it is clear that interest in local and natural is widespread across the industry, including with fast casual restaurant chains like Burgerville, Dick's Kitchen, Little Big Burger, and others. Therefore a 20 percent slice of restaurants may be worth considering.

[134] "Statistics and Facts on the US Beef Market," Statista, (n.d.).

Figure 7.4 Foodservice utilization of beef.



The chart in Figure 7.4 shows a National Cattlemen's Beef Association breakdown for foodservice utilization of beef, which reportedly represents 32 percent of total protein sales. A total of 5.3 billion pounds is sold to restaurants—of which about 1.8 billion pounds is sold to full-service restaurants. Nationally, independent full-service restaurants reportedly spend some $50 billion on select products annually, of which 30 percent is for proteins[135] —suggesting at least $4.8 billion spent on beef. Dividing those figures by the 232,000 venues nationally suggests each operator spends an average of $21,000 for 7,800 pounds of beef annually.

Using that estimate for 397 Oregon restaurants (top 10 percent) suggests a $16.6 million market for 6.2 million pounds of beef or about 13,000 head. This estimate is likely conservative.

7.5.6. Farm to Hospital

Health Care Without Harm (HCWH) is an international environmental health organization that supports sustainable food procurement at hospitals and healthcare facilities, including sourcing of antibiotic-free meat. A 2008 report[136] by HCWH indicated that 44 percent of 112 hospitals surveyed were buying some quantity of hormone- and antibiotic-free meat, and that another 47 percent had plans to start sourcing such products.

A contributor to the report, the Oregon Center for Environmental Health, documented 4 Portland area hospitals purchasing a total of 94,827 pounds of fresh beef in 2007, with purchasing of hormone- and antibiotic-free beef (Food Alliance Certified) ranging from 10 percent to 20 percent (1 response); to 40 percent to 60 percent (2 responses); to 80 percent to100 percent (1 response).

[135] "Independent Full Service Restaurants & Protein: A Match Made in Heaven," CHD Expert, (n.d.).

[136] "Menu of Change: Healthy Food in Health Care," Health Care Without Harm, 2008.

Follow-on inquiries about food procurement by Oregon Physicians for Social Responsibility in 2009 resulted in detailed reports of beef purchases from 4 Portland-area hospitals. Combined, the 4 institutions represent about 1,325 hospital beds and reported purchasing about 130,000 pounds of fresh beef annually (Primarily preformed hamburger patties, ground beef, stew meat, and roasts—not including any cooked, cured, or other processed beef products). Extrapolating from those 4 institutions to Oregon's 33 private hospitals and 6,008 total hospital beds suggests hospitals could represent a market for 590,000 pounds of beef or 1,230 head of cattle.

Adding the 12,403 beds in Oregon's licensed nursing care facilities would triple the market estimate, but it has not been shown those facilities would follow a similar procurement pattern.

Conclusions should be tempered with the knowledge that price remains a major consideration for foodservice in healthcare. If ABF beef is available from large, conventional suppliers, the added value of local products from smaller farm suppliers may not be enough to justify paying a price premium.

7.5.7. Farm to School

School Food FOCUS is a national collaborative working with fifteen large school districts across the US (including Portland Public Schools and the Beaverton School District) to make school meals nationwide healthier, regionally sourced, and sustainably produced, and has made meat raised without antibiotics a priority.

In Oregon, approximately 24 percent of school food budgets are spent on local food—the highest percentage in the nation. (USDA, 2014) Schools, with limited budgets and limited ability to prepare fresh foods, offer an interesting procurement challenge. Portland Public Schools (PPS) has enrollment of about 46,000 students, serves 21,000 lunches daily, and does provide meals prepared with natural and grassfed beef.

PPS conducted trials of "grassfed" hamburger patties from Cascade Natural Beef supplied by SP Provisions in 2008—from cattle that northwest ranchers actually finished conventionally on grain rations. Costs for the trial were reported at $44.85 a case (75 patties) Cascade Natural versus $17.11 per case (140 patties) for commodity hamburger.[137] The difference is $0.60 per serving vs. $0.12 per serving—500 percent.

PPS has two offerings of true grassfed (grass-finished) beef (from Carmen Ranch beef in Wallowa County) scheduled for lunches in the 2014–2015 school year as part of a Harvest of the Month program. Providing quarter-pound beef patties for a 21,000–lunch seating requires 5,250 pounds of beef.

[137] "OSU Taste Tests Grain-Fed vs. Grass-Fed Beef in Portland Schools," OSU Extension Service, 2008.

Extrapolating to the 567,000 students enrolled in districts across Oregon suggests 65,000 pounds would be required each time ground beef was served. If local grassfed beef were featured monthly during the school year, that suggests a need for 2.3 million servings—582,000 pounds or about 1,215 head of cattle.

Extending that scenario to serve grassfed beef weekly to the approximately 190,000 students enrolled in Oregon universities and colleges (with 45 percent participation in lunches) suggests a need for another 810,000 pounds of beef per year—or about 1,690 head of cattle.

The combined total is 2.4 million pounds or about 2,900 head of cattle.

7.6. Demand Summary

Combining the estimates provided for retail, restaurants, hospitals, and educational institutions suggests there is potential demand in Oregon for about 26 million pounds of fresh beef that offers a combination of desired attributes including: local, antibiotic free, free-range or pasture-raised. This is the equivalent of about 52,000 head of cattle. The total represents about 12 percent of beef consumed in Oregon each year.

The breakdown by channel is as follows:

- Retail: 65% (~16.8 million lbs. or 35,000 head)
- Restaurants: 24% (~6.2 million lbs. or 13,000 head)
- Hospitals: 2% (~590,000 lbs. or 1,230 head)
- Education: 9% (~2.4 million lbs. or 2,900 head)

With the assumption that at least half of the approximately 35,000 head of cattle already slaughtered under USDA inspection in Oregon are marketed in state, opportunity may remain for 34,500 additional head of cattle representing 16.4 million pounds of beef.

7.7. Oregon Beef Production

The 2012 USDA Census of Agriculture[138] shows a total of 11,638 farms in Oregon reported sales of cattle or calves. The number of farms is down 11 percent from 2007 (1,439 fewer farms).

A combined total of 879,251 animals were sold in 2012 with a total estimated value of $894 million. This is a 14 percent decline in the number of animals since 2007 (141,000 fewer), but total value has increased 11 percent.

All told, Oregon farmers and ranchers produce enough cattle to satisfy 195 percent of in-state consumption of beef. However, nearly all cattle produced are shipped for processing and marketing out of state.

[138] "Poultry—Inventory and Sales," 2012 Census of Agriculture—County Data, (n.d.).

Of all farms reporting sales of cattle, 84 percent sold fewer than 50 head (9,763 farms). Combined, those smallest farms represented about 86,000 head.

The 1,081 farms in the middle, with sales of between 50 and 200 head, sold a combined 83,000 animals.

The 794 largest farms, each with sales over 200 head, sold a combined 685,000 animals.

There is clearly capacity for smaller and midsized farms to meet a major portion of Oregon's demand for beef. The question is why those producers currently capture likely less than 2 to 3 percent of market share, and why production and sale of grassfed beef in particular is so limited.

7.8. Small Beef Producer Challenges

Most small natural, organic, or grassfed producers send cattle to slaughter in the fall, and as a result fresh beef is actually a seasonal product. These farmers market frozen beef for much of the year, which turns away some consumers and commercial buyers used to year-round availability of fresh meat.

Ranchers face cash-flow challenges holding animals an additional year until they reach target weights, can be harvested, processed, and eventually sold to a consumer or commercial buyer.

Ranchers implementing grassfed programs face financial risks if any number of their cattle ends up redirected to commodity markets, where the USDA grading system is based largely on marbling. Beef finished on grass tends to be leaner and grades poorly as one study showed below: (ATTRA 2006)

- **Grain-fed:** 0 percent Standard, 45 percent Select, 55 percent Choice
- **Grassfed:** 15 percent Standard, 70 percent Select, 15 percent Choice

Because of poor grading, grassfed producers "take a price kicking—to the tune of $220/head, or up to a 24¢/pound discount." (Martz et al., 1998)

Beef producers that have access to USDA-inspected facilities that allow them to retail meat (selling individual cuts by the pound) often struggle to manage inventories effectively. While high-end steaks sell quickly, some ranchers report difficulty finding profitable markets for lower-value cuts and ground beef. Several promising start-ups have failed because they could not sell enough hamburger.

With small lot sizes, ranchers may have difficulty assembling cuts of consistent size, appearance, and quality that are most appealing to restaurant and retail buyers.

Another challenge is that marketing beef instead of cattle requires additional skills and labor—a burden that on smaller farms may fall directly on family members. For smaller operations to be profitable, farmers must have technical,

managerial, and marketing skills that help them produce high-quality products, manage expenses and debt, and connect with appropriate customers. However, it is relatively rare to find all those skills in one person or even one family.

7.9. Oregon Beef Processing

Processing capacity is frequently referenced as an infrastructure gap and a barrier to the development of more midsized farm and food businesses.

The Niche Meat Processor Assistance Network lists ten USDA slaughter facilities in Oregon that as of October 2012 are accessible to producers.

- Bartels Packing, Eugene
- Carlton Packing Co, Carlton
- Central Oregon Butcher Boys, Prineville
- Dayton Natural Meats, Dayton
- Malco's Buxton Meat, Sandy
- Marks Meats, Canby
- Mohawk Valley Meats, Springfield
- Mt. Angel Meat Company, Mt. Angel
- Oregon Beef Company, Madras
- Stafford's Custom Meats, Elgin

The Oregon Department of Agriculture reported in 2009 that Oregon is also home to:

- 50 USDA-inspected meat processors (no slaughter—secondary processing only)
- 55 custom mobile slaughter trucks
- 12 custom slaughterhouses
- 86 custom meat processors

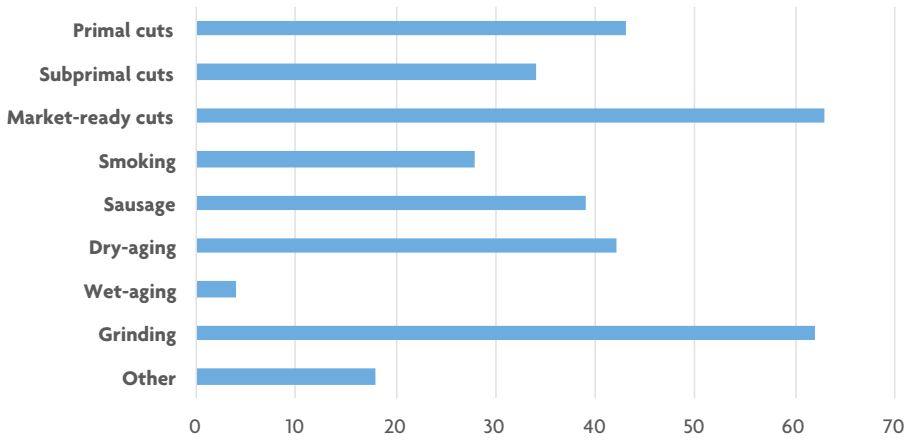
In a 2006 Ecotrust survey of eighty-four livestock producers, 24 percent stated their major obstacle is distance to slaughter and processing facilities:

- 60 percent use facilities more than 30 miles away.
- 33 percent use facilities more than 60 miles away.
- 29 percent use facilities more than 90 miles away.
- 16 percent use facilities more than 120 miles away.

Interestingly, 37 percent report that there is a closer processing facility. Reasons given for not using that facility include: dissatisfaction with the quality of processing, the facility is not USDA-inspected, or the facility doesn't provide all the services that the producer requires.

The graph below describes services typically sought.

Figure 7.5: Commonly requested further beef processing.



Additional surveys by Oregon State University and others show dissatisfaction with available processing facilities, including:

- The distance to the facility—transportation costs, and effects on animals and meat quality.
- Limited capacity of the facility—lack of services and difficulty scheduling in peak seasons.
- Lack of skilled labor (butchers and meat cutters)—quality control concerns.
- Inadequate packaging options.

A number of surveys show livestock producers saying they would be able to expand marketing, increase production, and/or improve profitability with better access to USDA slaughter and processing.

At the same time, however, existing small-scale USDA processing facilities are not operating at full capacity. Surveys suggest that USDA-inspected facilities in both Oregon and Washington are capable of processing more animals. Owners of custom mobile and fixed processing facilities also say they do not see a business need to face additional costs and licensing requirements for USDA certification.

A 2012 ERS report advises caution in considering the need for additional processing capacity, noting:

> "the presence of small livestock operations does not necessarily indicate demand for inspected processing. Many small livestock farmers and ranchers may not wish to participate in local markets. There may be a perception that there is demand for a small slaughter establishment in a particular area, but this could be due to a misperception between perceived and real demand. Furthermore, even if real demand appears to exist in a county, that demand may not be sufficient for a small slaughter establishment to be viable. There may not be enough producers willing to process enough animals at a high enough price to support the fixed and operational costs, especially for labor and equipment, of even a small facility."

Costs for opening a small USDA-inspected slaughter plant can run over $2 million. The same 2012 ERS report notes:

> "getting a plant to meet USDA inspection regulations can be a costly endeavor. To open a new plant, facilities must comply with a large number of regulations detailing the requirements for construction, lighting, ventilation, plumbing, sewage, water supply, dressing rooms, lavatories and toilets. Often it is just as costly, or even more so, to get a plant up to code after it has been out of commission. There are more costs associated with running a USDA inspected facility than a custom-exempt facility in part due to the money required for licensing. Once a facility is licensed, there is the extra requirement of paperwork and meat testing that must be completed which is a time burden to many small processors."

In a 2009 report, the Oregon Department of Agriculture described the costs and the profit margin of small-scale meat processors, based on review of 285 firms nationally with annual revenues between $500,000 and $999,999.

EXPENSES	Percent of Gross Revenues
Cost of Goods	83.8%
Gross Margin	16.2%
Selling, General & Admin	6.1%
Officer compensation	5.6%
Pension & benefits	0.8%
Advertising & sales	0.6%
Rents	0.3%
Depreciation and amortization	0.9%
Operating Expenses	14.3%
Net Income Before Tax	1.9%

Figure 7.6: Costs and profit margin of small-scale meat processors.

According to ODA's analysis, an operation processing 1,500 head of cattle might see gross revenues of $696,000, with net income before taxes of only $13,224—making it a marginal business, at best.

ODA also reports that economies of scale allow large meat processing facilities to slaughter 325 head an hour for about half the cost of a processor slaughtering 25 head an hour.

The expense of a fixed plant and difficulties finding appropriate sites for such plants (to maximize utilization and avoid conflicts with neighbors), have increased interest in USDA-inspected mobile slaughter units (MSU). An MSU is significantly cheaper—usually less than $300,000. However, MSUs also often need to work in tandem with one or more existing fixed "cut and wrap" facilities by facilitating a flow of meat products for secondary processing and packaging.

Ecotrust's 2006 survey had 65 percent of respondents reporting they would prefer to use a USDA inspected mobile slaughter unit and then transport carcasses to a fixed-site USDA-processing facility. The most commonly cited reason was decreased stress on the livestock.

The first USDA-inspected MSU was constructed in Washington in 2002 by the Island Grown Farmers Cooperative. This MSU is a 33-foot-long, 13-foot-tall trailer divided into three sections: processing, refrigeration, and storage. The MSU provides services to farmers within a 100-mile radius, but must process a minimum of 4 steers at each stop to break even. It can handle as many 8 steers a day, and can store 10 carcasses in its cooler. The MSU operates three days a week and meat is cut and packaged five days a week at a fixed-site processing facility—supporting six full-time employees.

The Oregon Department of Agiculture conducted a feasibility study in 2003 for establishment of a USDA-inspected MSU in eastern Oregon. More recent studies have continued to promote the idea.

However, there are also concerns that the MSU model does not scale well. With limits on the size of the trailer, slaughter capacity usually cannot exceed ten beeves per day. Rising fuel costs may also restrict the geographic area that can be served cost-effectively.

Whether an MSU, fixed facility, or combination are considered, there appear to be at least three major challenges to implementation:

- Securing funding for construction and initial operations: slaughter and processing are relatively low-revenue, low-margin businesses with some significant risks. As a result, banks and investors have shown little interest. However, nonprofits in other states have successfully secured grant funding and loans for construction, afterward leasing facilities to for-profit operators.

- Developing a business plan to ensure throughput of minimum numbers of livestock necessary for profitability and depreciation: this includes accessing appropriate end markets.

- Finding people with the necessary skills to operate facilities successfully. With few schools training people to slaughter and butcher meat, the potential employee pool is shrinking. The work is physically demanding and wages are modest. The median annual wage for butchers and meat cutters in 2008 was $28,290, with only the highest 10 percent earning more than $45,000.

7.10. Support Infrastructure for Beef

Beyond processing capacity, it is important to consider other support infrastructure necessary for production and marketing of beef.

7.10.1. Rendering

Rendering is the conversion of meat processing wastes into marketable goods such as edible fats and proteins, tallow, and grease. Rendering is typically a significant source of income for larger-scale meat processing operations. Smaller processors, however, often do not have sufficient volume to make transport of wastes to the rendering facility cost effective, and lose the opportunity for associated income—increasing the cost of processing. The Oregon Department of Agriculture's 2009 report on beef processing lists the closure of Oregon's two in-state rendering plants in 2006 and the subsequent need to ship wastes to California or Washington, as a reason for high in-state processing costs. That report estimates that about 91.65 million pounds of animal byproducts are generated annually in Oregon, with about 81.98 million pounds recoverable.

7.10.2. Hides

Finding a market for hides may also be important to the profitability of local/regional beef brands. A 2012 estimate of the value of cattle by-products showed hides representing 51 percent of the total ($72 of $140).

7.10.3. Pet Food

A 2009 NEOEDD study showed some successful niche meat producers generating revenue through sale of by-product, such as organs and ground trim, into the raw pet food market—representing an added value of up to $100 per animal. That report notes that pet food can be processed in the same facilities used for foods for human consumption, and that pet food sold direct to consumers can achieve prices on par with products sold for human consumption.

7.10.4. Cold Storage

With grassfed beef typically a seasonal product, freezer storage becomes an issue to maintain inventory and year-round sales. There is significant cold storage capacity in the Willamette Valley, but additional cold storage associated with existing or new regional processing facilities may have to be considered.

7.10.5. Distribution

Smaller local or regional beef producers are unlikely to see their products carried by large broadline distributors such as Food Services of America or SYSCO. Once some scale is achieved, there may be opportunities to work with associated businesses, such as Fulton Provision Company (owned by SYSCO). There are also some smaller, specialty distributors that may offer more immediate support. These include companies like SP Provisions, and Nicky USA.

7.11. Paths Forward

Demand for grassfed meats is growing and retail, restaurant, and food service buyers are interested in cultivating local/regional suppliers of high-quality meat. Allen R. Williams, a food industry consultant who specializes in grassfed and organic beef, sees health and sustainability concerns driving more than 100 percent market growth annually.

In 2009, the Food Innovation Center in Portland conducted a blind taste test with 112 consumers to compare commodity ground beef to grassfed ground beef from Wallowa County. Tasters found the grassfed beef significantly more tender and juicy. Perceptions about grassfed beef included:

- 88 percent perceived grassfed to be healthier.
- 76 percent perceived grassfed to be more humane.
- 71 percent perceived grassfed to be better for environment.
- 51 percent had already switched to natural/organic beef due to food safety concerns.

A 2009 survey by the Northeast Oregon Economic Development District (NEOEDD) found all the retail outlets and industry professionals contacted citing growing demand for grassfed meats. Several buyers indicated they cannot source sufficient quantities of grassfed meat from existing suppliers and are working to develop additional supply.

There are two models to consider for expansion of local/regional beef production and marketing: a single entrepreneur-led model and a collective/ cooperative model.

7.12. The Entrepreneur Model

Carman Ranch is a family-owned company that combines a production cattle ranch and a beef marketing business. The ranch was established in Wallowa County in 1913, but starting in the 1990s became increasingly less profitable due to a combination of rising grain costs and low prices for commodity beef. While completing an environmental policy degree at Stanford University, Cory Carman did research on grassfed beef production, discovering that only fifty ranches in the US still raised cattle solely on grass. The research convinced her, however, that it could be done, and that there was a market for healthier beef products. Cory moved back to the family ranch in 2003 and started to experiment with grassfed beef production, holding back a few cows each year from sales to feedlots to be grown out, slaughtered, processed, and marketed locally.

Cory started marketing "custom beef " (half and quarter cows) directly to local families in Wallowa and Union County in 2004. Sales of custom beef to families in Portland started in 2006. In 2007, she and her husband took over fulltime management of Carman Ranch and launched the Carman Ranch brand. Their mission statement is: "As 4th-generation ranchers raising and teaching the 5th generation, we are committed to preserving the natural environment and providing our customers with healthy and delicious beef." Carman Ranch posted profits starting in 2008.

In 2009, Cory started marketing whole animals to food service buyers. She felt there was too much inventory risk for her small company to sell wholesale beef by the piece. Bon Appétit Management Company made a trial purchase and asked chefs at University of Portland to find ways to use all cuts. Oregon Health Sciences University soon followed suit. In 2010, Bon Appétit signaled that while they wanted to increase purchases of Carman Ranch beef, they did not need middle meats or high-end steak cuts. In the interim, Cory had made connections with chefs in Portland, including Vitaly Paley of Paley's Place. In 2011, working with Fulton Meat Company, Cory started to sell wholesale in earnest. She quickly developed a growing list of restaurant customers in Portland and Seattle.

Carman Ranch's initial efforts marketing to institutional buyers were hampered by the comparatively high price of their beef. Universities and hospitals simply could not afford it. With mobile slaughter and processing at a small local plant, nearly 40 percent of Carman Ranch's cost of production was

incurred after the cattle left the ranch. To reduce cost and facilitate growth, Cory needed larger processing and distribution partners.

A major challenge was finding a USDA-certified slaughterhouse that would take the relatively modest volume offered by Carman Ranch. Currently, there are only 3 USDA-inspected slaughterhouses in Oregon east of the Cascades. As a result, many Eastern Oregon ranchers truck cattle more than 150 miles for butchering. Larger companies like AB Foods in Washington can require a minimum delivery of 250 cattle for a single production run. In contrast, Carman Ranch was often processing fewer than 25 cattle a week during the season.

With an introduction by Food Alliance, Cory developed a relationship with Fulton Meats (Portland), a SYSCO-owned meat processor and distributor. Fulton made several accommodations for Carman Ranch, including agreeing to buy the whole animals, carry inventory on Carman Ranch's behalf, and distribute fresh meat seasonally as available. Fulton also brokered an introduction to a larger-scale USDA processing plant, Walt's Wholesale Meats in Woodland, Washington. Those steps lowered the price of Carman Ranch products by 15 percent. They also enabled sales by the piece so that institutional buyers could take low-end cuts, while restaurants took high steaks and roasts. This opened the door to additional sales by food service operators and restaurants.

Concerns about quality and a need to scale even further subsequently led Cory to take her processing to Dayton Meats and to invest in capacity necessary for self-distribution.
As demand for Carman Ranch beef has grown, Cory has turned to other ranchers in the community to meet the need. Carman Ranch currently manages its own herd of Angus cattle and produced close to 120 marketable calves in 2012, but now requires over 400 head to meet orders. When Carman Ranch entered wholesale, Cory anticipated that demand would exceed Carman Ranch's productive capacity. In preparation, she developed a relationship with the McClaran Ranch in Joseph in 2009. Like Carman Ranch, the McClaran Ranch is a fourth generation cattle ranch, with a daughter, Jill McClaran, now taking a larger role in operations. Cory and Jill have also pursued relationships with other ranchers that could supply additional cattle.

Despite progress, the system still has challenges. While Carman Ranch beef at wholesale has been priced 25 percent higher than the commodity alternative, profits are comparable with commodity because of processing and distribution inefficiencies and added marketing costs.

While the wholesale business has grown substantially, Carman Ranch remains at an awkward stage of development. Cory notes that a small ranch that produces one hundred head can do well with direct sales. In wholesale, however, higher levels of efficiency and a sufficient operating base are not achieved until volume reaches at least one thousand head.

7.13. The Collective/Cooperative Model

Country Natural Beef (CNB) offers an example of producers collaborating to develop and advance a shared brand, with members providing expertise and capacity to manage operations and marketing. Originally known as Oregon Country Beef, CNB has grown beyond Oregon to include ranch members in a number of other western states, and now markets throughout the West and beyond—primarily through Whole Foods Markets.

The Oregon Department of Agriculture noted in its 2009 study that CNB

> ". . . learned early on that the economics of beef is about 'cost of production, return on investment, and a reasonable profit.' They have done exhaustive accounting of their costs of production and costs of marketing and set their prices based on this accounting regardless of 'market' prices. If the price they put on their meat is too high for consumers, they believe they would have to get out of the business and because if they can't meet their costs and a reasonable profit, they would have to stop producing. They have estimated, however, that they have averaged nearly $120 per animal profit over the market price for the last 10 years."

A value-chain study by OSU and the Center for Integrated Agricultural Systems at UW-Madison is the source for the following history and description of CNB:

> In 1986, 14 Oregon ranchers formed a cooperative—Country Natural Beef—to escape the rollercoaster cycles of the commodity cattle market and achieve predictable, relatively stable, premium prices. . . . Internally, CNB's full membership reaches consensus decisions during general meetings. Externally, CNB has developed close and stable relationships with a diverse set of supply chain partners. . . . In recent years, CNB has nearly 100 member ranches in multiple states that raise more than 100,000 brood cows, manage more than 6 million acres of land and sell almost $50 million of products.
>
> CNB cattle are raised without growth hormones, antibiotics or animal byproducts and most are raised from birth on member ranches. The cattle spend less time in the feedlot (90 to 95 days versus 120 to 150 days for conventional beef) and are fed rations that are, to the extent possible, sourced locally and forage based, including potatoes, alfalfa, barley and some corn. As a result, CNB 's meat is leaner than that of its competitors, reaching USDA grades of "high select" and "low choice" versus the fattier "high choice."
>
> The rancher members share strong commitments to both animal welfare and sound environmental practices. The cooperative's "Raise Well" animal welfare standards were written and endorsed by Dr. Temple Grandin, a leading animal behaviorist. . . . CNB Marketing Director Stacy Davies notes the important marketplace impact: "This animal welfare thing

appears to sell meat". . . . On their ranches, cooperative members have developed pasture management practices that maintain grass, plant and wildlife diversity, water resources and healthy streams.

The cooperative prides itself on its streamlined internal operations and low administrative costs. Money earned from the sale of cattle flows directly to individual ranching families, with few middlemen. Member ranches do not invest equity in the cooperative, and all financing relies on the proceeds of annual cattle sales. The cooperative owns no bricks, mortar, or trucks and therefore has no debt. It employs members who act as independent consultants and "internal partners" to handle key functions including production planning, sales and accounting. This approach allows the cooperative to limit management costs to less than four percent of gross revenue, but it requires a strong commitment to participatory decision-making.

CNB has forged business partnerships based on the Japanese model known as "Shin Rai," or mutual support and mutual reward. The cooperative works with business partners that provide complementary services and expertise, and share basic values such as humane animal treatment and land stewardship. CNB and its partners are engaged in a values-based food supply chain where everyone reaps the benefits of market premiums and price stability associated with an identity-preserved, high-value product.

A key production partner is Beef Northwest Feeders, which preserves the identity of the Country Natural Beef cattle and provides humane animal handling and non-antibiotic first treatment of ill cattle. AB Foods, another important partner, serves as both Country Natural Beef 's butcher and financial/logistical associate. The co-op's rancher members individually sell live cattle to AB Foods, and CNB buys back boxed beef cuts that the cooperative then seeks to sell

CNB has selected retail partners who share an interest in marketing high-quality, natural beef products to health- and eco-conscious consumers who are willing to pay premium prices. These partners maintain CNB's identity on its products through to the final consumers. Retail partners include Whole Foods Market, New Seasons Market, Burgerville and Bon Appétit Management Company.

7.14. Analysis

The entrepreneur model relies on the drive and skills of an individual, and the resources, partnerships, outside expertise, and employee capacity that person is able to bring into play. Decision-making is quicker with clear ownership and authority. Rancher suppliers can focus on production, but with grassfed systems face some risk holding over cattle from commodity sales. They are also dependent on the entrepreneur's ability to grow the market and may not receive the full benefit of any price premium.

The cooperative model requires more participation on the part of member ranchers, and the consensus decision-making model employed by CNB requires significant patience and ability to navigate internal conflicts. The ability to scale by growing the membership has its own rewards and challenges. CNB's relationship with Whole Foods Market has been important to its success, but with more than 50 percent of sales made to Whole Foods Market, the cooperative also faces concentration risks. Whole Foods Market has been aggressive encouraging further expansion of CNB and has required ranchers to submit to humane practice standards and audits the company developed. Recruitment and intake of members has to be done carefully in order not to upset the internal balance. Managing large numbers of ranch suppliers has sometimes created challenges with quality control and consistency. CNB has also undergone periodic contractions—as in recent years when members frustrated with shrinking returns during the recession turned to other markets.

One lesson to be learned from both models is that beef businesses have been built without investment in new infrastructure, through partnerships to leverage existing capacity. This has added complexity and cost, but has enabled production and growth without the burden of financing and operating facilities.

7.15. Conclusions

Northeast Oregon Economic Development District's 2009 study concluded that:

> "Producers who have the time and resources to cultivate relationships with buyers, and with entities actively promoting local and sustainable food production, will likely generate sales and brand awareness. There are opportunities for individual producers to act on their own to move some niche product and a few producers are exploring ways to share infrastructure and marketing costs to make these opportunities more attainable. Efforts to collectively supply larger volume buyers could move forward if the committed leadership of an individual or entity arises to support longer-term relationship development, education, promotion and infrastructure development."

Barriers to moving forward identified by NEOEDD included:

- The limited capacity of local humane slaughter and processing facilities.
- Lack of access to technical assistance to complete individual ranch business plans needed to transition from commodity to grass-finished systems.
- Difficulty deferring income during the switch to production of grass finished animals.

The reference above to committed leadership appears key. Oregon beef brands that have achieved some success have benefited from an individual or small group with the ability to coordinate production and delivery of cattle, manage processing and distribution partnerships and logistics, and cultivate customer interest and loyalty.

The commitment of individual ranch members/suppliers to grassfed or other "values-added" production systems and to the brand is also critical to the quality and continued availability of cattle for processing. A number of branded beef programs have seen ranchers eager to join when commodity prices are low, but faced challenges with discontent, desertions, and difficulty securing needed cattle when commodity prices swing high and/or other factors affect the work/risk/reward equation.

In short, bringing local/regional grassfed or other "values–added" beef to scale in Oregon will require the commitment of ranchers who truly believe that it is a better production system (better for the land, better for the animals, and ultimately better economically), and who are willing to ignore the commodity market, endure the challenges of growing a brand, and sacrifice short-term gains for the promise of long-term stability and sustainability.

There are potential benefits from bringing local/regional beef to scale in Oregon. A 2011 study by the Leopold Center for Sustainable Agriculture estimated that in small slaughter and processing facilities in Iowa each 1,000 cattle processed support 7.4 jobs and $257,509 in local wages. If 12 percent of beef consumed in Oregon were produced and processed in state, the 52,000 head of cattle needed would support 385 jobs and generate $13.4 million in local wages.

However, the Economic Research Service (ERS 2011) offers the following caution, which should temper expectations:

> "Expansion of the local meat sector will continue to depend on the willingness of consumers to pay premiums high enough to absorb the costs associated with the particular production program, processing, and the remainder of the supply chain. Consequently, the ability of this market to grow depends on the sector's capacity to broaden its consumer base in order to generate more consumer demand. This in turn depends on public perceptions about the value of local meat."

This suggests that entrepreneurs and investors should be careful to quantify demand and evaluate price elasticity to ensure adequate throughput to justify development of systems and infrastructure, and sufficient returns to the ranch to keep producer suppliers/partners engaged.

8

Pork

8.1. Introduction to Pork at the National Level

US consumption of pork has been in a range from 48 to 52 pounds per capita since the mid-1970s, but declined in 2011 and 2012 to just under 46 pounds per capita.

US hog production is heavily concentrated in the Midwest and North Carolina.[139] The industry is dominated by very large farms with more than five thousand hogs each, which represented 83 percent of the US inventory in 2012. Total US pork production in 2013 was about 23 billion pounds from 112 million hogs.[140] The National Agriculture Statistics Service estimated the value of hog production in 2012 at about $22.2 billion.[141]

A report from the USDA Economic Research Service in 2008 outlines the industry flow and provides ratios used in later parts of this report.

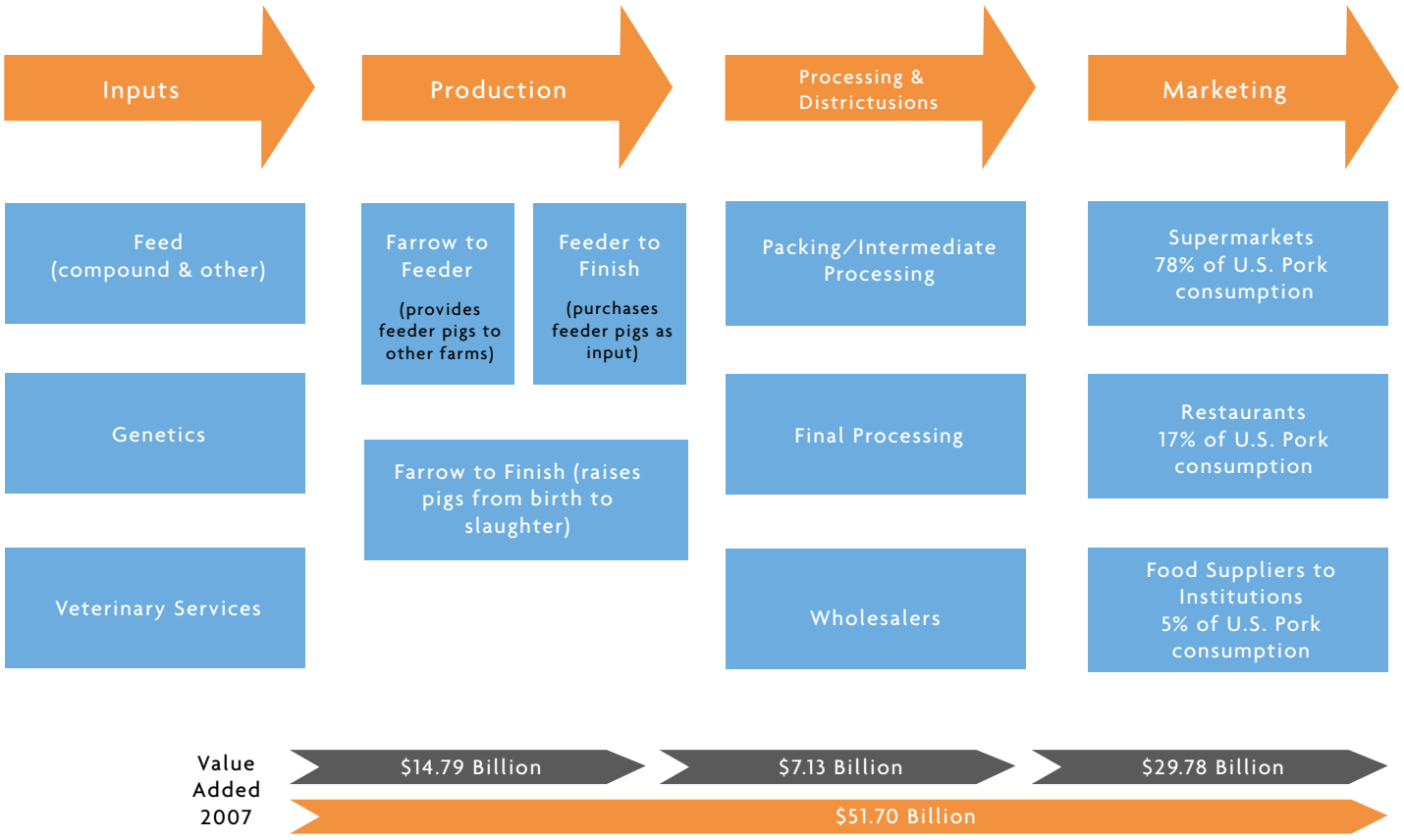


Figure 8.1: Pork industry process flow.

[139] "Overview (Hogs & Pork,") USDA, ERS, 2014.

[140] "Pork Facts," National Pork Producers Council, (n.d.).

[141] "Meat Animals Production, Disposition, and Income Final Estimates 2008-20012," USDA, NRSS, 2014.

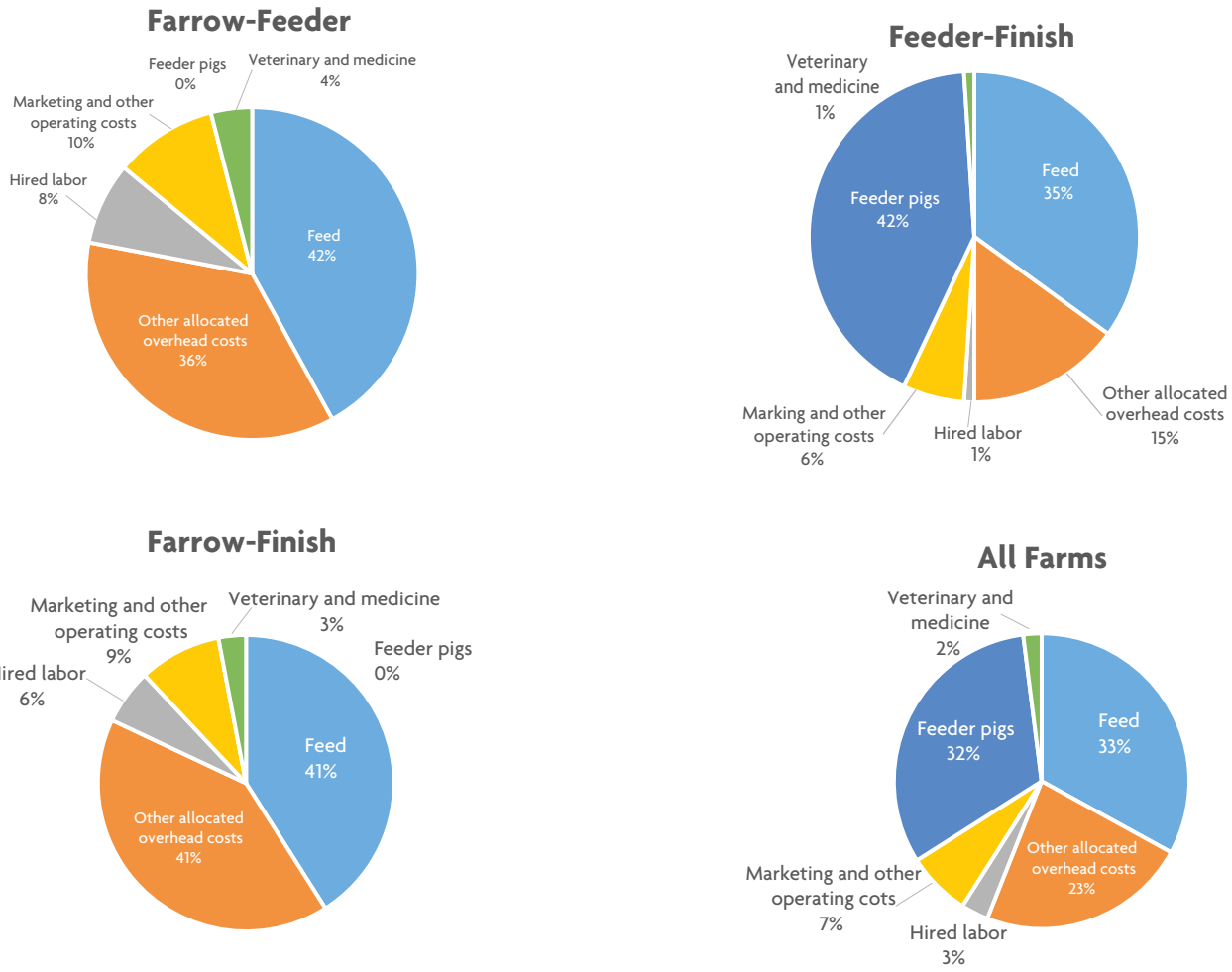
8.2. Segmentation, Key Issues, and Trends

There five basic production systems for hogs/pigs:

- Farrow to Finish: all stages from breeding through sale of a finished animal, approximately 240 to 270 pounds
- Farrow to Wean: breeding through sale of ten-to-fifteen-pound piglets
- Farrow to Nursery: breeding through sale of forty-to-sixty-pound "feeder" pigs
- Wean to Finish: purchase and feeding of ten-to-fifteen-pound piglets
- Finishing: purchase and feeding or forty-to-sixty-pound "feeder" pigs

Costs of production vary for the different production systems as seen in the graphic on the below.

Figure 8.2: Cost of pork production systems.



Common breeds of hogs raised include Yorkshire, Duroc, Hampshire, and Berkshire.

Most pigs end up sold directly to packers and delivered live to a buying station or processing plant. More than 95 percent are sold under a "carcass merit" system with pricing affected by ratios of fat to muscle. However, from a retail perspective, there is no corresponding grading system to alert customers to product differences (as with "select" or "choice" for beef).

Methods of production include:

- **Confinement:** Barns with areas to segregate pigs of different sexes and ages. Intensive production with large numbers of animals (eight hundred–plus). All feeds are provided. Often with easier-to-clean and disinfect hard surface flooring, sloped to facilitate collection and storage of liquid manure. Associated with use of "gestation crates" and "farrowing crates," which limit the movement of breeding and nursing sows. Very capital intensive to build or retrofit.

- **Hoop Houses:** Lower-cost structures with a frame and cover, open at one or both ends. Cement or earthen floors with straw or other bedding materials on top. All feeds are provided. Appropriate for one hundred to two hundred animals, which live in social groups. Requires more oversight to identify and segregate sick or injured animals. Requires more labor and expense to periodically remove used bedding and solid manure, and provide and spread fresh bedding.

- **Pasture:** Low- or no-structure costs. May be seasonal production. Pigs live outdoors with access to shade or shelter where appropriate, usually as part of a crop/livestock rotation system. Forage can meet a percentage of pigs' diet, but supplemental feeds must still be provided. Appropriate for smaller groups of animals. Hogs can engage in natural behaviors, but must be dispersed over a larger area to avoid concentrated environmental damage (from rooting and digging, etc.) and allow safe absorption of nutrients from manure. Some risk of exposure to disease/pathogens.

Consumer interest in alternatives to "conventional pork" has been stoked by:

- Concerns for food safety:
  - Routine use of antibiotics. (Use of hormones is prohibited under federal law for hogs.)
  - Consumer Reports studies found yersinia enterocolitica in 69 percent of tested pork samples, and additional incidences of salmonella, staphylococcus aureus, and listeria. More troubling is the fact that the majority of samples contained bacteria that were resistant to one or more antibiotics.

- Concerns for animal welfare with related advocacy by animal welfare organizations:
  - Discomfort with crowded conditions on very large "factory farms."
  - Discomfort with sows being immobilized for months in gestation or farrowing crates.
  - Routine manipulation of animals, including castration, tail docking, and teeth clipping.
  - Well-publicized videos showing mistreatment of animals.
- Concern for the environment:
  - Discomfort with the manure lagoons associated with large hog operations, each of which can hold 400,000 gallons of liquid manure. These are a source of odors and have contaminated ground and surface water, leading to algae blooms and fish kills.
- Interest in unique, high-quality, local foods and a desire to support local farm economies.

Farmers' desire to limit piglet mortality, a major source of loss, led to use of farrowing crates in confinement systems, which limit mobility in order to prevent the sow from accidentally crushing piglets against hard surfaces. However, deep, soft bedding has also been shown effective in reducing mortality.

In response to expressed consumer concern and initiatives passed in California and other states, since 2012 more than sixty of the world's largest food brands,[142] including McDonald's, Burger King, and Costco, have announced commitments to eliminate crates from their supply chains.

Alternatives to conventional pork discussed in this report include:

- Natural
- Organic
- Pasture Raised
- High animal welfare (Animal Welfare Approved, Certified Humane, Food Alliance, etc.)
- Local products from small and mid-sized farms offering one or more of the above attributes

8.2.1. Natural

As a marketing term, "natural" actually says very little about pork. The USDA has three requirements for use of "natural," which for pork all relate to handling of meat after the animal has been slaughtered—not to conditions under which the animal was raised:

- The product must be minimally processed
- It cannot contain any artificial ingredients
- It cannot contain any preservatives

[142] "Your Pig Almost Certainly Came from a Factory Farm, No Matter What Anyone Tells You," Matthew Prescott, Washington Post, 2014.

Most conventionally produced fresh pork meets these minimum requirements if it has not been packed with a marinade, tenderizer, or other ingredients. However, companies marketing branded pork (Niman Ranch, Applegate, etc.) typically have their own additional, internal program requirements. These can include:

- No antibiotics ("not ever"—with animals treated for health reasons sold conventionally)
- No feed containing animal protein or fat (often with allowances for milk)

These companies may also make humane animal handling claims, though criteria for those claims may not be public or may not be clear. Verification of requirements and claims also often happens internally, without the involvement of an independent auditor, and sometimes only with submission of affidavits.

8.2.2. Organic

"Organic" is regulated by the USDA and requires a third-party audit. USDA certified organic pork must come from cattle raised in compliance with the standards from the last third of gestation to slaughter.

- Feeds must be certified organic. Vitamin and mineral supplements must be approved.
- Forage must be grown without the use of synthetic fertilizers, herbicides, or pesticides.
- Genetically modified (GMO) feedstock and forage are prohibited.
- Hogs must have access to the outdoors, to appropriate shelter, and to clean dry bedding.
- Use of antibiotics is prohibited.
- Animals must also be slaughtered/processed under USDA or state equivalent certification.

There are currently very few certified organic hog producers. (In fact, a search using the Oregon Tilth directory for organic hog or pork producers returned no results in Oregon.) However, several smaller-scale hog farmers in Oregon do make "raised with organic practices" claims, while stating they are not organic certified. Reasons given for not seeking organic certification include the high cost of organic feeds and the added expense and administrative burden of going through the certification process.

However, a 2012 study at the University of Illinois[143] suggests:

> "there is a difference in prices based on the production of specialized pork products, i.e., certified organic pork. Those producers received $19.70 more per cwt. for market hogs than other producers. The regression

[143] "Determinants of Profitability in Niche Swine Production," Dwight Sanders, Ira Altman, Gary Apgar, Journal of the ASFMRA, 2012.

analysis shows that this same marketing association resulted in $13.47/cwt. increase in net margins for those producers. So, while producers are price-takers over time, they may be able to shift up their average price and increase profit margins by further specializing their production. Granted, meeting the more rigorous specifications and qualifications for "certified organic" pork is undoubtedly more costly; but, this analysis shows that producers who successfully meet those niche requirements are rewarded with higher net profits."

8.2.3. Pasture-Raised

Information on pasture-raised as a segment of the pork industry is difficult to collect. According to a 2014 **New York Times** article, "**Neither the United States Department of Agriculture nor the National Pork Producers Council has data on the number of pastured pigs, though in 2006, research done at Iowa State University estimated that the drift, as a group of pigs is known, numbered from 500,000 to 750,000.**"[144]

One source suggests that rotating hogs through production and wooded areas on a diversified farm operation to maximize forage opportunities can reduce purchased feed costs by as much as 50 percent.[145]

Founder Paul Willis is quoted in the **New York Times** article claiming Niman Ranch produces as many as half of all pastured pigs, and saying "We could sell 20 percent more than what we have in no time. This way of raising pigs is still a very small part of the business—400,000 hogs are killed each day and we can supply only 3,000 pigs a week." Niman Ranch customers include Chipotle restaurants and others.

However, the article also documents the difficulty smaller pasture-pork brands face trying to access markets, manage inventory, and deal with conditions of over- and under- supply while growing a business.

8.2.4. High Animal Welfare

There are a number of animal welfare claims paired with natural, organic, or pasture-raised pork claims. Food Alliance has, for example, certified Pure Country Pork (in Ephrata, Washington), and a number of other pork suppliers to the New Seasons Market grocery store chain.

8.2.5. Local Branded

The "local" segment of the market is represented by independent farmers marketing to consumers or to commercial food buyers (retail, restaurants, food service). There are a few independent producer brands in the Northwest (such as Pure Country Pork in Washington or Snake River Farms in Idaho), which have been successful accessing regional and even national markets. There do not appear to be any smaller regional pork brands involving multiple producer/

[144] "Demand Grows for Hogs That Are Raised Humanely Outdoors," Stephen Strom, New York Times, 2014.

[145] Insights on Beginning a Pastured Pork Operation," Agrowingculture, (n.d.).

owners. Carlton Farms (discussed in more detail below), which operates its own processing facility, dominates the local/regional market, with hogs reportedly sourced from Oregon, Washington, Idaho, and Canada.

8.2.6. Growth in Markets for Alternative Pork

Price differences for conventional and alternative pork observed in Portland December 2014 include:

	Loin Chops	Italian Sausage	Ham	Bacon
Major Grocer Generic or Store Brand	$5.99/lb. Boneless	$4.49/lb.	$1.89/lb.	$5.99/lb.
New Seasons Market Northwest Grown	$7.49/lb. Boneless	$5.49/lb.	$4.99/lb.	$7.99/lb.
Farm Direct—Heritage Farms Northwest OR, Pastured, Red Wattle Breed	$10.00/lb. Boneless	$9.50/lb.	$9.50/lb.	$10.50/lb.
Tails & Trotters Retail Store Northwest Grown, Hazelnut Finished	$10.00/lb. Bone-in	$10.00/lb.	$16.00	$12.50/lb.

Table 8.1: Price differences for conventional and alternative pork observed in Portland, December 2014.

As with other products studied in this report, despite the potential to realize higher prices overall for differentiated products, midsized and smaller scale farmers pursuing niche markets must earn a margin that enables profitability in spite of typically higher per unit production, processing, and marketing costs.

8.3. Demand for Pork in Oregon

Understanding market demand is critical to evaluating potential investments to increase production and profitability of local and alternative pork.

8.4. Consumer Spending on Pork

According to the Bureau of Labor Statistics, the average household (2.6 persons) in the western US spent $7,180 in 2013 on food at home (59 percent) and away (41 percent) in 2013.[146] This includes $163 spent on pork for at-home consumption. As noted above, US per capita consumption of pork is about forty-six pounds.

According to a 2005 report by the Economic Research Service, 38 percent of pork consumed domestically is fresh. The remaining 62 percent of consumption is of processed products, which industry figures divide roughly into ham (39 percent), sausage (25 percent), bacon (23 percent), or other "lunchmeats" (13 percent).[147]

[146] "Region of residence: Annual expenditure means, shares, standard errors, and coefficient of variation," Consumer Expenditure Survey, 2013.

[147] "Factors Affecting U.S. Pork Consumption," Christopher Davis and Biing-Hwan Lin, USDA, ERS, 2005.

Pork is primarily purchased at retail stores (78 percent). Approximately 82 percent of fresh pork and 76 percent of processed pork is consumed at home.[148]

Restaurants reportedly account for another 15 percent of fresh pork and 18 percent of processed pork. The remaining balances of 3 percent of fresh pork and 6 percent of processed pork are consumed through other foodservice venues.

In November 2013, the USDA Economic Research Service listed the value of pork at the farm level at $1.10, wholesale at $1.70, and retail at $4.06. This implies wholesale could average 42 percent of retail price.[149]

A number of sources indicate foodservice ingredient costs average 30 percent of the final price, but can range lower or much higher depending on the type of establishment. Schools and hospitals may be seeking to keep food costs closer to 20 percent. Fine dining establishments may be comfortable with food costs reaching 40 percent or more with a priority placed on high-quality ingredients.

Using population data and the figures above, it is possible to form estimates of the consumer market for pork in Oregon, at the county level or for municipalities. The estimates are separate for fresh and processed products, and represent averages for all pork products in each category.

According to ERS figures, the average price per pound paid for pork at retail in October 2014 was $3.10 for nonspecific pork products, $4.17 to $4.60 for fresh chops of various types, $4.60 for boneless ham, and $5.80 for bacon.[150]

However, given that producers developing branded pork programs to target local and regional markets will have to find markets for all cuts, the averages are worth considering.

Table 8.2: Estimated demand for pork.

Geographic Unit	Total Pork "Consumed"	Fresh Pork (38%)	Processed Pork (62%)
Oregon (pop. 3,919,020)	180M lbs.	68.4M lbs.	111.6M lbs.
Multnomah Co. (pop. 756,530)	34.8M lbs.	13.2M lbs.	21.6M lbs.
Jackson Co. (pop. 206,310)	9.5M lbs.	3.6M lbs.	5.9M lbs.
City of Bend (pop. 79,109)	3.6M lbs.	1.4M lbs.	2.2M lbs.
City of La Grande (pop. 13,048)	600K lbs.	228K lbs.	372K lbs.

Breakdowns for fresh and processed pork through retail and foodservice, and estimates for associated wholesale opportunities follow.

[148] "Factors Affecting U.S. Pork Consumption," Christopher Davis and Biing-Hwan Lin, USDA, ERS, 2005.

[149] "Overview: Meat Price Spreads," USDA, ERS, 2015.

[150] "Overview: Meat Price Spreads," USDA, ERS, 2015.

Geographic Unit	Total Fresh Pork	Fresh Pork: Retail (82%)	Fresh Pork at Home	Implied Wholesale (42%)	Fresh Pork: Foodservice (18%)	Implied Wholesale ($1.70 avg.)
Oregon (pop. 3,919,020)	68.4M lbs.	56M lbs.	$118M	$50M	12.4M lbs.	$21M
Multnomah Co. (pop. 756,530)	13.2M lbs.	10.8M lbs.	$22.6M	$9.5M	2.4M lbs.	$4M
Jackson Co. (pop. 206,310)	3.6M lbs.	3M lbs.	$6.2M	$2.6M	600K lbs.	$1M
City of Bend (pop. 79,109)	1.4M lbs.	1.1M lbs.	$2.4M	$1M	200K lbs.	$374K
City of La Grande (pop. 13,048)	228K lbs.	187K lbs.	$393K	$165K	41K lbs.	$70K

Geographic Unit	Total Processed Pork	Processed Pork: Retail (76%)	Processed Pork at Home	Implied Wholesale (42%)	Proc. Pork: Foodservice (24%)	Implied Wholesale ($1.70 avg.)
Oregon (pop. 3,919,020)	111.6M lbs.	84.8M lbs.	$128M	$54M	26.8M lbs.	$45.6M
Multnomah Co. (pop. 756,530)	21.6M lbs.	16.4M lbs.	$24.4M	$10.2M	5.2M lbs.	$8.8M
Jackson Co. (pop. 206,310)	5.9M lbs.	4.5M lbs.	$6.8M	$2.9M	1.4M lbs.	$2.4M
City of Bend (pop. 79,109)	2.2M lbs.	1.7M lbs.	$2.6M	$1.1M	500K lbs.	$850K
City of La Grande (pop. 13,048)	372K lbs.	283K lbs.	$425K	$179K	89K lbs.	$151K

Table 8.3: Implied wholesale opportunity for pork.

The dollar figures above are rough estimates. Consumer spending estimates account only for the resident population, and do not take into account spending by tourists, business travelers, or others who may be present or pass through. Consumer spending figures also do not account for purchases by entities such as schools, hospitals, nursing homes, or prisons that do not pass the cost of food directly to consumers. (These purchases are addressed in more detail below, where information is available.)

It should also be reiterated that the large majority of pork consumed comes from lowest-cost commodity producer/processors. This has bearing on interpreting the scope of the implied wholesale opportunities referenced above.

Industry figures are that 18 percent of packaged pork products bore a "natural" claim in 2010—up from 9 percent in 2004. Opportunities for local and regional pork producers to capture a share of that market or to push that percentage higher vary by marketing channel.[151]

8.5. Market Channels

Pork makes its way from farm to market through a number of channels both direct and wholesale.

8.5.1. Direct Market—Custom Exempt

Farmers with access to "custom exempt" slaughter and processing can sell "locker pork" directly to consumers—though technically they are selling whole live animals or shares of whole live animals (halves or quarters). Under state license, farmers are not able to sell pork by the piece or by the pound.

[151] "A Snapshot of Today's Retail Meat Case," 2010 National Meat Case Study Executive Summary, 2010.

As an example, Wood Family Farm in the Willamette Valley offers customers whole or half hogs with a "hanging weight" of about two hundred pounds The price per pound paid to the farm is $3.35. Slaughter and processing charges bring the final cost to about $4.50/pound or higher depending on requests for curing and smoking. A half hog will end up costing $450 or more, but will provide 40 to 50 wrapped packages containing 60 to 70 pounds of chops, bacon, sausage, and ham. This will typically fill a standard refrigerator freezer.

Locker pork requires a significant commitment on the part of the customer to make a large upfront purchase, and then store and make good use of a large quantity of meat.

A farmer may produce eight thousand hogs for her own use or to sell as locker pork in Oregon, representing 1.1 million pounds of wrapped pork (at an average yield of 137 pounds of retail cuts per animal). If accurate, that figure represents 0.6 percent of the pork consumed in Oregon.

Given challenges at the farm, processor, and consumer levels, it is difficult to imagine sales of locker pork increasing dramatically in the near future—though that would be a very desirable outcome. Regardless, there is an argument for promoting and educating consumers about the benefits of locker pork.

8.5.2 Direct Market—Under USDA License

Farmers with access to USDA-licensed slaughter and processing are also selling individual cuts of meat direct to consumer at farmers' markets, thorough buying clubs, and even online. Producers using USDA processing also have the option of selling product to distributors, restaurants, retailers, and institutions.

Selling individual cuts of meat has its own challenges, including inventory management, more complicated pricing, and the need to find viable markets for all parts of the animal. Farmers are often in locations remote from both processors and end markets, requiring travel to deliver animals for processing, to develop and maintain relationships with buyers, and, in some cases, to actually fulfill ongoing orders for meat. There is also a lot of work involved in developing sufficient scale to be able to engage the interest of retail and foodservice customers, and ultimately enter distribution.

Considering the number of processing facilities and with limited and somewhat dated survey data on throughput, it can be estimated that there are likely fewer than four thousand hogs slaughtered in Oregon under USDA inspection each year that are not dedicated to the Carlton Farms brand. That would suggest a total of about 550,000 pounds of finished pork representing 0.3 percent of Oregon consumption.

8.5.3. Processing/Manufacturing

There are few examples of food processors/manufacturers sourcing pork raised and processed in Oregon to be featured as an ingredient in products. This requires traceability to the farm and access to USDA-licensed processing necessary for sale of finished products across state lines.

Several independent butcher shops, such as Gartner's Country Meat Market and Otto's Sausage Kitchen, offer fresh sausages and other cured and smoked pork products—and appear to source raw pork primarily from Carlton Farms.

Companies notable in Oregon that offer high-end processed pork products nationally, such as Tails & Trotters and Olympic Provisions, source from Pure Country Pork (Washington) and Carlton Farms, respectively.

8.5.4. Retail

US Census County Business Patterns data indicate there were 763 grocery stores and 56 independent meat markets in Oregon in 2012. Many grocery stores are outlets of major chains like Safeway and Kroger, which are likely too large to integrate smaller local pork suppliers—but do carry natural and organic products from multiregional and national companies. As an example, Hemplers Foods Group in Ferndale, Washington, has been successful placing its branded pork products (including hams, bacon, and sausages) in Safeway and Fred Meyer Stores.

However, there are also about 80 independent or natural food stores, like New Seasons Market (12 stores), Market of Choice (9 stores), Whole Foods Market (8 stores in Oregon), Zupan's (4 stores), and about a dozen cooperative grocery stores (like People's Food or Oceana Natural Food), that may be interested in relationships with local suppliers.

Per capita consumption figures and other industry data suggest that the 80 independent stores in Oregon could be vending 14.3 million pounds of pork annually (about 5.7 million pounds fresh and 8.6 million pounds processed)—or the equivalent of 104,000 hogs. This is more than four times Oregon's current production.

New Seasons Market has its store-brand ham cured by Hemplers Foods Group, using pork raised by Pure Country Pork (Washington) and Rieben Farms in Banks, Oregon. It was reported in 2007 that Rieben Farm managed 120 farrowings per year, suggesting production of twelve hundred finished hogs.[152] News Seasons also reportedly assisted Rieben Farms with construction of new hoop houses in 2009.

8.5.5. Restaurants

US Census County Business Patterns data indicate there were 3,974 full-service restaurants (not including limited service "fast food") and 123 catering companies in Oregon in 2012.

[152] "Niche outlet for Oregon pork production," Stuart Lam, Pig Progress, 2007.

Restaurant usage of pork is strongly correlated with breakfast and bacon, with 37 percent of "eatings" associated with breakfast sandwiches or burritos, and another 23 percent represented by servings of bacon alone or on hamburgers.

However, in Portland and Oregon's wine country, a number of restaurants are known to buy whole and half hogs, to conduct their own butchery and to prepare their own charcuterie. These include Higgins, Ned Ludd, Country Cat, Ciao Vito, and others.

The top 10 percent may be considered "fine dining" and more likely to be engaged in procurement of local products (though primarily through wholesalers). However, it is clear that interest in local and natural pork is widespread across the industry—including with fast casual restaurant chains like Burgerville, Dick's Kitchen, Little Big Burger, and others. Therefore a 20 percent slice of restaurants may be worth considering.

ERS figures for pork consumption by venue suggest that restaurants nationally serve more than 886 million pounds of fresh pork and 1.7 billion pounds of processed pork annually.[153] Dividing those figures by the 232,000 venues suggests each operator buys an average 3,820 pounds of fresh and 7,300 pounds of processed pork annually.

Using that estimate for 794 Oregon restaurants (top 20 percent) suggests a $15 million market for 3 million pounds of fresh pork and 5.8 million pounds of processed pork—or the equivalent of 64,000 hogs. This estimate is likely conservative.

8.5.6. Farm to Hospital

Health Care Without Harm (HCWH) is an international environmental health organization that supports sustainable food procurement at hospitals and healthcare facilities, including sourcing of antibiotic-free meat. A 2008 report by HCWH indicated that 44 percent of 112 hospitals surveyed were buying some quantity of hormone- and antibiotic-free meat, and that another 47 percent had plans to start sourcing such products.[154]

A follow-on survey by Oregon Physicians for Social Responsibility in 2009 resulted in detailed reports of pork purchases from four Portland area hospitals. Combined, the four institutions represent about 1,325 hospital beds and reported purchasing about 20,000 pounds of fresh pork (primarily loin chops) and 73,680 pounds of processed pork annually (primarily bacon, pork sausages, and ham).
Extrapolating from those 4 institutions to Oregon's 33 private hospitals and 6,008 total hospital beds, this suggests hospitals could represent a market for

[153] "Factors Affecting US Pork Consumption," Christopher G. Davis and Biing-Hwan Lin, USDA, ERS, 2005.

[154] "Menu of Change: Healthy Food in Health Care," Health Care Without Harm, 2008.

91,000 pounds of fresh pork and 334,000 pounds of processed pork—or the equivalent of 3,100 hogs per year.

With an additional 12,403 beds in Oregon's licensed nursing care facilities, there is potential for the health care sector's demand to be even greater.

Conclusions should be tempered with the knowledge that price remains a major consideration for foodservice in healthcare. Most pork purchases reported are from large, conventional suppliers, such as SYSCO, Swift, and Hormel. The added value of local products from smaller farm suppliers may not be enough to justify paying a price premium.

8.5.7. Farm to School

School Food FOCUS is a national collaborative that is working with fifteen large school districts across the US (including Portland Public Schools and the Beaverton School District) to make school meals nationwide healthier, regionally sourced, and sustainably produced, and has made antibiotic-free meats a priority.

In Oregon, approximately 24 percent of school food budgets are spent on local food—the highest percentage in the nation. (USDA, 2014) Schools, with limited budgets and limited ability to prepare fresh foods, offer an interesting procurement challenge. Portland Public Schools (PPS) has enrollment of about 46,000 students, serves 11,000 breakfasts (24 percent participation) and 21,000 lunches daily (46 percent participation).

PPS does list Zenner's Sausage Company as a local/regional supplier, and features Zenner's all-beef hot dogs on menus. Zenner's also offers a full line of fresh and cooked pork sausages. Information was not available on the source of pork used in Zenner's products.

Offering 3-ounce portions of pork sausage or ham for 11,000 breakfasts would require 2,063 pounds of pork. Offering the same serving as part of a 21,000-lunch seating would require 3,938 pounds of pork.

Extrapolating to the 567,000 students enrolled in districts across Oregon suggests 25,500 pounds would be required each time pork sausage or ham was served for breakfast, and 49,000 pounds for each lunch. If sausage from local pork were featured monthly during the school year on both menus, that suggests a need for 3.6 million servings—670,000 pounds or the equivalent of 4,900 hogs.

Extending that scenario to serve sausage monthly to the approximately 190,000 students enrolled in Oregon universities and colleges suggests a need for another 225,000 pounds of pork per year—the equivalent of 1,640 hogs. Universities and colleges would also have more opportunity to utilize fresh pork in dining halls—for example, serving pull-pork or carnitas from less expensive pork shoulder roasts

The combined total for education is 895,000 pounds or about 6,540 hogs.

8.6. Demand Summary

Combining the estimates provided for retail, restaurants, hospitals, and educational institutions suggests there is potential demand in Oregon for about 24.4 million pounds of pork that offers a combination of desired attributes including: local/regional, antibiotic free, hoop house–raised or pasture-raised. This is the equivalent of about 120,000 hogs.

The total represents about 13.6 percent of pork consumed in Oregon—and more than five times the number of hogs produced in Oregon each year.

The breakdown by channel is approximately as follows:

- Retail: 59% ~14.3 million lbs. (40% fresh/60% processed) 104,000 hogs
- Restaurants: 36% ~8.8 million lbs. (34% fresh/66% processed) 64,000 hogs
- Hospitals: 1.5% ~425,000 lbs. (21% fresh/79% processed) 3,100 hogs
- Education: 3.5% ~895,000 lbs. (10% fresh/90% processed) 6,540 hogs

An unknown percentage of this demand is currently being met by Carlton Farms and by other small regional pork producers with access to USDA slaughter and processing. The online AMFIBI business directory estimates that Carlton Farms annual sales are between $12.5 and $15 million. A conservative estimate would be that existing regional pork brands are meeting less than 20 percent of the potential demand in Oregon identified above, and only by drawing large numbers of hogs from out of state.

8.7. Oregon Pork Production

The 2012 USDA Census of Agriculture shows a total of 1,172 farms in Oregon reported sales of hogs and pigs. The number of farms is down 20 percent from 2007 (294 fewer farms).

Oregon farmers sold a combined total of 23,063 hogs/pigs in 2012 with a total estimated value of $3.195 million. This is a 52 percent decline in the number of animals since 2007 (24,800 fewer), and a 44 percent decrease in total value (down $2.467 million).

Smaller-scale hog production tends to yield animals with weights below the conventional target of 240 to 270 pounds live-weight at slaughter. Using an average weight of 240 pounds with a standard yield of 57 percent for edible retail cuts, Oregon farmers produce enough hogs to generate 3.2 million pounds of finished pork.[155] This is sufficient to satisfy less than 2 percent of in-state consumption of pork. (Hog production is of similar scale in Washington, with some 27,000 animals sold in 2012, and appears to be growing rapidly in Idaho, with sales more than doubling from 66,000 animals in 2007 to 145,000 in 2012.)

[155] "How Much Meat?" Oklahoma Dept. of Agriculture, Food, & Forestry, (n.d.).

Of all farms reporting sales of hogs and pigs in 2012, 87 percent sold fewer than 24 head (1,014 farms). Combined, those smallest farms represented 5,465 head (an average just over 5 animals per farm).

The 143 farms in the low-middle, with sales between 25 and 200 head, sold a combined 8,118 animals (an average of 57 per farm).

Twelve farms in the high-middle, with sales between 200 and 500 head, sold a combined 3,203 animals (an averaged 267 per farm).

The 3 largest farms sold a combined 6,277 animals. One farm sold between 500 and 1,000 animals. Two farms sold over 2,000 animals. It is presumed that farms in this top tier either sell to Carlton Farms or have animals processed for sale to the New Seasons Market grocery store chain.

While there are probably opportunities for midsized and smaller farms to capture a larger share of Oregon's demand for both fresh and processed pork, the first step will have to be increasing hog production. The key questions are what it might take to incentivize producers to step up from 5 animals per year, to 50, to 250 and possibly beyond, what production systems are best suited for Oregon, and what capital costs might be involved.

8.8. Small Pork Producer Challenges

Hogs can be raised year-round, with farrowing of piglets timed to allow sequential harvest of finished hogs at about six months of age. However, some structure is required to support farrowing in winter months, which adds to both cost and labor.

A 2004 study of niche pork at Iowa State University notes:

> "One of the challenges for pork niche marketers is maintaining a steady supply of pork. Because most of the markets require that pigs be born outdoors or on bedding, a majority of the pigs are farrowed outdoors during favorable periods, such as late spring through early fall in the Midwest. Indoor farrowing is avoided because of high labor requirements, cold temperatures, lack of facilities, or high piglet disease. This creates a shortage of marketable pigs during the summer for many niche markets. Some niche markets will not accept new producers unless they agree to farrow pigs during the winter. Farmers have tried various approaches to improve alternative winter farrowing systems. Many involve using the outdoor farrowing huts in various indoor structures including pole barns, greenhouses, and hoop barns. Supplemental heat is essential."[156]

[156] "The Pork Niche Market Phenomenon," Mark Honeyman, R. S. Pirog, G. Huber, Animal Industry Report, 2004.

USDA SARE describes potential costs:

> "Originally developed in Canada, 'hoops' usually hold up to 250 hogs on an earthen floor that is heaped with a generous amount of bedding. The structures are topped with 15-feet-high steel arches covered with fabric tarps. Iowa State University researchers found that initial investment was about one-third cheaper for hoop barns than confinement barns. Confinement operations cost a producer $180 per pig space versus just $55 for a space in a hoop structure. Initial hoop barn construction costs vary from $9,000 to $16,200 to hold 200 head—compared to $150,000 to $200,000 for confinement structures that hold 1,000 head."

ERS figures from 2008 show feed representing 41 percent of production costs for a farrow-to-finish operation—and feed costs in the Northwest are another limiting factor for pork production. Other more recent estimates show feed running as high as 65 percent of all costs. One small-scale Washington producer in 2010 described feeding a pig 600 to 800 pounds of feed from wean to finish with feed at a cost of $290 per ton. In 2013, Wood Family Farm noted it was paying $590 per ton for feed.[157]

However, it is possible to grow or source and mill appropriate feeds in the Northwest. Rieben Farm in Banks, Oregon, grows two hundred acres of wheat, alfalfa, oats, and clover, which is milled on-farm for feed. Heritage Farms Northwest in Dallas, Oregon, raises its hogs on grass and clover pasture, and supplements their diet with wheat (purchased from a neighbor) and 10 percent soy meal for added protein.

A 2012 study at the University of Illinois on factors affecting the profitability of niche pork enterprises suggests:

> "Producers should focus on controlling costs, especially feed costs, and improving breeding and farrowing efficiency. Production efficiency is important throughout the farrow-to-finish enterprise. Feed conversion ratios are key in the grow-out phase and litters weaned per sow per year seem to be the more crucial variable to efficient breeding and farrowing. Years of niche experience (which is beyond the control of the producer) adds to the overall management efficiency of the operation. Finally, the one area where niche production differs from conventional production is supply chain partnering and further specialization of products. Overall firm profitability may be enhanced by carefully choosing marketing partners and targeting specialty markets within the niche pork segment."[158]

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[157] "How Much Does it Cost to Raise a Pig: July 2010," Bruce King, Meat, 2010.

[158] "Determinants of Profitability in Niche Swine Production," Dwight Sanders, Ira Altman, Gary Apgar, Journal of the ASFMRA, 2012.

8.9. Oregon Pork Processing

The Niche Meat Processor Assistance Network lists ten USDA slaughter facilities in Oregon that as of October 2012 are accessible to producers.

- Bartels Packing, Eugene
- Carlton Packing Co, Carlton
- Central Oregon Butcher Boys, Prineville
- Dayton Natural Meats, Dayton
- Malco's Buxton Meat, Sandy
- Marks Meats, Canby
- Mohawk Valley Meats, Springfield
- Mt. Angel Meat Company, Mt. Angel
- Oregon Beef Company, Madras
- Stafford's Custom Meats, Elgin

ODA reported in 2009 that Oregon is also home to:

- 50 USDA inspected meat processors (no slaughter—secondary processing only)
- 55 custom mobile slaughter trucks
- 12 custom slaughterhouses
- 86 custom meat processors

There are typically two models for plants: "slaughter-processing" companies that buy live animals and sell meat and "custom slaughter" companies that provide fee-for-service processing. The Agricultural Marketing Service notes:

> "The cost of acquiring hogs typically comprises 70 percent of the cost of the slaughter-processing company. This cost runs higher for niche hogs such as organic. The kill and cut costs for a large, well-capitalized multi-plant operation employing two shifts range from $10 to $12 per hog. Smaller plant costs are in the mid-teens. Most custom slaughter operations charge about $25 per pig broken into sub-primals with some a little higher, depending on the volume. Additionally, most packing plants have some sort of scheme to pay the producer for those edible items that he/she does not take. Normally these prices are at the low end of the commodity range for the items. All custom operations keep the "drop" or byproducts, which are worth $3 to about $8 per head, depending whether the pig is skinned. Another major challenge is that everybody wants to sell the loin, which represents just less than 20 percent of the carcass. There is really no romance in the hocks, spare ribs, back ribs or any shoulder meat that may be sold as fresh meat. Thus, with only about one-third of the pig being sold as fresh meat, the balance is further processed primarily into ham, bacon and sausage."

A 2009 study in Georgia concluded that a small slaughter-processing plant could be operated profitably:

> "The business model under consideration will process natural pork carcasses for sale in the wholesale and retail markets. The animals are slaughtered off-site and then returned to the plant for fabrication. The plant is assumed to operate 5 days a week year round. The expected processing throughput is 11 head per day. Based on these assumptions, the estimated annual head slaughtered would total 2,750. . . . Assumptions set forth in this analysis include a 78 carcass weight and 69 turnout of products available for sale from of a 260 lb. live weight animal. The resulting carcass is 203 , which is sold at an average price of $2.15 per pound. Other sales reflect the resulting products available after cutting at 69 of live weight, or 180 of product. The average price per pound utilized for other sales is $3.02, which represents a weighted average of historical sales by product per carcass. Operating and fixed costs were estimated for this venture based on historical costs and prior feasibility studies . . . the total projected operating costs total $1,170,924 and total fixed costs are estimated to be $56,665 per year. The resulting total annual costs are just under $1.228 million or $446.40 per head processed. Direct animal cost and labor and benefits represent the two largest expenditures of total operating cost at 37% and 22% respectively. Revenue projections were estimated based on current sales. It was assumed that 67% or the total output would be sold to a supermarket chain. The remaining 33% will be marketed to local retailers and through an on-site retail outlet. Average prices and cuts were utilized to project a price per pound . . . carcasses sold to the supermarket chain is assumed to be $2.15. . . . For all other sales, a blended average price of $3.02 is assumed. The projected product sales per carcass for other sales are assumed to be 180 pounds. Given the estimated revenue of $1.296 million and total cost for the facility of $1.227 million, the estimated net income is $68,868 for a return of $25 per head. The resulting return on investment is 20%."[159]

One major benefit of expanding hog production in Oregon would be increased need for year-round processing. That would help keep existing plants going in winter months, when they may be shuttered following the fall rush to harvest and process cattle. That would in turn help attract and retain skilled staff.

8.10. Support Infrastructure for Pork

Beyond processing capacity, it is important to consider other support infrastructure necessary for production and marketing of pork.

8.10.1. Feed

Feed is the major input for pork production, accounting for as much as 65 percent of production costs. A variety of feeds are used, including corn, barley, sorghum, oats, and sometimes wheat. Distillers' grain (spent barley from brewery operations) is also used. There is also a tradition of feeding hogs wastes and expired products from dairies, bakeries, and other food-processing

[159] "Feasibility of Locally Processed and Branded Pork Products in South Georgia," Audrey Luke-Morgan, The University of Georgia, College of Agricultural and Environmental Sciences, 2009.

businesses. Finding a regular, reliable, and cost-effective source of feed will be critical to scaling local pork production.

8.10.2. Rendering

As with beef, better access to rendering for wastes could reduce pork-processing costs and improve profitability.

8.10.3 Cold Storage

Costs to build dedicated cold-storage facilities may have to be considered.

8.10.4. Distribution

Smaller local or regional pork producers are unlikely to see their products carried by large broadline distributors such as Food Services of America or SYSCO. Once some scale is achieved, there may be opportunities to work with associated businesses, such as Fulton Provision Company (owned by SYSCO). There are also some smaller, specialty distributors that may offer more immediate support. These include companies like SP Provisions, and Nicky USA.

8.11. Paths Forward

There appear to be at least three paths forward for further development of local/regional hog production, processing, and marketing.

8.11.1. Farmer-Marketer Model

Pure Country Pork is a farrow-to-finish farm that raises hogs in open-air hoop houses using a deep-bedded straw system over a concrete slab (avoiding high infrastructure costs). The operation is Food Alliance certified for sustainable practices and humane animal care, and does not use antibiotics or feeds derived from animal proteins. Hogs are fed Non-GMO-certified Northwest grains and pulses (triticale, wheat, barley, and peas), with supplemental vegetable protein, flax seed, vitamins, and minerals. Manure is composted with straw and used to fertilize surrounding grain fields. Pictures on the farm website show hogs in the various stages of the operation and contribute to transparency. Pure Country markets pork direct to consumers, at a local farmers' market, and to natural food stores including twelve New Seasons Market stores in Oregon and ten PCC Market stores in Washington—as well as to customers as far away as Japan seeking high quality, natural pork. Pure Country raises small groups of hogs to customer specifications using custom feed regimes. (See Tails & Trotters below.) Owner Paul Klingeman is also a marketer for the White Trail hog pool, helping connect other regional producers and packers. Having lower infrastructure costs, market diversity, and customer loyalty has helped Pure Country weather cycles that have led other Northwest hog producers to close.

8.11.2. Brand Led Value Chain Model

Tails & Trotters is a fresh and processed pork wholesale, retail, and restaurant operation developed by entrepreneurs Aaron Silverman and Mark Cockcroft. (Aaron was also the owner of Greener Pastures Poultry, discussed in the chapter on chicken.) Tails & Trotters (T&T) differentiates its products with

a USDA-verified "hazelnut finished" feed regimen for its hogs. This creates unique flavor and marbling desirable for production of Tails & Trotters prosciutto, other high-end cured meats such as guanciale and pancetta, and specialty products such as pâtés and sausages. The company operates a small retail butcher shop and deli counter, but otherwise owns no infrastructure. Instead Tails & Trotters has worked carefully to develop "value chain" partnerships with a number of regional business partners. Over time these have grown to include: a hazelnut grower and packer, a mid-sized hog farmer (Pure Country Pork), a USDA-licensed slaughter and processing facility (Carlton Farms), a USDA-licensed secondary processing facility and regional meat distributor (Nicky's USA), an Oregon-licensed commercial kitchen, and a national distributor. Production began in 2009. The company won a national Good Food award for its "porkstrami" in 2012. Tails & Trotters now services wholesale accounts including butcher shops and some three dozen restaurants in Oregon and Washington. Using existing infrastructure has helped keep business investment costs low while the company developed products, markets, and sales to support further growth. Plans call for construction of a USDA-certified meat processing and curing facility.

8.11.3. Contracted Supply Pool Model

New Seasons Market operates a dozen natural food stores in the Portland area, and prioritizes local and regional products, which are identified in the store with shelf tags. New Seasons Market operates full service butcher counters and has capacity to receive and break down "primal cuts" of pork, beef, and lamb into retail cuts for the meat case. New Seasons Market contracts with Pure Country Pork and Rieben Farms for hogs, which are slaughtered and processed at Dayton Meats (owned by Chuck Eggert, CEO of Pacific Foods, who was one of the three founders and a lead investor in New Seasons Market). New Seasons Market fabricates fresh sausages in its stores, but contracts curing of hams to Hemplers Foods Group in Washington. New Seasons Market does purchase Carlton Farms products to fill the meat case, but is actively seeking additional local suppliers for meat products for its private label brand, and has even offered small loans to help suppliers expand. The company also has a preference for products that are third-party certified organic, Non-GMO, or under other programs that provide assurance for humane care and sustainability. News Seasons's close and committed relationship with farmers helps ensure supply and supports communication of the "farm story" to customers seeking high-quality, local, "values-added" products.

8.11.4. Analysis

There are no clear prospects for expanding or replicating the farmer-marketer model in Oregon in the immediate future with the rate at which hog farmers have been exiting production over the last five years and the fact that there is no farmer-led pork brand in the state operating at medium scale (as with Painted Hills Beef or Umpqua Valley Lamb). However, the space seems ripe for a farmer-entrepreneur to step forward, who might eventually work collaboratively with other farmer partners to develop markets and fulfill demand.

The brand-led value chain model also seems challenging. Tails & Trotters value proposition is based on a unique feeding regimen involving hazelnuts, which requires a relationship with the farm to achieve. Founder Aaron Silverman has said definitively that he did not see any farm in Oregon capable of delivering the number of hogs needed that would meet his specifications. Tails & Trotters has also—due to necessity—been willing to accept whole carcasses and work creatively to develop markets for fresh and processed products that will utilize all cuts from the animal. Other producers and purveyors of high-end cured meats, such as Olympic Provisions, offer gourmet quality—but meet ingredient needs at lower risk, buying only cuts needed from Carlton Farms.

The contracted supply pool model seems promising with the implicit market pull. The question is why a willing customer like New Seasons Market would have trouble finding suppliers of local pork to meet its goals. Part of the challenge may be perception—that hog farming as conventionally practiced is capital intensive and unpleasant (with confinement, manure lagoons, odors, etc.) reducing quality of life and leading to conflicts with neighbors. Part of the challenge is likely a commodity mindset, which dictates that Northwest hog producers will never be able to compete on cost with Midwest producers (due to scale and feed costs). And part is certainly a lack of knowledge and experience with relatively new hoop house and pasture systems.

Conclusions

Ecotrust's assessment of demand for local/regional pork products suggest a potential market for 120,000 hogs or about 24.4 million lbs. of fresh and processed pork. The total represents about 13.6% of pork consumed in Oregon, and more than five times the number of hogs currently produced in Oregon.

Oregon hog producers are likely meeting less than 1 percent of state demand for pork products and have a fourteen-times market development opportunity—though finished cost of goods will be a factor realizing that potential.

Pure Country Pork in Washington has shown it is possible to raise hogs in hoop houses profitably in the Pacific Northwest. There are also demonstrably willing buyers for additional hogs raised in that system.

The initial challenge may be perceptual. Why don't Oregon farmers see an opportunity to sell hogs or develop their own pork brands? Concerns about capital investment costs, feed costs, and quality of life likely play a role. A survey to assess perceived barriers, outreach to build awareness of potential opportunities, and education on hoop house and pasture production systems could be valuable.

The 120,000 hogs necessary to meet demand referenced above imply construction of some three hundred hoop houses at a minimum cost of $3.9 million ($13,000 per) for concrete slabs, metal bracings, covering materials,

and some interior fixtures. Additional costs may include fencing, feed storage, and milling facilities, loading docks, road building, etc.

Estimates are that 120,000 hogs will also consume 84 million pounds of feed. Since feed reportedly represents 41 percent to 65 percent of production costs, it is a significant challenge for commodity producers competing with large hog operations in the Midwest—but may be less of a factor for farmers pursuing local, regional, and other "values-added" opportunities. A number of Northwest producers are already operating their own small feed mills and utilizing local grain and pulse crops as inputs—and "closing the loop" by offering composted hog manure as fertilizer for crop production.

There are significant potential benefits to increasing hog production and processing in Oregon.

The Leopold Center for Sustainable Agriculture has estimated that for small facilities in Iowa each 1,000 hogs processed support 3.2 jobs and $110,361 in local wages. Applying that finding to the 120,000 hogs this report estimates might be required to meet demand for local pork suggests an industry that supports 384 jobs and $13,243,320 in local wages annually.

Grain and pulse producers would certainly benefit from a growing local market for animal feed. Demand from hog producers would also aid chicken producers, who would benefit from increasing availability and possibly reduced cost for feed.

In addition, a major benefit of expanding hog production in Oregon would be increased need for year-round slaughter and processing. That would help keep existing multispecies processing plants active in winter months, when they may be shuttered following the fall rush to harvest and process cattle. That would in turn help attract and retain skilled staff, spread operating costs to increase profitability and even reduce processing costs to producers, and even justify additional investment in equipment, facilities, and other capacity.

Expansion of hog production could therefore be valuable not only for its own sake, but also to support the development and profitability of both the chicken and beef industries.

9

Small Grains and Legumes

Photo courtesy JR Anderson

9.1. Introduction to Small Grains at the National Level

Small grains are a family of cereal crops that include wheat, rye, rice, oats, barley, and less common varieties of the same such as triticale, spelt, emmer, and kamut.

Wheat is further divided into six classifications:[160]

- Hard Red Winter (HRW)
- Hard Red Spring (also referred to as Dark Northern Spring, DNS)
- Hard White (includes both spring and winter varieties)
- Soft Red Winter
- Soft White
- Durum

The hard wheat varieties have higher levels of protein and are typically used for making all-purpose flour and breads. Spring varieties have higher proteins than winter varieties. Durum, a spring wheat, with the highest levels of protein, is commonly used for semolina and Italian style pastas. The soft wheat varieties have lower protein and are typically used for Asian noodles, cakes, pastries, crackers, muffins, and biscuits.

With barley, there is a distinction between malt quality barley (for brewing and distilling) and feed barley for animals. Within each of these there are subcategories for specialized applications. Approximately 51 percent of the US barley crop goes to animal feed, 44 percent is used for malt production, 3 percent as seed, and only 2 percent for food products.[161]

The National Agricultural Statistics Service reports regularly on production of small grains.[162]

Crop	Harvested Area	2014 Bushels	Pounds per Bushel	2014 Pounds
Wheat	46.5 million acres	2.04 billion	60	122.4 billion
Winter Wheat		1.38 billion		82.8 billion
Spring Wheat		601 million		36.1 million
Durum Wheat		57.1 million		34.3 million
Oats	1.04 million acres	70.5 million	32	2.26 billion
Barley	2.46 million acres	180 million	48	8.64 billion

Table 9.1: Production of small grains.

The Economic Research Service tracks per capita consumption of grains as food (farm level weights). The figure for barley does not include malt barley used for production of alcohol or animal feed.[163] (2010 figures are presented, as more current figures are not available for all categories.)

[160] "What Classes," US Wheat Associates, (n.d.).

[161] "Industry Facts," Barley News (n.d.).

[162] "Small Grains: 2014 Summary," USDA, NASS, 2014.

[163] "Food Availability (Per Capita) Data System: Overview," USDA, ERS, 2014.

Table 9.2: Per capita consumption of grains as food.

Flour and Cereal Products	2010
White and Whole Wheat Flour	122.4 lbs.
Durum Flour	12 lbs.
Rye flour	0.5 lbs.
Oat products	5.2 lbs.
Barley products	0.7 lbs.

Related estimates are that Americans on a per capita basis consume an average of 53 pounds of bread and 19.5 pounds of pasta per year.[164]

Small grains are commonly grown in rotations with legumes (pinto beans, black beans, chickpeas, lentils, field peas, etc.), other minor grains (millet, sorghum, amaranth, quinoa, buckwheat, teff, etc.), oil seeds (flax, safflower, sunflower, canola, mustard, etc.), and other forage crops (clover, alfalfa, etc.). These rotations can stretch three to nine-plus years, and are intended to control weeds/pests and promote soil health and fertility.

Figures for total US production of common legumes are:

Table 9.3: Total US production of common legumes.

Legumes	2012
Pinto Beans	1.35 billion lbs.
Navy Beans	491 million lbs.
Great Northern Beans	122 million lbs.
Black Beans	374 million lbs.
Red Kidney Beans	171 million lbs.
Dry Lima Beans	53 million lbs.
Other Dry Beans	629 million lbs.
Dried Peas, Chick Peas and Lentils	1.5 billion lbs.
Total	**3.19 billion lbs.**

Approximately 20 percent of US beans [165] and more than 70 percent of dried peas and 90 percent of chickpeas and lentils[166] are exported.

Economic Research Service estimates for per capita consumption of legumes includes breakouts for six bean types and a summary for "other dry beans."[167]

9.2. Segmentation, Key Issues, and Trends

2012 US Census figures for concentration of market value show that nationally there were 503,315 growers of grain, oilseeds, dry beans and dry peas.[168] About 81 percent of those growers manage fewer than 500 acres. The top 17 percent of those growers—most of whom manage 1,000 acres or more—represented 75 percent of all sales.

Grain can be grown in a "dryland" system taking advantage of natural precipitation (common in the Pacific Northwest), or with the aid of irrigation. Tillage (plowing) is commonly used to control weeds, prepare fields for planting, and incorporate crop stubble back into the soil. However, tillage contributes to water and wind erosion, and over time can result in a "hard pan" of compacted soil, which resists absorption of water and penetration

[164] "Wheat Info," National Association of Wheat Growers, (n.d.).

[165] "Production Facts & FAQs," US Dry Bean Council, (n.d).

[166] "USA Dry Pea, Lentil & Chickpea Production," USA Dry Pea & Lentil Council, (n.d).

[167] "Food Availability (Per Capita) Data System: Overview," USDA, ERS, 2014.

[168] "Farms by Concentration of Market Value of Agricultural Products Sold: 2012," USDA, NASS, 2012.

Legumes	2012
Pinto Beans	2.7 lbs.
Navy Beans	0.9 lbs.
Great Northern Beans	0.2 lbs.
Black Beans	0.7 lbs.
Red Kidney Beans	0.4 lbs.
Dry Lima Beans	0.1 lbs.
Other Dry Beans	1.6 lbs.
Dried Peas, Chickpeas, and Lentils	0.1 lbs.
Total	**6.7 lbs.**

Table 9.4: Per capita consumption of legumes.

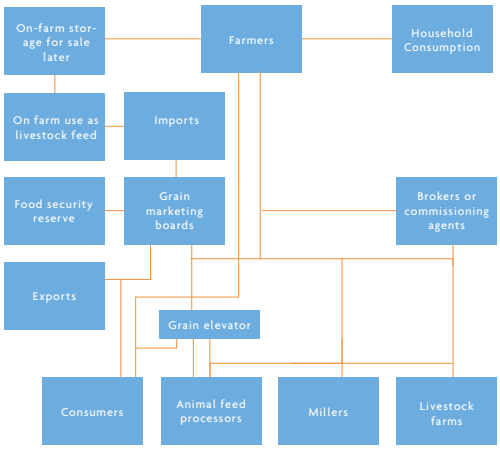


Figure 9.1: Wheat industry process flow.

by plant roots. This has led to the development of "conservation tillage" techniques (such as strip till, ridge till, and mulch till), which maintain at least 30 percent soil coverage. A further extension of that strategy is "no-till" or "direct seed," with farmers using specialized machinery to "drill" seeds and fertilizers directly into the residue of the previous crop and minimize soil disturbance. This has been shown to reduce erosion and increase soil "tilth" (higher organic matter and more open structure) which in turn increases the ability of soil to retain moisture—critical in dryland farming.

Wheat is a traded commodity, with prices typically set in three key US wheat markets: the Chicago Board of Trade, the Kansas City Board of Trade and the Minneapolis Grain Exchange.
Farmers commonly deliver wheat and other grains to a local elevator, but may store a portion of the crop on-farm or in contracted storage for their own use or with plans for later sale at a better price.

Consumer interest in alternatives to "conventional" grains and legumes has been stoked by:

- Concerns for health and food safety:
  - Increasing interest in whole grains and heirloom grains.
  - Increasing interest in legumes as a source of protein.
  - Belief that a gluten-free diet will lead to better health.
  - Concerns about GMO crops and use of pesticides such as glyphosate.
- Concern for the environment:
  - Water quality issues due to farm run-off related to the use of commercial fertilizers and pesticides.
  - Soil erosion and the flow of excess nutrients and bio-solids into water systems, with linkages between Midwest grain production and the growing "dead zone" in the Gulf of Mexico.
- Interest in unique, high-quality local foods and a desire to support local farm economies.
  - Resurgence of interest in artisan bread and home baking.
  - Emerging craft brewing and distilling industry.

Alternative value options to conventional commodity grains and legumes discussed in this report include:

- Organic
- Non-GMO
- No-Till/Direct Seed
- Heritage and specialty grains and legumes
- Local products from small and mid-sized farms offering one or more of the above attributes.

9.2.1 Organic

"Organic" certification is regulated by the USDA, requires a third-party audit, and regulates the origin of fertilizers and pesticides used on the farm. Consumers associate organic with the absence of chemical fertilizers or pesticides, although approved amendments and treatments may be used. Buying organic is also seen as a way to avoid GMO exposure. ERS figures

show that acreage dedicated to organic grain production in the US increased 94% from 2001 to 2011 (from 454,600 acres to 883,600 acres). During the same period, acreage dedicated to organic dry beans, lentils and peas increased 91% percent (from 24,400 to 46,500 acres).

ERS figures also show that farmers received a significant premium for organic grain. For example, in 2013 farmers received an average price of $7.03 per bushel of hard red winter wheat for conventional ($0.12/pound) versus over $14.00 for organic ($0.23/pound).[169]

9.2.2. Non-GMO

There are currently no GMO varieties of wheat, oats, or dried beans approved for human consumption. However, there are GMO varieties of corn, soybeans, canola, and alfalfa, which may be grown in rotations with wheat. The Non-GMO Project identifies wheat as a "monitored crop" due to reported incidences of contamination and risk for cross-pollination.[170] Non-GMO Project Verified claims to be the fastest growing label in the natural products industry, representing $7 billion in annual sales and more than twenty-one thousand verified products, including grains, beans, flours, and baked goods.

9.2.3. No-Till/Direct Seed

Food Alliance and the Pacific Northwest Direct Seed Association have developed certifications for "No-Till" or "Direct Seed" systems. Consumer understanding of no-till is limited, but the term has increasing credence with commercial buyers for bakery ingredients, baking mixes, and finished goods.

9.2.4. Heritage and Specialty Grains

There is increasing interest in so-called heritage grains—Einkorn, Emmer, Kamut, and other rare "landrace" varieties of wheat, barley, oats and rye which claim to offer unique flavor and baking qualities—and in specialty grains, including Amaranth, Buckwheat, Millet, Quinoa, Spelt, and Teff. Many of the specialty grains are marketed to offer better nutrition than conventional grain varieties and as a gluten-free alternative to wheat and barley.

9.2.5. Local and Regional

There are a growing number of examples around the country of independent farmers and small groups of farmers investing in small-scale seed cleaning and milling capacity in order to market whole grains, beans, and flours direct to consumers or to commercial food buyers (retail, restaurants, food service). Oregon examples include Camas Country Mill (Eugene, Oregon) and Green Willow Grains (Tangent, Oregon). Traceability and source-identity have emerged as key issues in grains, according to retail buyers we interviewed.

Shepherd's Grain (regional—California, Idaho, Oregon, Washington, western Canada) offers an example of growers organizing to develop a brand and work with value-chain partners (millers, distributors, food product manufacturers,

[169] "Organic Production: Overview," USDA, ERS, 2013.

[170] "What Is GMO," The Non-GMO Project, (n.d).

commercial bakers, foodservice, retail brands, etc.) to enable flow of products to markets.

9.3. Markets for Alternative Grains

Price differences for flour and grain/legume products observed in Portland January 2015 include:

Table 9.5: Price differences for flour and grain/legume products observed in Portland, January 2015.

	Major Grocer	New Seasons Market	Hummingbird Wholesale Buyers' Club
Packaged All-Purpose Flour			
Kroger	$0.42/lb.		
Western Family		$0.49/lb.	
Gold Medal	$0.59/lb.	$0.59/lb.	
Stone-Buhr	$0.75/lb.	$0.99/lb.	
Fisher - Shepherd's Grain: NW—Sustainable		$1.00/lb.	
King Arthur	$1.02/lb.		
Camas Country Mill: Oregon Grown			$1.28/lb.
Gold Medal: Organic	$1.32/lb.		
Bob's Red Mill: Organic	$1.34/lb.	$1.26/lb.	
Camas Country Mill: Organic, Oregon Grown			$1.55/lb.
Green Willow Grains: Organic, Oregon Grown		$1.60/lb.	
Camas Country Mill: Heirloom Red Fife, Oregon Grown			$2.57/lb.
Packaged Rolled Oats			
Bob's Red Mill	$3.00/lb.	$2.00/lb.	
Bob's Red Mill: Organic		$2.75/lb.	
Green Willow Grains: Organic, Oregon-Grown		$3.00/lb.	
Packaged Dried Legumes			
Pinto Beans	$0.80/lb. Kroger		
Green Lentils	$1.39/lb. Kroger	$2.36/lb. Bob's Red Mill	
Navy Beans	$1.49/lb. Kroger		
Black Beans	$1.59/lb. Kroger		
Red Kidney Beans	$1.90/lb. Kroger		
Green Lentils: Organic	$2.99/lb. Simple Truth		
Black Beans: Organic	$2.99/lb. Simple Truth		
Bulk Goods			
All-Purpose Flour	$0.69/lb.	$1.29/lb. Organic	
Rolled Oats	$0.89/lb.		
Rolled Oats: Organic	$1.69/lb.	$1.49/lb.	$1.07/lb. Montana
Dry Green Lentils	$1.12/lb.	$2.19/lb. Organic	$1.44/lb. Hunton's Farm, Oregon
Dry Black Beans	$1.49/lb.	$2.69/lb. Pacific NW	$1.49/lb. Organic, North Dakota
Dry Navy Beans	$1.64/lb.	$2.99/lb. Organic	$1.55/lb. Organic
Dry Pinto Beans	$1.89/lb.	$2.19/lb.	$1.39/lb. Organic
Dry Red Kidney Beans	$2.24/lb.	$2.69/lb.	$1.68/lb. Organic

As with other products studied in this report, despite the potential to realize higher prices overall for differentiated products, midsized and smaller scale farmers pursuing niche markets must earn a margin that enables profitability in spite of typically higher per unit production, processing, and marketing costs.

9.4. Demand for Small Grains and Legumes in Oregon

Understanding market demand is critical to evaluating potential investments to increase production and profitability of local and alternative grains and related rotation crops.

9.5. Consumer Spending on Grains and Legumes

According to the Bureau of Labor Statistics, the average household (2.6 persons) in the western US spent $7,180 in 2013 on food at home (59 percent) and away (41 percent) in 2013.[171] This includes $188 spent on cereals and cereal products, and another $356 spent on bakery products—both for at home consumption. Spending on legumes is not called out.

In 2014 Packaged Facts reported,

> "The biggest shift in bread consumption over the last 10 years is the increase in whole wheat bread [accounting for 53.8% of usage rates for bread in 2013 vs. 45% in 2004]." That report continued: "Shelf-stable breads should continue to decline in both volume and dollars. More consumption of higher-priced, healthier breads could mitigate overall volume drops and prop up dollar sales."[172]

Using population data and the figures above, it is possible to form estimates of the consumer market for grains and legumes in Oregon, at the county level or for municipalities.

[171] "Region of residence: Annual expenditure means, share, standard errors, and coefficient of variation," Consumer Expenditure Survey, US Bureau of Labor Statistics, 2014.

[172] "56% of US shoppers say they are cutting back on white bread, says Packaged Facts," Elaine Watson, William Reed Business Media, 2014.

The estimates for Oregon consumption of grain and grain products are as follows:

Geographic Unit	Wheat Flour	Durum Flour	Rye Flour	Oat Products	Barley Products
Oregon (pop. 3,919,020)	185M lbs.	18.1M lbs.	754K lbs.	7.8M lbs.	1.1M lbs.
Multnomah Co. (pop. 756,530)	35.6M lbs.	3.5M lbs.	146K lbs.	1.5M lbs.	204K lbs.
Jackson Co. (pop. 206,310)	9.7M lbs.	952K lbs.	40K lbs.	413K lbs.	56K lbs.
City of Bend (pop. 79,109)	3.7M lbs.	365K lbs.	15K lbs.	158K lbs.	21K lbs.
City of La Grande (pop. 13,048)	614K lbs.	60K lbs.	2.5K lbs.	26K lbs.	3.5K lbs.

Table 9.6: Estimated Oregon consumption of grain and grain products.

NASS published 2013 assessments of price spreads for flour (high protein wheat approximately $0.12/pound versus all purpose flour approximately $0.53/pound.).[173] These indicate that wheat may be less than 23 percent the retail cost of flour.

Related estimates are that Americans on a per capita basis consume an average of 53 pounds of bread and 19.5 pounds of pasta per year.[174] For Oregon, this translates to about 208 million pounds of bread and about 76 million pounds of pasta annually. One estimate is that artisan breads, for which local and specialty flours may be most desirable, represented 30.6 percent of bread sales in 2014.[175]

A useful conversion when considering the figures above is that about 1 pound of flour is used to produce a 1.5 pound loaf of bread.[176] This suggests that the large majority of the 185 million pounds of wheat flour consumed in Oregon is in the form of bread and other finished baked goods.

BLS figures for consumer spending at retail for consumption at home break down as follows.

Table 9.7: Consumer spending on wheat flour and products at retail.

Geographic Unit	Wheat Flour & Cereal Products	Baked Products
Oregon (pop. 3,919,020)	$283,375,292	$536,604,277
Multnomah Co. (pop. 756,530)	$54,702,938	$103,586,415
Jackson Co. (pop. 206,310)	$14,917,800	$28,248,600
City of Bend (pop. 79,109)	$5,720,189	$10,831,848
City of La Grande (pop. 13,048)	$943,471	$1,786,572

[173] "Farm-to-Food Price Dynamics," Randy Schnepf, Congressional Research Service, 2013.

[174] "Wheat Info," National Association of Wheat Growers, (n.d.).

[175] "Category share of bread sales in the United States in 2014, by bread type," Statista, 2015.

[176] "Wheat Info," National Association of Wheat Growers, (n.d.).

NASS published 2013 assessments of price spreads for bread (high protein wheat about $0.12/pound versus white bread about $1.41/pound). These indicate that wheat may be less than 9 percent the retail cost of bread.[177]

The estimates below are for Oregon consumption of legumes:

Geo. Unit	Pinto Beans	Navy Beans	Great Northern Beans	Black Beans	Red Kidney Beans	Dry Lima Beans	Other Dry Beans	Peas, Chickpeas, Lentils	TOTAL
Oregon pop. 3,919,020)	4.1M lbs.	1.4M lbs.	302K lbs.	1.1 M lbs.	603K lbs.	150K lbs.	2.4 M lbs.	151K lbs.	10.1M lbs.
Multnomah Co. (pop. 756,530)	786K lbs.	3.5M lbs.	58K lbs.	204K lbs.	116K lbs.	29K lbs.	466K lbs.	29K lbs.	1.95M lbs.
Jackson Co. (pop. 206,310)	214K lbs.	952K lbs.	16K lbs.	56K lbs.	32K lbs.	8K lbs.	127K lbs.	8K lbs.	532K lbs.
Bend (pop. 79,109)	82K lbs.	365K lbs.	6K lbs.	21K lbs.	12K lbs.	3K lbs.	49K lbs.	3K lbs.	204K lbs.
La Grande (pop. 13,048)	13.5K lbs.	60K lbs.	1K lbs.	3.5K lbs.	2K lbs.	500 lbs.	8K lbs.	500 lbs.	34K lbs.

Table 9.8: Estimated Oregon consumption of legumes.

ERS reports about three-fourths of all dry beans are purchased at retail stores for home consumption.[178]

Geo. Unit	Retail Beans (75% total)	Foodservice Beans (25% total)
Oregon (pop. 3,919,020)	7.58M lbs.	2.52M lbs.
Multnomah Co. (pop. 756,530)	1.46M lbs.	.49M lbs.
Jackson Co. (pop. 206,310)	399K lbs.	133K lbs.
Bend (pop. 79,109)	153K lbs.	51K lbs.
La Grande (pop. 13,048)	26K lbs.	8K lbs.

Table 9.9: Estimated Oregon purchase of dry beans at retail and foodservice.

The December 2014 "all bean" price paid to farmers was $34 per hundredweight (S0.34/pound).[179] ERS figures for a category that includes beans suggest that production, processing, packaging, and wholesale may account for about 60 percent of the end retail price.[180]

The dollar figures above for wheat and baked goods are estimates. Consumer spending estimates account only for the resident population, and do not take into account spending by tourists, business travelers, or others who may be present or pass through. Consumer spending figures also do not account for purchases by entities such as schools, hospitals, nursing homes, or prisons that do not pass the cost of food directly to consumers. (These purchases are addressed in more detail below, where information is available.)

177 "Farm-to-Food Price Dynamics," Randy Schnepf, Congressional Research Service, 2013.

178 "Dry Beans," USDA, ERS, 2012.

179 "Bean Prices Rise," Northwest Bean Growers Association, 2014.

180 "Marketing Bill Dollar," USDA, ERS, 2015.

It should also be reiterated that the large majority of grain and bean products consumed come from lowest-cost commodity producer/processors. This has bearing for interpreting the scope of the implied market opportunities.

9.6. Market Channels

Grains and legumes make their way from farm to market through a number of channels both direct and wholesale.

9.6.1. Direct Market

A small number of farmers are beginning to market grain and beans directly to consumers through farmers markets, CSAs (community supported agriculture), and "Fill Your Pantry" events organized by Willamette Farm and Food Coalition (WFFC), Ten Rivers Food Web, and other organizations.

WFFC reported that 630 shoppers attended one Fill Your Pantry event in Eugene in 2013, purchasing 27,500 pounds of products from 12 participating farms for total sales of $34,000. A total of 5 such events are known to have been held in Oregon in 2013.

Small Oregon farm and milling operations include:

- Camas Country Mill (Junction City)
- Green Willow Grains (Brownsville)

(A third small mill—Butte Creek Mill in Eagle Point—appears to be packaging its own branded products, but offers no information on its sources for wheat, beans, and other products.)

Lonesome Whistle Farm offers a grain and bean CSA, which for a $300 share price provides 80 pounds of dry goods (avg. $3.75/pound including:

- 20# dry beans (four varieties)
- 10# Dakota black popcorn
- 10# Tri-color polenta
- 5# Corn Flour
- 5# Soft White Pastry Flour
- 10# Red Fife Wheat Flour
- 5# Dark Northern Rye Flour
- 5# Emmer/Farro Berries
- 10# Oats

There may be less than 100,000 pounds of wheat flour and 50,000 pounds of dried beans being sold direct to consumers by Oregon farmers. If true, this would be 0.05 percent of wheat flour and 0.5 percent of dry beans consumed in the state.

9.6.2. Processing/Manufacturing—Baking and Other Processed Foods

There are a growing number of examples of food processors/manufacturers sourcing grains and legumes raised and processed in the Pacific Northwest to be featured as ingredients in products.

Oregon is home to a good number of baking establishments that represent potential markets for flour. US Census County Business Patterns data for 2013 show the following:

Establishments by Number of Employees	Total	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999
Bakeries and Tortilla Manufacturing	169	58	33	40	20	5	9	3	1
Retail Bakeries	80	35	19	22	3	1			
Commercial Bakeries	55	14	8	12	11	2	6	1	1
Frozen Cakes, Pies, and Other Pastries	6	1	1		1		3		
Cookies and Crackers	14	4	4	3	1	1		1	
Dry Pasta, Dough, and Flour Mixes	10	3	1	1	4	1			
Tortillas	4	1		2				1	

Table 9.10: Number of Oregon baking establishments by number of employees.

Dave's Killer Bread's Oregon Grains bread, which reportedly sourced 95 percent of ingredients from within one hundred miles of the bakery in Milwaukie, Oregon, is perhaps the most widely known example of truly local sourcing of wheat for bread. (However, there do not appear to be any current references to that bread, originally introduced in 2011, on the company website.) Tabor Bread in Portland is also very forward with the fact that grains are sourced primarily from Camas Country Mill in Eugene, Oregon.

Shepherd's Grain has been successful supplying its Northwest grown and processed flours to Continental Mills for packaged baking mixes, and to commercial bakeries offering wholesale (Fairlight Bakery, McTavish Shortbread, etc.) and retail (Grand Central Baking, St. Honoré Baking, etc.) products. Shepherd's Grain lists about forty bakery locations in Oregon that utilize their flour.

Central Bean Company (Quincy, Washington) also supplies beans from Northwest farmers to processors including Truitt Family Foods (Salem, Oregon) and the Better Bean company (Portland, Oregon). Truitt now offers canned black, pinto, kidney, garbanzo, and navy beans in foodservice and retail, as well as a new packaged hummus. Better Bean offers prepared beans, bean dip, and chili fresh in refrigerated containers.

There is also a growing market for beans and peas processed into protein-rich snack foods, which may lead to new business development and ingredient sales opportunities for Oregon growers.

Total sales of Oregon grain and beans to manufacturers are not known. Sales of regionally identified products, traceable to a farm or specific group of farms, likely represent less than 1 percent of total supply.

However, if 10 percent of the approximately 64 million pounds of artisan breads consumed in Oregon annually were prepared with local/regional flour, the resulting need would be for at least 4.2 million pounds of flour.

If we assume that 80 percent of bean/lentils are purchased in a processed form (canned, in soups, etc.) and that 5 percent came from local/regional sources, the resulting need would be for 400,000 pounds of beans/lentils.

9.6.3. Manufacturing—Brewing and Distilling

Breweries and distilleries are important potential markets for local malt barley, wheat, and other grains.

Establishments by Number of Employees	Total	1-4	5-9	10-19	20-49	50-99	100-249
Breweries	48	27	6	6	3	3	3
Distilleries	17	8	3	2	3	1	

Table 9.11: Oregon breweries and distilleries by number of employees.

Rogue Spirits now operates its own farm from which they harvested 1,063,521 pounds of malting barley in 2014. Rogue also has a proprietary malting operation.

Christiansen Farms near McMinnville grows barley and operates a custom micro-malting facility, which supplies Portland-based House Spirits Distillery (makers of Aviation Gin and Medoyeff Vodka). That facility can reportedly process 68 tons of malt annually, which equates to roughly thirty-four acres of production.[181]

According to the Brewers Association, Oregon is home to 214 craft breweries, which produced a total of 1.4 million barrels of beer in 2014. Each barrel of craft beer utilizes an average of 65 pounds of malt, suggesting a need for a total of 91 million pounds of malt in Oregon each year.[182]

Oregon is now home to 69 distilleries, which generated $53 million in annual sales in the state—almost 12 percent of Oregon's total liquor sales in 2011.[183] That sales figure suggests production of at least 1.5 million liters (derived using a high average retail cost of $35/liter). According to Pro Brewer, approximately 222 pounds of grain will support a 600-liter mash, which will yield 32 to 35 liters of pure alcohol, which can in turn be diluted to 80 to 87

[181] "Malting: the latest craft," Dave Thomas, Brewer & Distiller International, 2013.

[182] "Potential for Increased US Malting Barley Acreage," American Malting Barley Association, Inc. 2012.

[183] "Starting Your Own Craft Distillery," OLCC, (n.d).

liters of finished 80 proof spirits.[184] If half of Oregon's spirit production is from grain (as opposed to potatoes or fruit) that suggests a need for at least 2 million pounds of malt annually.

The combined figure of 93 million pounds of malt represents about half of Oregon's annual barley production. Assuming 1:1 ration in pounds of malt to grain, 93 million represents 22,000 to 25,000 acres of production. According to Mike Moran, "Shepherd's Grain's annual production of barley in 2014 was about 11,000 acres. So at the right price there are very real opportunities." However, lack of regional malting capacity makes it unlikely that Oregon barley can be marketed in large quantities to either industry as a local product in the near future.

9.6.4. Retail

US Census County Business Patterns data indicate there were 763 grocery stores. Many grocery stores are outlets of major chains, like Safeway and Kroger, which both carry natural and organic products from local, multiregional, and national companies. As an example, selected Fred Meyer stores in Portland carry Grand Central Baking artisan breads.

There are also about 80 independent or natural food stores, like New Seasons Market (12 stores), Market of Choice (9 stores), Whole Foods Market (8 stores in Oregon), Zupan's (4 stores), and about a dozen cooperative grocery stores (like People's Food or Oceana Natural Food), that may be interested in relationships with local suppliers.

Figures for consumption of wheat flour, after factoring out flour consumed in the form of bread, suggest grocery stores in Oregon sell a total of 47 million pounds of bulk and packaged flour—an average of 60,000 pounds per store.

Nationally, sales of fresh bread and rolls were $5.8 billion for the 52 weeks ending August 11, 2013. In-store bakeries represent 25 percent of bread sales and reportedly average $1,565 per week per store.[185] That suggests average bread sales per store of $325,000 annually, with an average of $81,380 from in-store bakeries. If artisan loaves represent one-third of sales, at $3 to $4 per loaf, that suggests a need for about 27,000 pounds of flour to supply artisan bread in each store.

Per capita bean consumption and the 75 percent share of dry beans sold through retail, suggests that grocery stores sell an average of about 10,000 pounds of dry beans and lentils annually. It is assumed that 80 percent are sold in processed form (canned, etc.).

If the 80 independent stores in Oregon prioritized local/regional flour in artisan breads and had local/regional flour and dry (unprocessed) beans/lentils representing 50 percent of total bulk and packaged good sales, the resulting

[184] "Whiskey," probrewer.com, (n.d.).

[185] "Ahead of Its Time," Charlotte Atchley, Baking & Snack, 2011.

need would be 4.6 million pounds of flour and 80,000 pounds of dry beans annually.

If the remaining 683 conventional grocery stores had local/regional packaged/bulk flour representing 5 percent of sales and packaged/bulk dry (unprocessed) beans/lentils representing 10 percent of sales, the resulting need would be 2 million pounds of flour and 137,000 pounds of beans/lentils.

The combined total is 6.6 million pounds of flour and 217,000 pounds of dry beans/lentils.

9.6.5. Restaurants

US Census County Business Patterns data indicate there were 3,974 full-service restaurants (not including limited service "fast food") and 123 catering companies in Oregon in 2012. The top 10 percent may be considered "fine dining" and more likely to be engaged in procurement of local products (though primarily through wholesalers).

However, certain categories of casual restaurants, such as pizzerias (17 percent of all restaurants) and sandwich shops, will buy large quantities of flour, prepared dough, or finished breads—and may be seeking to differentiate themselves based on the quality of dough or breads. Portland's 5-store Hot Lips Pizza chain, for example, sources flour from both Shepherd's Grain and Camas Country Mill. Shepherd's Grain lists a total of 34 restaurants in Oregon that source their flour.

If the top 10 percent of pizzerias used local/regional flour, the total need could be for more than 2,000,000 pounds of flour. If the top 10 percent of all full-service restaurants (not including pizzerias) used local/regional flour for in-house baking, that would require an additional 500,000 pounds of flour.

Per capita bean consumption and the 25 percent share of dry beans sold through foodservice, suggests that most restaurants source an average well below 200 to 300 pounds of beans and lentils annually. However, some Mexican-themed fast casual restaurants such as Chipotle and the local Laughing Planet Burrito chain may source significantly larger quantities, potentially well over 5,000 pounds annually per outlet.

If the top 10 percent of full service restaurants and at least 20 Mexican-themed fast-casual restaurants sourced local/regional dry beans and lentils, that would imply a need for at least 200,000 total pounds.

9.6.6. Farm to Hospital

Health Care Without Harm (HCWH) is an international environmental health organization that supports sustainable food procurement at hospitals and healthcare facilities. A 2007 survey by Oregon Center for Environmental Health resulted in detailed reports of grain and legume purchases from six regional hospitals. Combined, the six institutions representing 1,726 total hospital beds, reported purchasing:

Table 9.12: Purchasing of bean and grain prducts by six hospitals.

Product	Pounds/Yr.
Bread/Rolls	93,645
Tortillas	15,438
Pasta	16,014
Oats/Oatmeal	15,048
Granola	915
Dried Beans	8,676
Dried Lentils	936

Extrapolating from those six institutions to Oregon's thirty-three private hospitals and 6,008 total hospital beds, this suggests hospitals could represent an annual market for:

Table 9.13: Estimated demand for bean and grain products by hospitals.

Product	Pounds/Yr.
Bread/Rolls	325,967
Tortillas	53,738
Pasta	55,743
Oats/Oatmeal	52,380
Granola	3,185
Beans	30,200
Lentils	3,258

The totals for bread, rolls, and tortillas suggest a need for at least 250,000 pounds of flour annually.

Adding the 12,403 beds in Oregon's licensed nursing care facilities would triple the market estimate, but it has not been shown those facilities would follow a similar procurement pattern.

Conclusions should be tempered with the knowledge that price remains a major consideration for foodservice in healthcare. Most grain and bean purchases reported are from large, conventional suppliers, with dry goods reportedly coming from SYSCO and FSA and breads from Franz Bakery. The added value of local products from smaller farm suppliers may not be enough to justify paying a price premium.

However, some hospitals do report purchases from Grand Central and Marsee Baking, which are likely single-serving pastries and rolls destined for cafes and other retail within the institution. In these cases, foodservice managers are able to pass added costs on to the end consumers.

9.6.7. Farm to School

School Food FOCUS is a national collaborative that is working with fifteen large school districts across the US (including Portland Public Schools and the Beaverton School District) to make school meals nationwide healthier, regionally sourced, and sustainably produced.

In Oregon, approximately 24 percent of school food budgets are spent on local food—the highest percentage in the nation. (USDA, 2014) Schools, with limited budgets and limited ability to prepare fresh foods, offer an interesting procurement challenge. Portland Public Schools (PPS) has enrollment of about 46,000 students, serves 11,000 breakfasts (24 percent participation) and 21,000 lunches daily (46 percent participation).
Portland Public Schools does list Bakeworks (Vancouver, Washington), Bob's Red Mill (Milwaukie, Oregon), Don Pancho (Salem, Oregon), Roadrunner Pizza (Gladstone, Oregon), Shepherd's Grain (Reardon, Washington), and Truitt Family Foods (Salem, Oregon) as suppliers. The school district has previously specified use of Shepherd's Grain flour in contracts for provision of baked goods. PPS also helped develop and trial a three-bean chili working with Truitt Family Foods.

In 2013, the Bend-LaPine School District (with 24,653 students enrolled) also ordered 12,500 pounds of hard white spring wheat flour and 2,500 pounds of pastry flour from Camas Country Mill.

School nutrition formulas suggest 3.75 pounds of mixed white and whole-wheat flour to provide 50 2-ounce servings of bread/rolls. If bread/rolls from local/regional flour were featured in breakfasts and lunches 8 times per month, PPS would require 2.3 million total servings—in turn requiring 173,000 pounds of flour.

One pound of dry beans yields 6 cups of cooked beans. Each cup serving contains about 15 grams of protein (approximately 0.5 ounces). If lunches featuring a one-half-cup serving of cooked beans were offered twice a month through the school year, PPS would require 378,000 servings—requiring 31,500 pounds of dry beans.

Extrapolating to the 567,000 students enrolled in districts across Oregon suggests a need for 2,130,000 pounds of flour and 388,000 pounds of dry beans.

Extending that scenario to the approximately 190,000 students enrolled in Oregon universities and colleges suggests a need for 762,000 pounds of flour and 130,000 pounds of dry beans.

The combined total is 2.9 million pounds of flour and 518,000 pounds of dry beans/lentils.

9.7. Demand Summary

Combining the estimates provided for retail, restaurants, hospitals, and educational institutions suggests there is potential demand in Oregon for 9.3 million pounds of malt, at least 16.4 million pounds of flour, and about 1.4 million pounds of mixed legumes. The total represents 10 percent of malt barley, about 8.8 percent of flour, and about 14 percent of legumes consumed in Oregon.

The breakdown by channel for flour is as follows:

- Retail: 40% ~6.6 million lbs.
- Manufacturing 25.5% ~4.2 million lbs.
- Education: 18% ~2.9 million lbs.
- Restaurants: 15% ~2.5 million lbs.
- Hospitals: 1.5% ~250,000 lbs.

The breakdown by channel for legumes is as follows:

- Education: 38% ~518,000 lbs.
- Manufacturing 29% ~400,000 lbs.
- Retail: 16% ~217,000 lbs.
- Restaurants: 15% ~200,000 lbs.
- Hospitals: 2% ~32,500 lbs.

9.8. Oregon Small Grains and Legumes Production

The 2012 USDA Census of Agriculture shows a total of 2,479 farms in Oregon with sales of grains, oilseed, dry beans, and/or dry peas. Associated production was reported as follows.

Crop	Farms	Acres Harvested	2012 Bushels	Lbs./ Bushel	2014 Pounds	% OR Consumption
Wheat	1,968	906,013	57.5 million	60	3.45 billion	1,865%
Winter Wheat	1,653	782,209	49.7 million		2.98 billion	
Spring Wheat	648	122,897	7.8 million		468 million	
Durum Wheat	7	907	57,700		3.5 million	19%
Rye	17	876	16,700		1 million	133%
Oats	271	18,899	1.65 million	32	52.8 million	677%
Barley	335	53,898	3.9 million	48	187 million	170% (for food)
Dry Beans	116	10,742			264 million	2,640%
Dry Peas	61	8,885			196 million	13,000%
Lentils	4	(D)			~150,000	

Table 9.14: Estimated Oregon production of grains and beans.

9.9. Segmentation

Oregon is fortunate to have a community of growers for wheat, rye, oats, and barley that is well diversified by scale, with many midsized and smaller-scale operations that could potentially benefit from branding and local/regional marketing strategies. For example, there are 109 midsized oat growers (harvesting 25 to 99 acres) that represent 34 percent of Oregon's production.

USDA Agricultural Census data does not provide segmentation for growers of dry beans, peas, or lentils.

9.10. Support Infrastructure for Small Grains and Legumes

The majority of firms in the region cleaning, packaging, processing, and/or trading seed and grain crops are oriented to commodity export.

9.10.1. Commodity Wholesalers

The County Business Patterns Survey shows Oregon firms trading in grain and dry beans.

By # of Employees	Total	1-4	5-9	10-19	20-49	50-99	100-249
Grain & Bean Wholesalers	50	23	12	8	3	2	2

Table 9.15: Grain and bean wholesalers by number of employees.

9.10.2. Seed Cleaning Capacity

A survey of eleven regional seed-cleaning facilities commissioned in 2014 by Shepherd's Grain had operators reporting the region is at or near capacity for cleaning pulse and seed crops. There are typically only narrow or seasonal opportunities for toll processing. Furthermore, there is very limited capacity for identity-preserved processing (requiring chain of custody for small-batch processing and dedicated storage) or for handling of specialty crops (such as teff, the grains of which are so small that they leak out of conventional processing lines and storage facilities).

9.10.3. Milling Capacity

The County Business Patterns Survey shows Oregon firms milling grain and oilseeds.

By # of Employees	Total	1-4	5-9	10-19	20-49	50-99	100-249
Grain and Oilseed Milling	15	5	2	2	4	1	1
Flour Milling	4	2	0	0	2	0	0
Rice Milling	1	1	0	0	0	0	0
Malt Manufacturing	1	0	0	0	1	0	0
Soybean and Other Oilseed Processing	2	0	1	1	0	0	0
Fats and Oils Refining and Blending	2	0	0	0	1	1	0
Breakfast Cereal Manufacturing	5	2	1	1	0	0	1

Table 9.16: Grain and oilseed milling establishments by number of employees.

9.10.4. Distribution

A number of regional brokers and distributors have expressed interest to Ecotrust and to growers in securing additional supplies of regionally grown grains and legumes, including Glory Bee Foods, Hummingbird Wholesale, and others.

9.10.5. Markets for Animal Feed

Ecotrust's analysis of potential for development of local/regional chicken and hog production in Oregon suggests a need for at least 134 million pounds of animal feed. This suggests opportunities for synergy between regional seed and legume growers, seed cleaning and milling facilities, brewers and distillers, and processing, retail and possibly other waste streams.

9.11. Paths Forward

A 2010 Agricultural Marketing Service study concludes that for farmers,

> "the investment required to grow grains for human consumption is both that of learning how to produce food-grade grains and accessing

> or purchasing the equipment and facilities to clean, dry and store them. Farmers need to market their grains at a price that covers their investment in education and capital. Millers need customers who are willing to deal with the potential inconsistencies of flours milled from locally grown grains. Bakers need to understand the unique characteristics of local flour and how to work with it, and be comfortable with the inevitable growing pains associated with an expanding market. Finally, consumers need ways to support bakers when product availability fluctuates."[186]

There appear to be a number of potential paths for further development of local/regional grain and legume food enterprises in Oregon.

9.11.1. Vertically Integrated Small Farm/Processor/Direct Market Model

Entities like Lonesome Whistle Farm and Green Willow Grain demonstrate a "hyper-local" approach, which offers close connection to a specific farm, and access both to unique products and to products with unique characteristics and story. Lonesome Whistle markets exclusively direct to consumers. Green Willow has also placed organic, branded, packaged products in select retail stores.

Despite the efforts of Willamette Food and Farm Coalition and others to organize "Fill Your Pantry" events and otherwise facilitate purchasing, such hyper-local products remain relatively difficult to procure and significantly more expensive than more readily available alternatives. In addition, while home cooks and bakers may value variability in availability and characteristics of products as a sign of authenticity, this makes it difficult for most commercial entities to incorporate these products in supply chains.

Ecotrust has estimated there may currently be less than 100,000 pounds of wheat flour and 50,000 pounds of dried beans sold direct to consumers annually by Oregon farmers. There may be opportunities for both growth and replication of existing farm-direct businesses. There are a number of entities around the state interested in development of very small-scale milling and seed cleaning capacity—and equipment at the scale that Lonesome Whistle Farm operates is both available and reasonably affordable. Consumer interest seems likely to support hyper-local options where they are not now currently available.

However, given the limitations of the model, Oregon consumption of single source products seems unlikely to exceed 0.25 percent of wheat flour (500,000 pounds, five times over current estimate) or 1 percent of dry beans (200,000 pounds, four times over current estimate).

[186] "From Farm to Bakery," Sarah Johnson, New State Department of Agriculture and Markets, 2012.

9.11.2. Vertically Integrated Farmer-Entrepreneur and Supply Partner Model

Camas Country Mill processes and markets products both from owner Tom Hunton's farm and from three other partner farm suppliers. Camas Country Mill has entered distribution through Hummingbird Wholesale and is also selling to institutions such as schools. The supply partner model facilitates achievement of scale, however goods remain priced a significant margin over conventional alternatives. Tom Hunton has also expressed intent to limit growth of the business and geographic distribution of products as part of his personal belief in the meaning and value of "local."

Absent the artificial constraint set by the owner, there may be opportunities to grow Camas Country Mill or replicate the model on a limited basis. However, during start-up such a business may face competition from hyper-local competitors (as above), and as the business achieves scale, it will face increasing competition from the entities described in the following two sections.

9.11.3. Brand/Distributor Coordinated Supply Pool Model

With connections to retail and consumer-buying-club accounts in western Oregon and in select cities from San Francisco, California, to Bellingham, Washington, distributor Hummingbird handles significant quantities of a wide diversity of products. Hummingbird has a growing network of farmers in and around Oregon that grow specialty grain and legumes to meet the company's needs—but with increasing demand the company reports ongoing shortages for various organic wheat varieties, dry beans and lentils, sprouting seeds (such as alfalfa), spelt, teff, sunflower seeds, and wild rice.

Farmers contracting with Hummingbird find a reliable market paying a fair price for high-quality products, and have received encouragement and support to conduct trails of new crops varieties and cropping systems.

With its existing farm supplier pool and significant experience with specialty grain, legume, and seed varieties, Hummingbird will likely enjoy a competitive local market advantage in those categories for the foreseeable future. Hummingbird has secured investments from Lane County Economic Development and from RSF Social Finance. Their network of existing customers, product diversity, and volumes allow them to incorporate new, unique, and limited-quantity items cost effectively. Larger broadline distributors, in contrast, will have no choice but to source commodity versions of those products nationally and internationally. As a result, Hummingbird seems well positioned for continued growth

9.11.4. Farmer Owned Joint Marketing Value Chain Model

Columbia Plateau Producers (CPP) markets wheat for Shepherd's Grain brand flours, which are in turn marketed to West Coast manufacturers, bakeries, restaurants, and food service companies. The brand is also extended to marketers of packaged baking mixes and retail flour. Since 2002, Shepherd's Grain has grown from its two founders to include nearly sixty farm families

in Oregon, Washington, California, Idaho, and western Canada. Members are third-party certified by Food Alliance for sustainable practices, including use of direct-seed/no-till. Columbia Plateau Producers has not invested in its own infrastructure to date, but instead has worked through value-chain partners to secure needed storage, milling, and distribution. Sales of wheat for all-purpose, baking, whole wheat and pastry flours totaled $6.5 millon in 2014. Customers have included Bon Appétit Management Company, Grand Central Baking, Krusteaz Baking Mixes, and others. Farmer members have also sold Food Alliance–certified legumes to Central Bean Company and other customers. Shepherd's Grain has significant first-to-market advantage as a farmer-branded, certified-sustainable, regional flour, and seems well positioned for continued growth.

9.11.5. Path Forward

The small farm/processor direct market model and farmer entrepreneur model above seem viable on a small scale, but unlikely to have significant impact on the food system due to inefficiencies and higher product costs. As one producer described, "It is another dilemma of the middle. Small hyper-local can survive on the high premiums a small percentage of consumers will spend, and large scale can work with economies of scale benefits. Like the farm in the middle, the processor in the middle is a tough model."

The other two models incorporate products from farms in Oregon and elsewhere in the region. It is not clear that "Oregon Grown"–branded flour, specialty grain, or packaged dried legume products would be more appealing to consumers and commercial food buyers than the already well-received local/regional options offered by Hummingbird Wholesale and Shepherd's Grain.

Rather than investing in start-up and development of competing Oregon brands, it seems more strategic to invest in continued growth of Hummingbird Wholesale and/or the Shepherd's Grain brand and their ability to incorporate additional Oregon farmer suppliers and members. (Full disclosure: Amanda Oborne of Ecotrust is now a member of the Shepherd's Grain board of directors.)

9.12. Conclusions

There appears to be meaningful demand and opportunity to develop new markets for local/regional grain and legume products. Oregon has significant productive capacity in most product categories, and has significant numbers of midsized and smaller growers suited to production of differentiated and branded goods.

Combining the estimates provided for manufacturing, retail, restaurants, hospitals, and educational institutions suggests there is potential demand in Oregon for 9.3 million pounds of local malt, at least 16.4 million pounds of local flour, and about 1.4 million pounds of mixed local legumes. The total represents 10 percent of malt barley, about 8.8 percent of flour, and about 14 percent of legumes consumed in Oregon.

Farmer-members of Columbia Plateau Producers have been successful developing value-added markets for wheat grown in direct-seed/no-till systems. However, realizing the full environmental and productive benefits of those systems requires rotations of other grain, seed, and pulse crops. The challenge to maximizing economic returns and ensuring financial sustainability is developing value-added market opportunities for all the crops in those rotations.

With that in mind, for development of the regional food system, investments in milling capacity to increase local/regional flour production are probably secondary to investments in seed cleaning and storage, pressing of oil seeds, and other infrastructure to support marketing of products other than wheat.

Priority opportunities may include:

- Malting facilities to enable development of identity-preserved specialty malts for the brewing and distilling industry.

- Seed cleaning and storage facilities to enable expanded production and marketing of identity-preserved heritage and specialty grains, and dried beans and lentils.

In addition, Ecotrust's analysis of potential for development of local/regional chicken and hog production in Oregon suggests a need for at least 134 million pounds of animal feed. This suggests opportunities for synergy between regional seed and legume growers, seed cleaning and milling facilities, brewers and distillers, and processing, retail and possibly other waste streams.

10

Storage Crops

Photo courtesy Leah Harb

10.1. Introduction to Storage Crops at the National Level

"Storage crops" include both vegetables and fruits that can, with the right handling, be kept for a period of weeks or months after harvest in marketable condition. This chapter addresses commonly eaten vegetables for storage, including: beets, cabbage, carrots, garlic, onions, potatoes, pumpkin, turnips, and winter squash. Other vegetables for storage that are not addressed in detail include: Brussels sprouts, celeriac, celery, kohlrabi, leeks, parsnip, rutabaga, shallot, and sweet potatoes.

Successful storage depends on the crop in question entering a natural period of dormancy. For many root vegetables, this involves controlling respiration (by lowering temperature) and providing a moist environment to mimic conditions in the ground. Some crops, such as garlic and onions, need dry conditions to encourage dormancy. Different varieties are also grown specifically for storage.

Growing for Market provides a summary of storage times and conditions.[187]

Product	Storage Time	Temperature	Humidity
Pumpkins	5 months	50–60F	50-70% humidity
Winter Squash	1+ month	50–55F	50-70% humidity
Potatoes	5 months	40–50F	90% humidity
Onion	6 months	32F	65-70% humidity
Beets	3–5 months	32F	90-100% humidity
Turnip	4–5 months	32F	90-100% humidity
Cabbage	6 months	32F	90-100% humidity
Carrot	6 months	32F	90-100% humidity

Table 10.1: Storage crop storage times and conditions.

Many crops need to be "cured" before entering storage. In roots and bulbs, the process of curing refers to the product drying and/or developing new tissue in order to heal wounds. During curing, potato skins harden and small cuts seal over. Garlic and onions begin to dry out and the opening at the neck of the bulb closes.

[187] "Extend the Selling Season with Storage Crops," Growing for Market, 2011.

Simple guidance for small farmers on harvesting, curing, and storage requirements include:

Cool Storage (45–60°F)	Harvesting and Curing
Garlic	Dig when plant is still 60% green. Fewer than six leaves should appear healthy. Cure in a warm (80 degrees Fahrenheit or warmer), well-ventilated place for at least two weeks. Trim back tops to 4 inches, and then cure another week. Trim again before storing.
Onion	Pull when at least half of the tops are dead or have fallen over. Avoid harvesting in wet weather. Cure in a warm (80 degrees or warmer), shady, well-ventilated place for a week. Trim back tops, and then cure two weeks more. Trim again before storing.
Potato	Harvest before soil temperatures fall below 55 degrees to minimize bruising. Protect from sun. Wash only to remove clods of soil. Cure in a cool, dark, moist place (55 to 60 degrees) for two to three weeks.
Pumpkin	Cut ripe fruits from the vine, leaving a short stub of stem attached. Wipe with a damp cloth to remove soil. Cure in a well-ventilated place with warm room temperatures (70 to 80 degrees) for one to two weeks.
Winter squash	Cut ripe fruits from the vine, leaving a short stub of stem attached. Wipe with a damp cloth to remove soil. Cure in a well-ventilated place with warm room temperatures (70 to 80 degrees) for one to two weeks.

Table 10.2: Cool storage crop harvesting and curing guidelines.

Cold Storage (32–45° F)*	Harvesting and Curing
Beet	Harvest before hard freeze. Trim tops to one quarter-inch, but do not trim roots. Wash in cool water. Pat dry. Refrigerate in plastic bags to maintain humidity.
Cabbage	Harvest before outermost leaves start losing color, or before hard freeze. Remove outer leaves. Refrigerate in plastic bags to maintain humidity.
Carrot+	Harvest before hard freeze. Trim tops to one half-inch. Wash gently in cool water. Pat dry. Refrigerate in plastic bags to maintain humidity.
Turnip+	Harvest before hard freeze. Trim tops to one half-inch, but do not trim roots. Wash in cool water. Pat dry. Refrigerate in plastic bags to maintain humidity.

*** Very low temperatures (32 to 35 degrees) can further prolong storage life of these vegetables.**

+ Sensitive to ethylene given off by apples and other fruits, and from decaying plant tissues.

Table 10.3: Cold storage crop harvesting and curing guidelines.

Crops for fresh market may be hand harvested and some roots crops cured in the field. However, at commercial scale, crops are more likely to be harvested mechanically and transported to temperature and humidity-controlled packing/storage sheds, with forced air circulation to avoid variation in conditions and exposure to ethylene.

By total production, the most common storage crops are potatoes, onions, carrots, and cabbage.

Table 10.4: Common storage crop production by pounds and farm value.

2012 Ag Census/NASS/ERS	Total Pounds	Farm Value
Potatoes (fresh market)	11,853,500,000	$1,085,781,000
Onions (storage for fresh market)	5,400,000,000	$554,708,000
Carrots (fresh market)	2,338,800,000	$619,391,000
Cabbage (fresh market)	2,241,500,000	$408,195,000
Pumpkin (fresh market)	~1,650,564,000	Unknown
Garlic (fresh market)	431,900,000	$227,090,000
Winter Squash (fresh market)	~299,880,000	Unknown
Beets (fresh market)	~157,134,000	Unknown
Turnips (fresh market)	~157,134,000	Unknown

10.2. Segmentation, Key Issues, and Trends

2012 US Census figures[188] show number of farms and acreage dedicated to specific crops[189]. Breakdowns by acreage are provided for the major crops.

Table 10.5: Production acreage of common storage crops.

Crop	Farms	Acres	Percent of Farms with <1 Acre	# of Farms over 100 acres/ % Total Acres
Beets (fresh market)	3,592	5,644	-	-
Cabbage (fresh market)	4,035	54,302	65%	146 / 78%
Carrots (fresh market)	4,266	70,244	85%	108 / 94%
Garlic (fresh market)	3,306	12,027	-	-
Onions (fresh market)	5,937	107,463	76%	303 / 82%
Potatoes (fresh market)	19,750	544,587	72%	1,122 / 94%
Pumpkin (fresh market)	15,490	73,947	-	-
Turnips (fresh market)	1,090	3,790	-	-
Winter Squash (fresh market)	6,371	548	-	-

Consumption of many storage crops is actually decreasing year on year. The Packer notes that consumption of cabbage, squash, and turnips "skews older," meaning that younger consumers are less likely to buy these foods.[190] However, opportunities are noted to promote brightly colored carrots and beets as healthy foods, high in antioxidants. There are also recommendations to prominently feature more expensive varieties of specialty potatoes and organic versions of cabbage and other storage crops.

[188] "2012 Census, Volume 1, Chapter 1: US National Level Data," USDA, Census of Agriculture, (n.d).

[189] "Farms by Concentration of Market Value of Agricultural Products Sold: 2012," USDA, NASS, (n.d).

[190] "Cabbage," The Packer Produce Universe, (n.d).

A 2014 Food Marketing Institute study listed the following reasons for Buying Locally Grown at Retail:

86% Freshness
75% Support local economy
61% Taste
56% Like knowing source/how produced
39% Nutritional value
39% Price
31% Enviro. impact of long distance transportation
30% Appearance
24% Long term personal health effects

In addition to the availability of storage crops on the conventional commodity market, there are also growing markets for the following:

- Organic
- Local products from small and mid-sized farms

10.2.1. Organic

"Organic" is regulated by the USDA and requires a third-party audit. Consumers associate organic with the absence of chemical fertilizers or pesticides, although approved amendments and treatments may be used.

The Environmental Working Group publishes a list of 50 produce items for which it cautions consumers to seek organic certification based on pesticide residue testing. Potatoes (#12), carrots (#22), winter squash (#25), onions (#46), and cabbage (#48) all appear.[191]

ERS studies of selected crops show growth in organic production of potatoes and carrots at the national level and in Oregon:[192]

Table 10.6: Organic production of potatoes and carrots in Oregon.

Crop	Acres 2000	Acres 2011	% increase
Potatoes	5,433	13,256	144%
Oregon	180	1,654	812%
Carrots	5,665	12,080	113%
Oregon	1	12	1,100%

[191] "All 48 Fruits and Vegetables with Pesticide Residue Data," Environmental Working Group, (n.d.).

[192] "Organic Production: Overview," USDA, ERS, 2013.

ERS figures also show that farmers received a significant premium for organic storage crops:[193]

Table 10.7: Organic premium for storage crops.

2013 Organic Premium	Low	High
Cabbage	135%	222%
Carrots	114%	217%
Onions	17%	128%
Potatoes	150%	165%

10.2.2. Local and Regional

There are a growing number of independent farmers marketing direct to consumers or to commercial food buyers (retail grocery stores, restaurants, food service).

A 2014 National Grocery Association survey indicates that the availability of locally grown produce and other packaged foods are major influences on grocery shopping decisions, with 87.2 percent of consumers regarding this as "Very or Somewhat Important."

A 2014 National Restaurant Association survey on the top 10 menu trends, included:

1. Locally sourced meats and seafood
2. Locally grown produce
3. Environmental sustainability

According to the 2012 USDA Census of Agriculture, a total of 6,680 Oregon farmers reported sales direct to consumers (18.8 percent of all farmers) and 1,898 Oregon farmers reported sales direct to a retailer (5.4 percent).[194]

10.3. Pricing for Storage Crops

Price differences for storage crops observed in Portland April 2015 include:

Table 10.8: Price differences for storage crops observed in Portland, April 2015.

Product	Major Grocer (conventional)	New Seasons Market (certified organic)
Beets	$2.49/lb.	$2.99/lb.
Cabbage (green)	$0.99/lb.	$1.29/lb.
Carrots	$0.69/lb.	$1.49/lb.
Garlic	$2/lb.	$5.99/lb.
Onions (sweet)	$1.29/lb.	$1.49/lb.
Potatoes (russet)	$0.79/lb.	$1.49/lb.
Turnips	$1.49/lb.	$2.99/lb.
Winter Squash (acorn and butternut)	$1.29/lb.	$1.79/lb.

[193] "Organic Prices: Overview," USDA, ERS, 2014.

[194] USDA Census of Agriculture.

As with other products studied in this report, despite the potential to realize higher prices overall for differentiated products, midsized and smaller scale farmers pursuing niche markets must earn a margin that enables profitability in spite of typically higher per unit production, processing, and marketing costs.

10.4. Demand for Storage Crops in Oregon

Understanding market demand is critical to evaluating potential investments to increase production and profitability of local storage crops.

10.5. Consumer Spending on Storage Crops

According to the Bureau of Labor Statistics, the average household (2.6 persons) in the western US spent $7,180 in 2013 on food at home (59 percent) and away (41 percent) in 2013. This includes $283 spent on fresh vegetables of all types for at home consumption. Spending on storage crops is not called out.[195]

However, The Packer offers an estimate of total retail sales for 2012 with average pricing:[196]

Table 10.9: Total retail sales of selected storage crops.

	Pounds	Sales	Avg. per lb.
Beets	19,013,461	$33,249,207	$1.75
Cabbage	470,920,215	$286,287,777	$0.61
Carrots	855,940,149	$1,083,274,373	$1.27
Garlic	54,809,915	$181,995,259	$3.19
Onions	1,565,855,630	$1,598,938,111	$1.02
Potatoes	4,328,642,789	$2,654,199,086	$0.61
Pumpkin	331,245,765	$126,519,534	$0.38
Turnips	14,426,890	$16,778,129	$1.16
Squash (all types)	433,175,789	$600,189,036	$1.39

A 2001 ERS report suggests that 67 percent of fresh-market onions are purchased at retail and consumed at home. The remaining 33 percent of fresh-market onions are consumed through the foodservice sector, with 12 percent through fast-food establishments.

According to a 2007 ERS report, 80 percent of fresh-market carrots are purchased at retail and consumed at home, including a growing quantity of fresh-cut or "baby" carrots. The remaining 20 percent of fresh-market carrots are consumed through the foodservice sector, with 3 percent through fast-food establishments.

The 2007–2010 National Health and Nutrition Examination Survey (NHANES) suggests that 63 percent of potatoes are consumed at home. The remaining

[195] "Region of residence: Annual expenditure means, shares, standard errors, and coefficient of variation," Consumer Expenditure Survey, US Bureau of Labor Statistics, 2014.

[196] "Lettuce," The Packer's Produce Universe, (n.d).

37 percent of potatoes are consumed through the foodservice sector, with 14 percent through fast-food establishments.

That same study suggests that on average about one-third of all vegetables are consumed outside the home (12.7 percent in full service restaurants, 12 percent in fast food restaurants, and 8.4 percent through other channels such as school food service).

The ERS also tracks per capita consumption (retail weight), which allows estimates of per capita and household spending on fresh-market storage crops.[197]

Table 10.10: Estimated per capita and household spending on fresh-market storage crops.

Crop	Per Capita Pounds (2012)	% Purchased Retail	Estimated Per Capita Spending	Estimated Household Spending
Beets	0.5	66%	$0.58	
Cabbage	6.3	66%	$2.54	
Carrots	7.6	80%	$7.72	
Garlic	1.9	66%	$4.00	
Onions	18.6	67%	$12.71	
Potatoes	34.1	63%	$13.10	
Pumpkin	4.7	66%	$1.18	
Turnips	0.1	66%	$0.08	
Winter Squash	0.5	66%	$0.46	
Total	**74.3**		**$42.37**	**$110.15**

Using population data and the figures above, it is possible to form estimates for total consumption of storage crops in Oregon, at the county level or for municipalities.

POUNDS	Beets	Cabbage	Carrots	Garlic	Onions	Potatoes	Pumpkin	Turnips	Winter Squash
Oregon	1.9M	25M	29.8M	7.4M	73M	134M	18.4M	392K	1.9M
Multnomah Co.	378K	4.8M	5.8M	1.4M	14M	25.8M	3.5M	76K	378K
Jackson Co.	103K	1.3M	1.6M	392K	3.8M	7M	970K	21K	103K
Bend	40K	498K	601K	150K	1.5M	2.7M	372K	8K	40K
La Grande	6.5K	82K	99K	25K	243K	445K	61K	1.3K	6.5K

Table 10.11: Estimated Oregon consumption of storage crops.

[197] "Mushroom Sales Top $1 Billion 4 Years in a Row," Hodan Farah Wells, Jennifer Bond, Suzanne Thornsbury, USDA, ERS, 2014.

This suggests that consumer spending at retail for storage crops in Oregon may be as follows:

RETAIL SPENDING	Beets	Cabbage	Carrots	Garlic	Onions	Potatoes	Pumpkin	Turnips	Winter Squash
Oregon	$2.3M	$10M	$30M	$16M	$50M	$51M	$4.6M	$300K	$1.8M
Multnomah Co.	$437K	$1.9M	$5.8M	$3M	$9.6M	$10M	$892K	$58K	$347K
Jackson Co.	$119K	$523K	$1.6M	$825K	$2.6M	$2.7M	$243K	$16K	$94K
Bend	$46K	$200K	$611K	$316K	$1M	$1M	$93K	$6K	$36K
La Grande	$7.5K	$33K	$101K	$52K	$166K	$171K	$15K	$1K	$6K

Table 10.12: Estimated consumer spending on storage crops at retail in Oregon.

ERS price-spread figures suggest that in 2012 the farm price for fresh market potatoes is about 17 percent of the final retail price.[198] The average across a "market basket" of fresh vegetables was 23 percent of the final retail price. This has bearing on evaluating the real scope of opportunity in markets referenced above.

10.6. Market Channels

Storage crops make their way from farm to market through a number of channels both direct and wholesale.

10.6.1. Direct Market

Oregon farmers reported a total of $44.1 million in sales direct to consumers in 2012—an average of just over $6,600 for each farm reporting direct sales. It can be assumed that at least two-thirds of sales through farmers' markets, farm stands, CSAs, and other direct market channels are of fresh produce—representing about $29 million. BLS consumer spending figures suggest that 46 percent of fresh produce sales will be for vegetables. Estimates above suggest that as much as 39 percent of that subtotal for vegetables will be for storage crops.

This implies as much as $5.2 million spent on storage crops through direct market, a majority of which will be organic or marketed as "grown with organic practices." If true, this would be about 3 percent of total spending on storage crops in Oregon.

10.6.2. Grower-Shippers

The Oregon Potato Commission lists thirteen grower-shippers located in Oregon.

- Amstad Produce, Sherwood
- Baggenstos Farms, Sherwood
- Bud-Rich Potato, Hermiston
- Cal-Ore Produce, Inc., Hermiston
- Circle C Marketing, Malin
- Gold Dust Potato Processors, Merrill
- Malin Potato Co-op, Inc., Merrill

[198] "Price Spreads from Farm to Consumer: Overview," USDA, ERS, 2015.

- Riverside Potato, Inc., Merrill
- South Basin Packing, Umatilla
- Strebin Farms, Troutdale
- Tualatin Valley Potato, Sherwood
- John Walchli, Hermiston
- Wong Potatoes, Inc., Klamath Falls

Four additional potato grower-shippers located close to the Oregon border in California and Washington are also listed.

Gower-Shippers of onions in Oregon identified by USA Onions include:

- Baker Packing Co., Ontario
- Curry & Company, Hermiston
- Eastern Oregon Produce Vale
- Fiesta Farms, Inc., Nyssa
- Frahm-Fresh Produce, Ontario
- Golden West Produce, Nyssa
- Jamieson Produce, Inc., Vale
- Murakami/Potandon Produce, LLC, Ontario
- Oregon Trail Produce, Inc., Nyssa
- Owyhee Produce, Nyssa
- Schiemer Farms, Nyssa
- Snake River Produce, Nyssa
- Standage Farms, Inc., Vale
- Treasure Valley Farms, Ontario
- West Wind Produce, Ontario

10.6.3. Processing/Manufacturing

Many Oregon growers produce storage crops that are destined for processing—either minimally processed as canned or frozen, or included in manufactured/processed goods such as soups or chips. The 2012 USDA Agricultural Census shows Oregon farmers raising beets, cabbage, carrots, garlic, onions, potatoes, pumpkins, and winter squash for processing. About two-thirds of Oregon's potatoes and 41 percent of onions go to processing.

The Oregon Potato Commission lists four potato-processing companies headquartered in Oregon:

- Diamond Foods/Kettle Foods, Salem (Chips)
- Oregon Potato Company, Boardman (Dehydrated Products)
- Reser's Fine Foods, Beaverton (Refrigerated and Frozen Specialty Products)
- Shearers, Hermiston (Chips)

Six additional potato-processing companies in California, Idaho, and Washington are also listed. (Additional plants that may be owned by out-of-region interests are not identified here.)

Oregon processors handling beets, carrots, onions, potatoes, pumpkins, squash, and other products include NORPAC (Salem), Stahlbush Island Farms (Corvallis), and National Frozen Foods (Albany).

10.6.4 Retail

In 2012, there were 763 grocery stores in Oregon.[199] Many are outlets of major chains, which carry conventional and organic produce from local farm suppliers. Both Safeway and Fred Meyer stores in Portland carry storage crops packed by Oregon- and Washington-based businesses. Products are sometimes identified as local with shelf-tags. In other cases, it is necessary to read packaging labels for clues as to the origin of products.

There are also about 80 independent or natural food stores, like New Seasons Market (12 stores), Market of Choice (9 stores), Whole Foods Market (8 stores), Zupan's (4 stores), and about a dozen cooperative grocery stores (like People's Food or Oceana Natural Food), that may have strong relationships with local suppliers.

Estimates based on ERS figures suggest that per-week stores sell an average of 2,122 pounds of fresh potatoes, 1,231 pounds of onions, 601 pounds of carrots, and a combined total of 900 pounds of other storage crops. If the 80 independent stores in Oregon had 80 percent local fresh onions and potatoes and 40 percent local procurement of other fresh storage crops, and the remaining 683 chain grocery stores in Oregon had 50 percent local potatoes and onions and 20 percent local procurement of other storage crops, the need would be:

Crop	Independent	Chain	Total	OR Consumption
Beets	54,240	231,535	285,775	14.6%
Cabbage	683,420	2,917,347	3,600,767	14.6%
Carrots	999,324	4,212,198	5,211,522	17.5%
Garlic	206,111	879,835	1,085,946	14.6%
Onions	4,096,573	21,859,056	25,955,628	35.6%
Potatoes	7,062,002	37,682,402	44,744,404	33.5%
Pumpkin	509,853	2,176,434	2,686,286	14.6%
Turnips	10,848	46,307	57,155	14.6%
Winter Squash	54,240	231,535	285,775	14.6%

Table 10.13: Estimated Oregon demand for storage crops at retail.

[199] "2012 County Business Patterns (NAICS)," CenStats, US Census, 2012.

10.6.5. Restaurants

US Census data indicate there were 3,974 full-service restaurants (not including limited service "fast food") and 123 catering companies in Oregon in 2012. The top 10 percent may be considered "fine dining" and more likely to procure local products (though primarily through wholesalers). If 397 Oregon restaurants procure 100 percent of storage crops locally, that implies a need for:

Table 10.14: Implied demand for storage crops at fine dining restaurants in Oregon.

Crop	Pounds	OR Consumption
Beets	24,886	1.3%
Cabbage	313,561	1.3%
Carrots	297,846	1.0%
Garlic	94,566	1.3%
Onions	1,020,513	1.4%
Potatoes	1,603,663	1.2%
Pumpkin	233,926	1.3%
Turnips	4,977	1.3%
Winter Squash	24,886	1.3%

10.6.6. Farm to Hospital

Health Care Without Harm (HCWH) is an international environmental health organization that supports sustainable food procurement at hospitals and healthcare facilities. A 2007 survey by Oregon Center for Environmental Health resulted in detailed reports of purchases from six regional hospitals. Combined, the six institutions represented 1,726 hospital beds and reported purchasing:

Table 10.15: Purchasing of onions and potatoes by six Oregon hospitals.

Product	Pounds/Yr.
Onions (fresh, whole)	8,916
Potatoes (fresh, whole)	32,880
Potatoes (cut or diced)	172,560

Extrapolating from those six institutions to Oregon's thirty-three private hospitals and 6,008 total hospital beds, this suggests hospitals could represent an annual market for:

Table 10.16: Estimated demand of onions and potatoes by Oregon hospitals.

Product	Pounds/Yr.	% OR Consumption
Onions (fresh, whole)	31,036	<0.1%
Potatoes (fresh, whole)	114,451	0.5%
Potatoes (cut or diced)	600,661	

With an additional 12,403 beds in Oregon's licensed nursing care facilities, there is potential for the health care sector's demand to be even greater.

A 2012 survey by Oregon Physicians for Social Responsibility tracked purchasing of selected products by 3 hospitals (1,198 staffed beds), 2 retirement and nursing care facilities (831 independent and assisted living units), the Portland Public School district (46,000 combined enrollment with

46 percent lunch participation), and Multnomah County Corrections (1,310 beds with 79 percent average occupancy). Purchases by those entities were as follows:

Table 10.17: Purchasing of storage crops by select Oregon institutions, 2012.

Crop	Total Purchases (lbs.)	OR Purchases (lbs.)	% from OR
Carrots, whole	30,510	5,920	19.4%
Carrots, Cut	26,585	0	0.0%
Onions, Whole	37,005	6,605	17.8%
Onions, Diced	43,493	10,500	24.0%
Potatoes, Whole	133,265	67,500	50.7%
Potatoes, Cut/French Fried	180,695	10,660	5.9%
Garlic, peeled	5,442	0	0.0%
Parsnips, whole and cut	11,365	10,540	92.7%
Squash & Pumpkins, whole	9,298	5,330	57.3%
Squash & Pumpkins, cut	320	0	0.0%

With the information provided it was not possible to disaggregate hospital purchasing. However, the inability of these institutions to find fresh-cut carrots, peeled garlic, or fresh-cut squash and pumpkins from Oregon suppliers is telling. Anecdotally, food system advocates regularly hear that access to minimally processed product is a major barrier to institutions interested in purchasing locally grown storage crops.

Conclusions should be tempered with the knowledge that price remains a major consideration for foodservice in healthcare. The added value of local products from smaller farm suppliers may not be enough to justify paying a price premium.

10.6.7. Farm to School

School Food FOCUS is a national collaborative that is working with fifteen large school districts across the US (including Portland Public Schools and the Beaverton School District) to make school meals nationwide more healthful, regionally sourced, and sustainably produced.
In Oregon, approximately 24 percent of school food budgets are spent on local food—the highest percentage in the nation. (USDA, 2014) Schools, with limited budgets and limited ability to prepare fresh foods, offer an interesting procurement challenge. Portland Public Schools (PPS) has enrollment of about 46,000 students, and serves 11,000 breakfasts (24 percent participation) and 21,000 lunches daily (46 percent participation).

PPS lists a number of local farmer suppliers on its website.[200]

[200] "Real Food with Local Flavors, " Portland Public Schools, (n.d).

A survey by Ecotrust of the top seven largest Oregon school districts showed schools buying:

Table 10.18: Purchasing of storage crops by the seven largest Oregon K-12 public school districts.

Crop	Pounds
Beets—fresh cut	3,800
Cabbage—fresh cut	6,100
Carrots—whole	5,000
Carrots—fresh cut	125,480
Onions—whole	2,400
Onions—fresh cut	1,200
Potatoes—whole	57,000
Potatoes—fresh cut	6,000
Turnips—fresh cut	2,600
Winter Squash—fresh cut	11,000

Ranges for district purchasing were provided in the aggregated survey results. With the top response assumed to be Portland Public School District (the state's largest), it is possible to extrapolate from the 46,000 PPS students to the 567,000 students enrolled in districts across Oregon. That exercise suggests a potential need across all districts for:

Table 10.19: Estimated demand for storage crops by K-12 public school districts in Oregon.

Crop	Pounds	Combined	% OR Consumption
Beets—fresh cut		30,815	1.6%
Cabbage—fresh cut		61,630	0.2%
Carrots—whole	61,630	875,152	2.9%
Carrots—fresh cut	813,522		
Onions—whole	12,326	24,652	<0.1%
Onions—fresh cut	12,326		
Potatoes—whole	616,304	677,935	0.5%
Potatoes—fresh cut	61,630		
Turnips—fresh cut		30,815	7.9 percent
Winter Squash—fresh cut		73,957	3.8 percent

Assuming this procurement scenario holds true at the college and university level, it is possible to extend the scenario to the approximately 190,000 students enrolled in Oregon universities and colleges, thereby increasing the required totals by about one-third.

1.6 Demand Summary

Combining the estimates provided above for retail, restaurants, hospitals, and educational institutions suggests that Oregon farm and food businesses offering local and organic fresh and fresh-cut storage crops could capture significant percentages of the in-state market.

Table 10.20: Estimated percentage of Oregon consumption of in-state storage crop production.

Crop	Pounds	% of OR Consumption
Beets	351,500	19%
Cabbage	3,996,300	16%
Carrots	6,673,300	22%
Garlic	1,180,500	16%
Onions	27,040,000	37%
Potatoes	47,965,000	36%
Pumpkin	2,920,200	16%
Turnips	103,100	26%
Winter Squash	409,000	21%

Retail represents more than 70 percent of market opportunity in most categories. However, schools, which are actively encouraging students to try and regularly eat a wide variety of vegetables may represent a critical opportunity for growers of beets, cabbage, turnips, and other crops that "skew old" to develop a new generation of consumers.

10.8. Oregon Storage Crop Production

The 2012 USDA Census of Agriculture shows the number of farms in Oregon reporting production and sale of various storage crops.

The production estimates that follow are based on crop budgets published by Oregon State University, using a midrange figure for yield per acre that might be expected.

Crop	Farms	Acres	Production in Pounds	% Oregon Consumption
Beets (fresh market)	120	89	1,246,000	63.6%
Cabbage (fresh market)	85	681	16,003,500	61.0%
Carrots (fresh and for processing)	411	823	24,690,000	80.8%
Garlic (fresh and for processing)	175	1,248	16,848,000	186.9%
Onions (fresh market)	502	12,011	600,550,000	773.9%
Potatoes (fresh market)	547	14,352	839,592,000	603.5%
Pumpkin (fresh market)	521	1,477	44,310,000	240.6%
Turnips (fresh market)	15	290	8,700,000	2,219.9%
Winter Squash (fresh market)	125	548	16,440,000	839.0%

Table 10.21: Oregon production estimates of storage crops.

Oregon farmers are capable of meeting 100 percent of local demand for garlic, onions, potatoes, pumpkin, turnips, and winter squash, and more than 60 percent of demand for beets, cabbage, and carrots. However, these products are

not consistently being identified as local, which is limiting opportunities for added value.

The critical shortages across all categories are likely for **certified organic crops**. Grocery retailers that have made certified organic crops an integral part of their brands, such as Whole Foods Market nationally, or New Seasons Market locally, have experienced significant growth, and are likely to continue to do so.

Breakdowns by size of operation are provided for onions and potatoes. Production of onions is concentrated in Malheur and Morrow counties. Production of potatoes is concentrated in Baker, Klamath, Malheur, Morrow, and Umatilla counties. About 78 percent of fresh-market onion growers (390 farms) and 80 percent of fresh-market potato growers (438 farms) harvest less than 1 acre. Based on total dollar value potatoes (#7) and storage onions (#8) are both top-ranked commodity crops for Oregon. Oregon is actually the leading producer of storage onions (representing 27 percent of US production) and the third-ranked producer of garlic.[201]

10.9. Oregon Storage Crop Infrastructure

10.9.1. Cold Storage and Packing

A number of grower-shippers are listed above, which combined likely have sufficient capacity to grow, store, pack, and distribute quantities of potatoes and onions sufficient to meet in-state demand.

The situation is less clear for other storage crops. Detailed information is not available from the USDA Agricultural Census for most of these crops, and they do not have related grower associations providing information and advocating for the interests of their members.

According to the Agricultural Census, only 2 percent of Oregon farms (761 total) report having their own on-farm packing facility. The majority of farmers raising storage crops can therefore be assumed to be contracting storage and packing services, or more likely to be selling crops outright at harvest—which are then pooled with product from other farms and packed under the handler's brand.

It has been reported that most farmers prefer to contract for storage, rather than invest in an on-farm facility that will be only partially utilized or empty for major portions of the year. Further exploration of the capacity and willingness of storage service providers to segregate and preserve the identity/origin of products, and of the potential need for dedicated or on-farm facilities would be valuable.

[201] "Oregon Agriculture: Facts and Figures, July 2014," Oregon Department of Agriculture, (n.d).

10.9.2. Packaging

A look at enterprise budgets for potatoes and onions reveals that the cost of consumer packaging (plastic bags or mesh nets) can actually exceed the cost of the product inside. There are relatively few suppliers of the heavy-duty tinted film used for potatoes, and costs for petroleum products of all types have been increasing. This raises an interesting question whether there are packaging alternatives that could be developed and/or produced by Oregon companies.

10.9.3. Fresh-Cut Processing

The inability of schools, hospitals, and other institutions to source sufficient quantities of fresh-cut carrots, onions, potatoes, and other crops from Oregon suppliers suggests that additional processing capacity may be required. Further research is necessary to determine whether this is the case, or whether other challenges are complicating procurement (loss of identity with pooled products of indeterminate origin, high cost of goods from Oregon suppliers, etc.).

10.9.4. Special Equipment

It has been reported that there is no commercial garlic peeler accessible to small or midsized farmers in Oregon. This may be an opportunity for vertical integration or offer of copacking services.

10.10. Conclusions

Oregon farmers are capable of meeting 100 percent of local demand for garlic, onions, potatoes, pumpkin, turnips, and winter squash, and more than 60 percent of demand for beets, cabbage and carrots.

Ecotrust's assessment of demand for locally produced storage crops found market potential ranging from 16 percent (cabbage, garlic, pumpkin) to 36-37 percent (onions, potatoes) of Oregon consumption. In reality, in-state sales of Oregon storage crops may already exceed those percentages. However, these products are not consistently being identified as local, which is limiting opportunities for added value.

Products like fresh market beets, cabbage, turnips and squash, which are typically sold loose with no or minimal packaging (stickers, twist ties), do not lend themselves to consumer branding and marketing. However, retailers do see increasing value in being able to identify the origin of products (place and even farm name) for customers. This should create competitive advantages for Oregon growers (ability to capture shelf space) and in some cases opportunity to sell direct to retailers.

Grower-shippers of retail packed onions and potatoes would likely benefit from a stronger and more prominent statement of origin to distinguish their products, thereby providing them with stronger differentiation in local markets from the traditional commodity supply stream. Consumers may not notice when the only reference to Oregon is in the company address in small print at the bottom of the bag or on the closure of a mesh bag.

Institutional interest in sourcing more Oregon grown and fresh-cut processed products is worth further exploration. It is not clear that the demand signal is reaching farmers who may have opportunity for vertical integration or to pursue copacking, or existing in-state processors who may be able to capture market share from suppliers from outside Oregon. The need for additional processing capacity and specific pieces of equipment (garlic peeler) should also be more closely studied.

11

Greens

Photo courtesy Carole Topalian

11.1 Introduction to Greens at the National Level

"Leafy greens" include a variety of plants eaten raw or cooked, such as arugula, cabbages, chard, cress, dandelion, endive, escarole, kale, lettuces, mache, mizuna, radicchio, spinach, tat soi, and winter purslane. The main types of lettuce are head lettuce (iceberg, butterhead, Boston, and Bibb), romaine, and various leaf varieties. Other "cooking greens" include collard greens, mustard greens, and turnip greens.

Total acreage of lettuce harvested in 2013 was 259,100 acres. The 7.9 billion pounds of lettuce harvested were valued at over $2.4 billion at the farm level.

Acreage dedicated to other leafy vegetables is significantly smaller.

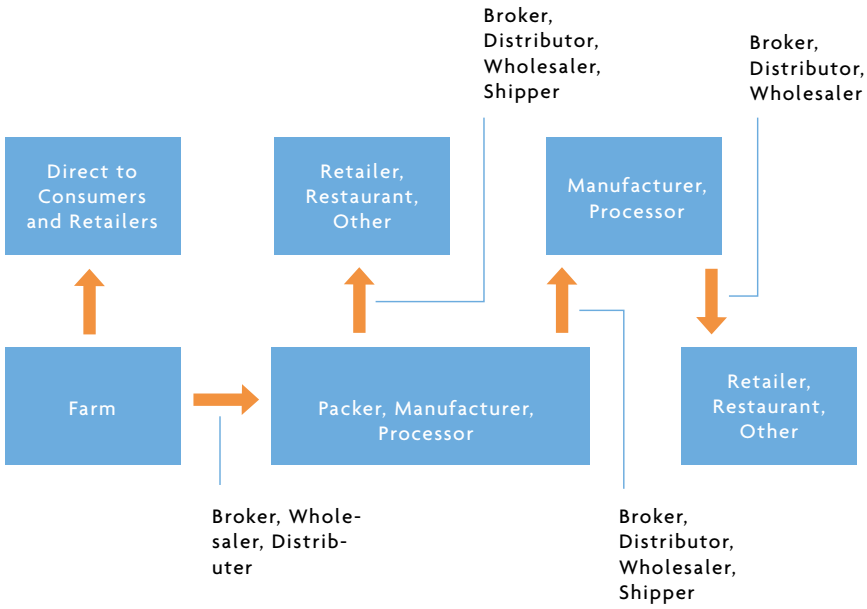
Table 11.1: Total production of greens by type.

2013 NASS	Acres	Total Pounds	Farm Value
Head Lettuce	115,000	4,025,000,000	$1,081,920,000
Leaf Lettuce	53,000	1,219,000,000	$467,614,000
Romaine Lettuce	91,100	2,662,000,000	$880,373,000
2012 Ag Census/NASS/ERS			
Spinach (fresh)	31,440	509,400,000	$221,006,000
Collard Greens (fresh)	10,005	301,763,000	Unknown
Mustard Greens (fresh)	5,705	140,038,000	Unknown
Turnip Greens (fresh)	5,033	125,373,000	Unknown
Escarole/Endive	2,030	89,364,000	Unknown
Kale (fresh)	5,535	114,300,000	Unknown

Greens grown for fresh market may be harvested either as single leaves or as whole plants. Harvesting is usually done by hand, making these crops quite labor intensive.

Greens are described as a "farm to fork" industry in which growers may market direct to consumers or to retailers, or send product through a chain of as many as three handlers as seen in the following graphic.

Figure 11.1: Greens market channels.

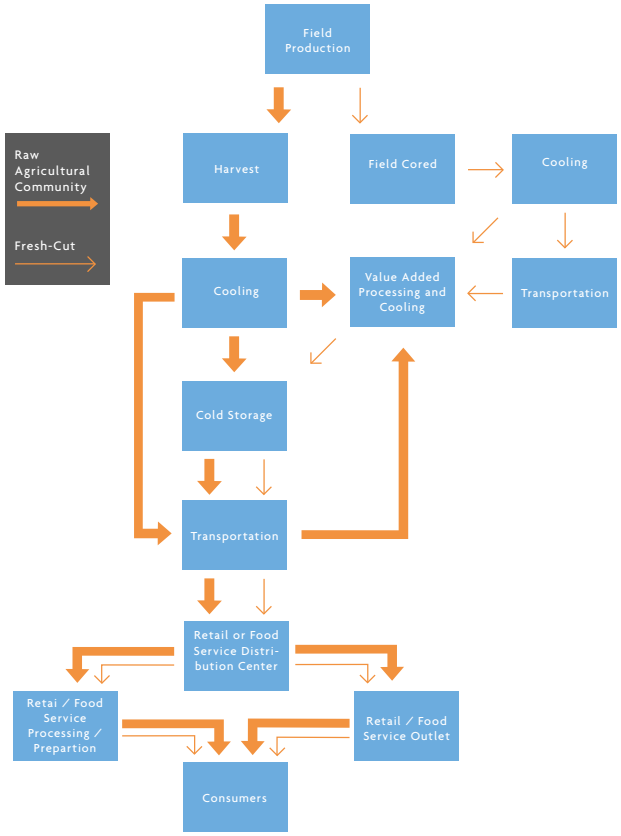


However, it is becoming less common for farms to ship whole plants. The Economic Research Service notes:

> "The marketing of vegetables has undergone radical changes in the past 20 years with the introduction of packaged, prewashed vegetables sold in either bags or plastic containers. The convenience to consumers of prepackaged vegetables, particularly leafy greens, includes timesavings from not having to sort, wash, dry, or chop. These timesavings come at a price. Packaged vegetables typically cost more than their conventional counterparts. For example, in 2006, washed packaged leaf and baby spinach cost $3.32 per pound, while loose or bunched random-weight spinach sold for $1.05 per pound. Despite these higher prices, prepared and ready-to-eat bagged leafy green products, including salad mixes, accounted for more than half of all retail leafy green purchases in 2009."[202]

In 2013 Nielsen Perishables Group estimated that 83 percent of households have purchased fresh-cut bagged salad mixes. The popularity of fresh-cut vegetables has put increasing emphasis on post-harvest cooling and handling of products to maintain quality and to ensure food safety.[203]

Figure 11.2: Greens industry process flow.



[202] "Consumers Cut Back on Convenience but not Necessarily Quantity, When Incomes Fall," Fred Kuchler, UDSA, ERS, 2011.

[203] "Understanding Today's Produce Consumers and Reaching Them in New Ways," Nielsen Perishables Group, 2014.

11.2. Segmentation, Key Issues, and Trends

2012 US Census figures show that nationally there were 5,757 farmers reporting sales of lettuce. The large majority of those growers—about 76 percent—grew less than 1 acre of lettuce. The top 1.5 percent of those growers—each managing 1,000 acres or more—represented 75 percent of all sales.[204]

California and Arizona alone account for about 98 percent of commercial lettuce production.

The Agricultural Marketing Service reports:

> "A small number of firms are responsible for growing, processing, and transporting lettuce to retail outlets. In addition, the share of firms competing for bagged products has become more concentrated in recent years. The higher concentration is thought to be the result of barriers to market entry including high capital investments, difficulty in transporting bagged products while maintaining freshness, and brand recognition."[205]

A 2014 Food Marketing Institute study listed the following reasons for Buying Locally Grown at Retail:

86% Freshness
75% Support local economy
61% Taste
56% Like knowing source/how produced
39% Nutritional value
39% Price
31% Enviro. impact of long distance transportation
30% Appearance
24% Long term personal health effects

Alternatives to conventional greens discussed in this report include:

- Organic
- Local products from small and midsized farms.

11.2.1. Organic

"Organic" is regulated by the USDA and requires a third-party audit. Consumers associate organic with the absence of chemical fertilizers or pesticides, although approved amendments and treatments may be used.

ERS figures show that acreage dedicated to organic lettuce production in the US increased 307 percent from 2000 to 2011 (from 11,410 acres to 34,967

[204] "Farms by Concentration of Market Value of Agricultural Products Sold: 2012," USDA, NASS, 2012.

[205] "Commodity Profile: Lettuce," Hayley Boriss, Henrich Brunke, Agricultural Issues Center, University of California, 2005.

acres). As a percent of all acreage dedicated to lettuce production, organic production increased from 3.69 percent to 11.56 percent of all production.[206]

ERS figures also show that farmers received a significant premium for organic greens:[207]

Table 11.2: Premium for organic greens by type.

2013 Organic Premium	Low	High
Greens (Chard)	-	34%
Romaine Lettuce	68%	89%
Mesculin Mix	23%	101%
Leaf Lettuce	55%	105%
Spinach	68%	135%

Organic bagged salads reportedly represent 23 percent of total sales of bagged salads as of 2014.[208]

11.2.2. Local and Regional

There are a growing number of independent farmers marketing direct to consumers or to commercial food buyers (retail grocery stores, restaurants, food service).

According to the 2012 USDA Census of Agriculture, a total of 6,680 Oregon farmers reported sales direct to consumers (18.8 percent of all farmers) and 1,898 Oregon farmers reported sales direct to a retailer (5.4 percent).[209]

11.3. Markets for Greens

Price differences for greens observed in Portland January 2015 include:

Table 11.3: Price differences for greens observed in Portland, January 2015.

	Major Grocer	Major Grocer	New Seasons Market
Fresh			
Head Lettuce	$0.99/head		
Leaf Lettuce	$0.99/head	$2.29/head, Organic	$1.99/head, Organic
Kale	$1.29/bunch, Local	$1.79/bunch, Organic	$2.00/lb., Organic
Collard Greens	$1.79/bunch	$2.49/bunch, Organic	$2.50/lb., Organic
Mustard Greens	$1.79/bunch		$2.50/lb., Organic
Packaged			
Bagged Spinach	$3.18/lb. (10oz. bag @ $1.99)	$9.00/lb., Organic (5oz. bag @ $3.00)	$5.99/lb., Organic
Spring Mix Bagged Salad	$6.34/lb. (5oz. bag @ $1.98)	$4.99/lb., Organic	$6.99/lb., Organic

206 "Organic Production: Overview," USDA, ERS, 2013.

207 "Organic Prices, Overview," USDA, ERS, 2014.

208 "Trends in the Marketing of Fresh Produce and Fresh-cut/Value-added Produce," Dr. Roberta Cook, Department of Ag and Resource Economics, University of California, Davis, 2014.

209 USDA Census of Agriculture.

As with other products studied in this report, despite the potential to realize higher prices overall for differentiated products, midsized and smaller scale farmers pursuing niche markets must earn a margin that enables profitability in spite of typically higher per unit production, processing, and marketing costs.

11.4. Demand for Greens in Oregon

Understanding market demand is critical to evaluating potential investments to increase production and profitability of local greens.

11.5. Consumer Spending on Greens

According to the Bureau of Labor Statistics, the average household (2.6 persons) in the western US spent $7,180 in 2013 on food at home (59 percent) and away (41 percent) in 2013. This includes $283 spent on fresh vegetables of all types for at home consumption.[210]

Spending on lettuces and leafy vegetables is not called out in BLS reports. However, the ERS does estimate per capita consumption[211] and average retail prices[212] of lettuce and other leafy vegetables as follows:

Table 11.4: Estimated household spending on greens.

Crop	Pounds (2012)	Avg/lb. (2008)	Per Capita Spending	Est. Household Spending
Head lettuce	14.23	$0.99	$14.09	
Leaf & Romaine Lettuce	11.28	$1.95	$22.00	
Spinach	1.4	$3.92	$5.49	
Collard Greens	0.8	$2.36	$1.89	
Mustard Greens	0.4	$2.19	$0.88	
Turnip Greens	0.4	$2.11	$0.84	
Escarole/Endive	0.3	$2.55	$0.77	
Kale	0.3	$2.19	$0.66	
Total	**29.11**		**$45.74**	**$118.92**

The Packer offers another estimate of retail sales for 2012 with more up to date pricing:[213]

Table 11.5: Estimated retail sales of greens.

2012	Pounds	Sales	Avg. per lb.
Salad Mix	1,216,156,495	$3,022,681,827	$2.47
Lettuces	975,898,702	$1,381,067,303	$1.42
Spinach	124,539,494	$535,764,092	$4.30
Greens	114,450,819	$172,604,702	$1.51

[210] "Region of residence: Annual expenditure means, shares, standard errors, and coefficient of varaition," Consumer Expenditure Survey, US Bureau of Labor Statistics, 2014.

[211] "Region of residence: Annual expenditure means, shares, standard errors, and coefficient of varaition," Consumer Expenditure Survey, US Bureau of Labor Statistics, 2014.

[212] "How Much Do Fruits and Vegetables Cost?" USDA, ERS, 2011.

[213] "Lettuce," The Packer's Produce Universe, (n.d).

Using population data and the figures above, it is possible to form estimates for total consumption of fresh greens in Oregon, at the county level or for municipalities.

POUNDS	Head Lettuce	Leaf Lettuce	Spinach	Collard Greens	Mustard Greens	Turnip Greens	Escarole Endive	Kale
Oregon	51.7M	41.9M	5.5M	3.1M	1.6M	1.6M	1.2M	1.2M
Multnomah Co.	10M	8.1M	1.1M	605K	303K	303K	227K	227K
Jackson Co.	2.7M	2.2M	289K	165K	83K	83K	62K	62K
Bend	1M	847K	111K	63K	32K	32K	24K	24K
La Grande	172K	140K	18K	10K	5.2K	5.2K	3.9K	3.9K

Table 11.6: Estimated consumption of fresh greens in Oregon.

A 2007–2010 National Health and Nutrition Examination Survey (NHANES) suggests that about one-third of vegetables are consumed outside the home (12.7 percent in full service restaurants, 12 percent in fast food restaurants, and 8.4 percent through other channels such as school food service.)

This suggests that consumer spending at retail for greens in Oregon may be as follows:

CONSUMER SPENDING	Head Lettuce	Leaf Lettuce	Spinach	Collard Greens	Mustard Greens	Turnip Greens	Escarole Endive	Kale
Oregon	$33.8	$54M	$14.2M	$4.9M	$2.3M	$2.2M	$2M	$1.7M
Multnomah Co.	$6.5M	$10.4M	$2.7M	$943K	$437K	$421K	$382K	$328K
Jackson Co.	$1.8M	$2.8M	$747K	$257K	$119K	$115K	$104K	$89K
Bend	$682K	$1.1M	$287K	$99K	$46K	$44K	$40K	$34K
La Grande	$113K	$180K	$47K	$16K	$7K	$7K	$6.5K	$5.6K

Table 11.7: Estimated consumer spending on greens in Oregon.

ERS price-spread figures suggest that in 2012 the farm price for head lettuce is about 21 percent of the final retail price. The average across a "market basket" of fresh vegetables was 23 percent of the final retail price. This has bearing on evaluating the real scope of opportunity in markets referenced above.[214]

11.6. Market Channels

Salad and cooking greens make their way from farm to market through a number of channels both direct and wholesale.

11.6.1. Direct Market

Oregon farmers reported a total of $44.1 million in sales direct to consumers in 2012—an average of just over $6,600 for each farm reporting direct sales. It can be assumed that at least two-thirds of sales through farmers' markets, farm stands, CSAs, and other direct market channels are of fresh produce—representing about $29 million. BLS consumer spending figures suggest that 46 percent of fresh produce sales will be for vegetables. ERS figures suggest that at least 42 percent of that subtotal will be for salad and cooking greens.

[214] "Price Spreads from Farm to Consumer: Overview," USDA, ERS, 2015.

This implies about $5.6 million spent on direct market greens, much of which will be organic or marketed as "grown with organic practices," which could translate to about 1.7 million pounds of lettuce and 250,000 of other mixed greens. If true, this would be 1.8 percent of lettuce and 1.7 percent of other greens consumed in the state.

11.6.2. Processing/Manufacturing

The 2012 USDA Agricultural Census does show small numbers of Oregon farmers raising collard greens, kale, mustard greens, and spinach for processing. About half of Oregon's spinach crop goes to processing. USDA does not disclose dedicated acreage for other crops in order to preserve confidentiality.

11.6.3 Retail

US Census County Business Patterns data indicate there were 763 grocery stores.

Many grocery stores are outlets of major chains, like Safeway and Kroger, which do carry conventional and organic produce from local farm suppliers. Both Safeway and Fred Meyer stores in Portland identify local lettuce and cooking greens with shelf tags, which in some cases name the farm. Cal Farms (Oregon City) and others have also been featured on billboards as part of a Fred Meyer advertising campaign.

There are also about 80 independent or natural food stores, like New Seasons Market (12 stores), Market of Choice (9 stores), Whole Foods Market (8 stores in Oregon), Zupan's (4 stores), and about a dozen cooperative grocery stores (like People's Food or Oceana Natural Food), that may be most dedicated to relationships with local suppliers.

Grocery Headquarters reported in 2011 that sales of cooking greens averaged $337 per store per week.

The Nielsen Perishables Group reported that 2013 sales of lettuce averaged $1,334 per store per week, and that sales of bagged salad mixes averaged $3,286 per store per week.

Private labels now represent the largest segment of the bagged salad market, with 29.7 percent of sales.

If the 80 independent stores in Oregon had local/regional fresh greens representing half of total sales, the resulting need would be 3.9 million pounds of lettuce and 928,000 pounds of other greens annually. Those figures represent about 4.2 percent of Oregon lettuce consumption and about 6.5 percent of Oregon greens consumption.

If the remaining 683 chain grocery stores in Oregon had local/regional fresh greens representing 10 percent of total sales for 6 months out of the year, the

resulting need would be 3.3 million pounds of lettuce and 793,000 pounds of other greens annually. Those figures represent about 3.5 percent of Oregon lettuce consumption and about 5.6 percent of Oregon greens consumption.

11.6.4. Restaurants

US Census County Business Patterns data indicate there were 3,974 full-service restaurants (not including limited service "fast food") and 123 catering companies in Oregon in 2012. The top 10 percent may be considered "fine dining" and more likely to be engaged in procurement of local products (though primarily through wholesalers).

The NHANES study referenced above suggests that 12.7 percent of vegetables are consumed in full-service restaurants. (A separate breakout for "dark green vegetables" is even higher at 18.2 percent.) That in turn implies that 397 Oregon restaurants (10 percent) represent a market for at least 1.2 million pounds of lettuce and about 180,000 pounds of other greens—or about 1.3 percent of lettuce consumption and 1.3 percent of other greens consumption.

11.6.5. Farm to Hospital

Health Care Without Harm (HCWH) is an international environmental health organization that supports sustainable food procurement at hospitals and healthcare facilities. A 2007 survey by Oregon Center for Environmental Health resulted in detailed reports of lettuce purchases from six regional hospitals. Combined, the six institutions represented 1,726 hospital beds and reported purchasing:

Table 11.8: Greens purchasing by six Oregon hospitals, 2007.

Product	Pounds/Yr.
Head Lettuces (whole)	6,360
Leaf Lettuces (whole & dices)	69,984
Salad Mixes	26,544

Extrapolating from those six institutions to Oregon's thirty-three private hospitals and 6,008 total hospital beds, this suggests hospitals could represent an annual market for:

Table 11.9: Estimated purchasing of greens by Oregon hospitals.

Product	Pounds/Yr.	Percent OR Consumption
Head Lettuces (whole)	22,138	
Leaf Lettuces (whole & dices)	243,606	
Salad Mixes	92,396	
Total	358,140	0.4 percent

Other greens were not included in the survey. But if hospital purchases of other greens were proportionate with consumption, it would imply a need for 49,000pounds of greens—about 0.3 percent of Oregon consumption.

With an additional 12,403 beds in Oregon's licensed nursing care facilities, there is potential for the health care sector's demand to be even greater.

Conclusions should be tempered with the knowledge that price remains a major consideration for foodservice in healthcare. The added value of local products from smaller farm suppliers may not be enough to justify paying a price premium.

11.6.6.66 Farm to School

School Food FOCUS is a national collaborative that is working with fifteen large school districts across the US (including Portland Public Schools and the Beaverton School District) to make school meals nationwide healthier, regionally sourced, and sustainably produced.

In Oregon, approximately 24 percent of school food budgets are spent on local food—the highest percentage in the nation. (USDA, 2014) Schools, with limited budgets and limited ability to prepare fresh foods, offer an interesting procurement challenge. Portland Public Schools (PPS) has enrollment of about 46,000 students, serves 11,000 breakfasts (24 percent participation) and 21,000 lunches daily (46 percent participation).

Portland Public Schools follows guidelines that call for serving at least one-half cup of dark green vegetables per week. The district also lists a number of local farmer suppliers on its website.[215]

Portland Public Schools offers a fruit and veggie bar allowing students unlimited access to two types of vegetables and two types of fruit and fresh salad greens. One-half cup of fresh, raw, chopped leafy greens is considered equivalent to one-quarter cup of dark green vegetables for purpose of compliance with school lunch program requirements. USDA purchasing guidelines state that 4.8 pounds of Romaine lettuce or 6.9 pounds of leaf lettuce will yield one hundred quarter-cup servings after being trimmed and chopped.

The school district also features locally grown kale in its Harvest of the Month promotion for February 2015. USDA purchasing guidelines state that 8.5 pounds of fresh, raw kale will yield one hundred quarter-cup servings after being trimmed, cooked, and drained.

One-eighth cup is the smallest recognized serving size for vegetables.

If local lettuce were featured in salad bars on a daily basis for at least half the school year (90 days) and half of participating students (10,500) consumed a minimum a quarter-cup of fresh, chopped lettuce, PPS would require 945,000 million total servings, which would in turn require 65,205 pounds of leaf lettuce.

If cooked local greens were featured in meals four times during the school year, and students receive the minimum one-eighth-cup serving, PPS would

[215] "Real Food with Local Flavors," Portland Public Schools, (n.d.).

require 84,000 servings, which would require 3,570 pounds of fresh kale or similar quantities of other greens.

Extrapolating to the 567,000 students enrolled in districts across Oregon suggests a need for 803,700 pounds of leaf lettuce and 44,000 pounds of other greens.

Extending that scenario to the approximately 190,000 students enrolled in Oregon universities and colleges suggests a need for another 270,000 pounds of lettuce and 15,000 pounds of other greens.

11.7. Demand Summary

Combining the estimates provided for retail, restaurants, hospitals, and educational institutions suggests there is potential demand in Oregon for at least 9.8 million pound of local lettuces, and about 2 million pounds of other local greens. Those totals represent about 10.5 percent of all lettuces and about 14 percent of other greens consumed in Oregon—but, as seen below, more than 150 percent of all lettuce currently produced in Oregon, with the greatest shortfall in head lettuces.

The breakdown by channel for lettuces is as follows:

- Retail: 73% ~7.2 million lbs.
- Restaurants: 12% ~1.2 million lbs.
- Education: 11% ~1.1 million lbs.
- Hospitals: 4% ~358,000 lbs.

On the surface, it appears Oregon lettuce farmers have at least a 1.6-times opportunity to expand local markets.

The breakdown by channel for other greens is as follows:

- Retail: 85% ~1.7 million lbs.
- Restaurants: 9% ~180,000 lbs.
- Education: 3% ~59,000 lbs.
- Hospitals: 3% ~49,000 lbs.

Production figures in the next section suggest that Oregon farmers are likely meeting close to 100 percent of local demand for fresh kale and turnip greens in season, about 70 percent of demand for fresh spinach, and a significant percentage of demand for mustard greens. However, these products are not consistently being identified as local, which may be limiting opportunities for value-add.

The critical shortages across both categories are likely for **certified organic crops**.

11.8 Oregon Greens Production

The 2012 USDA Census of Agriculture shows a total of 163 farms in Oregon reported sales of lettuces raised on 255 total acres. Lettuces and other greens are minor crops in Oregon and breakdowns are not provided by size of operation or by production.

The production estimates that follow are based on crop budgets published by Oregon State University, using a midrange figure for yield per acre that might be expected.

Table 11.10: Estimates of Oregon production of greens.

	Farms	Acres	Production		% of Oregon Consumption
			Heads	Pounds	
Head Lettuce	39	13	218,400	409,500	0.8%
Romaine & Leaf Lettuce	134	241	5,775,600	5,594,800	13.3%
Total Lettuces				**6,004,300**	**6.4%**
Collard Greens	9	11		165,000	5.3%
Escarole/Endive	-	-	-	-	-
Kale	119	100		3,800,000	323.2%
Mustard Greens	14	42		630,000	40.2%
Spinach	45	407		7,163,200	130.6%
Turnip Greens	15	300		4,500,000	287.1%
Total Leafy Veg.				**16,258,200**	**115.2%**

Meeting a great percentage of Oregon's consumption of lettuces will require increasing production—by enrolling additional acres, by implementing season extension strategies to enable harvests over a greater portion of the year, and by developing post-harvest handling capacity to improve product quality and limit losses due to wilting and spoilage.

11.9. Oregon Greens Infrastructure

11.9.1. Season Extension—High Tunnel Hoop Houses

Lettuce and spinach in the Willamette Valley typically yield two crops per year. Some hardier greens, such as kale and chards, can be grown year-round, but may fair poorly in hot summer sun. High tunnel hoop houses offer a means to extend the production season and control environmental conditions. One study suggests that high tunnels can lengthen the growing season from 1 to 4 weeks in the spring, and 2 to 8 weeks in the autumn (Wells and Loy, 1993)—but there are also examples of farmers growing greens year round using tunnels.

Iowa State University's Ag Decision Maker notes:

High tunnels enable growers to increase their profitability in several ways:

- They extend the growing season in the spring and fall allowing earlier and later production of cool and warm-season crops.
- Crop quality and yields can be improved through better climate, water, and nutrient management, and a reduced incidence of plant diseases.
- They allow for better labor efficiency because planting, maintenance, and harvest can be performed without being affected by weather.
- Growers often receive higher prices for out-of-season crops.

The estimated cost to construct a 2,160-square-foot-high tunnel (30 feet by 72 feet—84 percent usable space) is $7,000.

Production and gross receipts with such a tunnel were estimated as follows:

	Yield per Sq. Ft.	$ per lb.	Gross per Sq. Ft.	Yield per Crop	Gross per Crop
Greens	0.46 lbs.	$7.00	$3.22	835 lbs.	$5,842.37
Lettuce	1.15 lbs.	$7.00	$8.05	2,087 lbs.	$14,605.92

Table 11.11: Production and gross receipts for greens grown in high tunnels.

A study of high tunnel production in Washington found that tunnel-grown lettuce had three times greater marketable yield compared with field-grown.[216] However, tunnels are not a panacea. The study also found that labor costs were six times higher in a high tunnel than in the open field. While still profitable to grow lettuce in a tunnel, it was 43 percent more profitable to grow in an open field—suggesting that use of tunnels will be less competitive during the peak-growing season.

The authors did note, however, that their sample was small, there is a learning curve associated with maximizing production and minimizing costs, and that economies of scale may be possible with more tunnels in operation. Tunnels can also significantly reduce stress on plants affecting crop quality and risk of crop loss (due to frost, hail, etc.)

Barriers to more widespread adoption of high tunnels were also noted as follows:

> "high cost of tunnel production in terms of capital investment, time, and effort; lack of experience with tunnel set up and management; lack of horticultural experience with crops requiring high labor input; low knowledge base to manage tunnel operation, maintenance, and repairs;

[216] "Economic Profitability of Growing Lettuce and Tomato in Western Washington under High Tunnel and Open-field Production Systems," Suzette P. Galinato and Carol A. Miles, HortTechnology, 2013.

and lack of understanding of the optimal planting dates and varieties for production."[217]

Other opportunities to consider may be repurposing of under-utilized greenhouses and development of hydroponic or aquaponic production. Some informants have suggested that with the recent recession, a number of nurseries have greenhouses that have been taken out of production. There are also a small but growing number of start-up businesses raising lettuce hydroponically (Next Season, Bend) or in combination with on-land fish farming (The Farming Fish, Rogue River).

11.9.2. Labor

Labor is clearly a factor for greens production. The Washington study found that labor represented 58 percent of total cost for both field-grown and tunnel-grown lettuce.[218] A 2011 University of Kentucky study estimated that high tunnel greens production in a 1,920-square–foot tunnel could require between 70 and 150 hours of labor depending on the crop mix (less with greens and head lettuce, more with lead lettuce or herbs).

Given the small number and smaller size of farms raising lettuces and greens in Oregon (limiting implementation of technologies employed in California and Arizona), access to labor (ten dollars/hour for field work, twelve dollars/hour for equipment operators) may actually be the single most limiting factor for increasing production.

11.9.3. Post-Harvest Cooling and Handling

As important—or more important—than total production of lettuces and greens is the capacity to deliver products to distributors, food service, and consumers in marketable condition. A number of informants remarked that investments in post-harvest handling by farmers in California ensure that their products can arrive in Oregon markets two to three days after harvest in better condition than Oregon products harvested the same or prior day.

In summer heat, lettuces cut and allowed to sit in fields wilt quickly. The scale of agriculture in California allows almost immediate transfer of cut produce by truck to cold rinse to quickly reduce temperature and contaminants that may promote spoilage. This will be less of a concern in high-tunnel production, with better ability to moderate extremes of temperature, but growers may still benefit from investments in owned or shared facilities to quickly wash and cool greens to increase the marketable quantity, quality, and shelf-life of produce. Combining quality with local origin, even at a higher price, seems a path to success.

[217] "Economic Profitability of Growing Lettuce and Tomato in Western Washington under High Tunnel and Open-field Production Systems," Suzette P. Galinato and Carol A. Miles, HortTechnology, 2013.

[218] "Economic Profitability of Growing Lettuce and Tomato in Western Washington under High Tunnel and Open-field Production Systems," Suzette P. Galinato and Carol A. Miles, HortTechnology, 2013.

11.9.4. Aggregation and Distribution

With the small number and smaller size of farms raising lettuces and greens in Oregon, it seems unreasonable to expect that any single grower-shipper could emerge in the near term capable of satisfying a meaningful percentage of identified demand. More likely is that growers will aggregate product under a single brand, either as contracted suppliers or as member-owners. Given the proximity of Portland/Vancouver, Salem, Corvallis, and Eugene as markets and the need to take advantage of existing labor pools, it may be advantageous for the brand or cooperative to be based in the Willamette Valley. One or more strategically placed growers may be host to post-harvest handling and aggregation sites—facilitating transfer of full truckloads of washed and cooled greens to distribution centers. Lower land costs and reduced competition may also make smaller-scaled production profitable outside population centers in southern, eastern, and coastal Oregon

11.10. Conclusions

Oregon farmers are likely already meeting a significant percentage of in-state demand for kale, a crop that is attaining status for nutritive benefits and use in the trending "healthy" snack food, kale chips.

Oregon farmers are capable of meeting demand for turnips greens and spinach, but it is unclear what percent of production is actually consumed in state. Both products are increasingly marketed in packaged form (washed and bagged)—capacity for which Oregon lacks at any meaningful scale. Lettuces of all types are also increasingly consumed in washed and bagged form or as prepared salads.

Meeting a great percentage of Oregon's consumption of lettuces will require increasing production—by enrolling additional acres, by implementing season extension strategies to enable harvests over a greater portion of the year, and by developing post-handling capacity to improve product quality and limit losses due to wilting and spoilage.

Combining the estimates provided for retail, restaurants, hospitals, and educational institutions suggests there is potential demand in Oregon for at least 9.8 million pound of local lettuces—about 150 percent of current production.

Producing an additional 3.8 million pounds of lettuces would require construction of some 440 to 585 2,160-square-foot high tunnels (assuming 3 to 4 instead of 2 crops per year) at a total cost of $3.1 to $4.1 million. A cost-share program available to farmers from the Natural Resources Conservation Service could reduce that cost by half—from $1.55 to $2.05 million.

University of Kentucky figures suggest that the labor required to operate that number of high tunnels could be between 66 and 143 full-time employees, with combined annual wages between $1.4 and $3 million.

12

Recommendations

We invite you to meet our hero, an aspiring impact investor named "Intrepid," as he digests this research and figures out his next steps, online at http://food-hub.org/regional-food-infrastructure/

12.1. For Impact Investing

Pick a problem and go to work. This research confirmed that food infrastructure is not readily or affordably accessible by Oregon's Ag of the Middle producers, and that the lack of access is inhibiting the growth and development of a robust regional food economy. The issues are many and varied, so coordination of a wide variety of investment and initiatives will be required to change the overall situation. Clearly needed are models that fill gaps in scale-appropriate aggregation, processing and distribution infrastructure, whether by working with established industry players to create access for smaller producers, or by developing new infrastructure specifically suited to support a distributed, regional-scale system.

Look for clear differentiation. All of the categories we studied—beef, pork, chicken, grains, greens and storage crops—have well established existing players that have the capacity to shift production practices and compete on any number of differentiating attributes. As this report is getting submitted, Tyson has just announced that it will eliminate antibiotics important to human health by 2017. Local chicken producers will have a very difficult time competing against Tyson on price if mainstream consumers are content with its approach being "good enough". Opportunity for financial viability is likely better in niche categories, perhaps proteins such as lamb, goat, or buffalo, and niche produce like local adaptations of ethnic ingredients. Another alternative is to focus on products targeted at discerning customers who care, and are willing to pay for, storied product or a transparent supply chain that matches their values.

Invest in models that help Ag of the Middle producers get or appear bigger. As discussed in many of the individual product chapters, co-ops, collaborations, and alliances of many kinds hold potential for smaller scale Oregon producers and entrepreneurs to create leverage in domestic (and international) marketplaces. Because of the need for differentiation, regional brands can sometimes be problematic (producers may be better served to invest in their own brands), however shared use of processing facilities, storage capacity, distribution trucks, and other infrastructure can reduce costs for all. Co-marketing of complementary products can also help build sales and market share for like-minded producers and processors. Exploring potential partnerships or collaborations with existing players committed to regional food systems, like Organically Grown Company in the case of organic produce, or B-Line Sustainable Transport in the Portland market, seems a smart starting point.

Seek to understand root causes. The signal to noise ratio in regional food systems can be very high, given the degree of complexity and fragmentation. Understanding root causes will likely require examination of problems from multiple perspectives, as a great many proposed solutions address only symptomatic issues.

Explore interdependencies among sectors. The "food system" is a misnomer in many ways. The system is actually a collection of dozens of discrete industries, most of which do not cross over from one to another. Ag of the Middle producers and processors may offer opportunities to solve multiple problems at once because they tend to operate holistically.

We discovered an interesting chain of connections **between product categories** worthy of further exploration:

- Analysis shared in the infrastructure and beef chapters showed that adequate slaughter and processing facilities may not exist in the state to serve ranchers trying to develop their own value chain for **beef** (rather than participating in the commodity supply chain as a cow/calf operators).

- Like all other hard infrastructure, beef slaughter and processing require steady **throughput** of animals in order to be financially viable. Because differentiated product (e.g., antibiotic and hormone-free and/or grassfed) is likely to be seasonal, there is a significant processing crunch in the fall. A rancher may need to reserve a fall slaughter date more than a year in advance, but the equipment is underutilized during other parts of the year.

- **Pork** can be run in the same facilities and on the same equipment as beef, and can be raised year-round. Oregon ranchers don't produce anywhere near the amount of pork we consume in Oregon (only about 2% of our consumption is produced locally) because commodity pigs usually eat corn and soy, so the hog industry is located closer to those fields in the Midwest.

- Pigs are **omnivores** and can be raised on a wide variety of feed options.

- **Wheat** farmers need to rotate crops in their fields to build fertility, disrupt disease cycles, manage pests and weeds, and increase yields. What do they grow in rotation? Stuff pigs eat.

- It seems worth exploring whether a special "Northwest Blend" of pig feed could also help wheat farmers monetize their **rotational grains**, while creating better utilization and perhaps more convenient location of livestock slaughter and processing facilities. Waste, including spent grains from breweries and compost from institutional foodservice (provided no pork products or bones were included), could also theoretically be aggregated and re-distributed to pork producers for feed.

- If a regionally appropriate hog feed were developed in partnership with wheat farmers, it seems possible that the same could be done for chicken.

- Our **chicken** supply chain analysis suggests that in some cases up to 60% of the cost of raising a differentiated chicken is purchased feed (higher if the feed is Certified Organic), so a less expensive option could have a significant impact on the economic viability of local chicken production.

Create space and structure for collaboration. The food system is complex and the challenges are significant. As an emerging sector, regional food system players have shown a penchant for **working together for mutual benefit**, but the process is inefficient. Workshops, meet and greets and "hackathons" are often too superficial to spur engagement that goes deep enough to wrestle through the complexities. Ag of the Middle producers and processors may benefit from structured "containers" that facilitate collaboration and co-working directly on their businesses over a longer period of time.

Clarify target beneficiaries. In order to facilitate effective coordination, we believe it is helpful to describe the primary beneficiary or outcome desired in as much detail as possible. If an investor is keenly interested in facilitating the success of rural producers, then it is helpful to describe to which scale, stage of business and/or primary market channel (e.g. small/midsize, new and beginning/Ag of the Middle, direct to consumer/wholesale) the investor is most drawn. It may be helpful to ask, is there a specific product category (e.g. diversified mixed vegetable, chicken, beef) or production practice (e.g. Certified Organic, antibiotic-free, grassfed) for which you see opportunity and want to solve problems?

Consider the definition of "Local". In all cases it is helpful to describe relevant geographic filters, whether based on political boundaries, such as states or counties, naturally derived boundaries such as a watershed, "food shed" or bioregion, or a more abstract concept of geography such as "Salmon Nation" (which is Ecotrust's region of interest and runs along the west coast from Northern California, through British Columbia to Alaska, and across Oregon and Washington into Idaho and Montana as far as the salmon have historically run). When considering whether a model will scale across multiple geographies, it is useful to parse which components of the model are unique to the region in which it is being developed, and which would apply to all regions.

One note of caution regarding **geography as it relates to food**. It is generally confusing or misleading to describe target geography for regional food systems in terms of mileage (as with constructs like the "100 Mile Diet"). Appropriate distance traveled is highly dependent on product category, location, season, and availability of enabling infrastructure. A conscientious eater in the Pacific Northwest may go no further than her backyard for a ripe tomato in late summer, but always need to buy avocados grown hundreds of miles away. Pigs may be raised by a producer within the county, but have to be trucked across the state for slaughter and processing, and then be trucked back to arrive in the local grocer's meat case. Organic produce distributor Organically Grown Company is guided by the principle "go as far as necessary and no farther" to allow the necessary flexibility for seasonally appropriate sourcing; such a notion may be worth adapting to your context.

Adopt a collaborative mindset. As noted earlier in this report, collaboration has become a hallmark of regional food system development, which seems both in tune with and energized by the generational changeover currently

happening across all industry sectors in the US. The approach seems well suited to food system investing also.

Whereas profit serves as an efficient organizing principle, and provides a simple scorecard, as a singular objective it has also contributed to the creation of many food products and related offerings which generate strong financial results, but deleterious health, community and environmental impacts. The addition of social and/or environmental targets in impact investing facilitate the incorporation of wellness (individual, community and of the natural resource base) into evaluations of success, however also result in multifaceted solutions and a need for multi-dimensional measurement.

Given the increased complexity, it may make sense to pursue a portfolio approach that is **broader than one's own portfolio**. In other words, by partnering, co-investing or collaborating with like-minded investors, multiple solutions to overcoming key challenges can be tested in a coordinated and transparent fashion, and the learning shared, to achieve the greatest possible impact. Furthermore, collaboration allows each investor to prioritize the opportunities most aligned with his or her objectives, confident in the knowledge that other investors in the collaborative network will focus on other pieces of the puzzle.

Start with the soil. Long-term competitive advantage in a resource-constrained environment is likely to ultimately go to players who effectively steward the resource base on which their business depends.

First, do no harm. Above all else, reviewing the existing portfolio and divesting from unaligned holdings may achieve the greatest incremental investment on behalf of regional food system development. Whether individually or on behalf of a foundation, if the investment thesis includes leveraging assets to promote values-aligned solutions ("impact investing"), then it may be counterproductive to focus energy on placing 5% of investments in "mission-related" vehicles (as is common), while leaving 95% of the portfolio invested in entities actively causing harm. Thus, reviewing the full portfolio and divesting from funds or other vehicles out of alignment with stated values or objectives could achieve an immediate spike in "social return on investment".

12.2. For Philanthropic/Governmental/ Programmatic Development

Farm to Institution. As an example of how we see this report facilitating action on the programmatic side, consider how it has already helped refine and channel the focus of Ecotrust's own Food & Farms program. Based on these research findings, we believe a programmatic strategy centered on institutions offers the best opportunity for us (given our long track record in

Farm to School initiatives and collaborations[219]) to help facilitate measurable impact on all three of the dimensions—financial, social and environmental—to which we're dedicated. While we also strongly believe relief for those among us experiencing hunger is critical, we are of the mind that creating truly equitable access to nutrient-dense food can't happen without shifting the system itself.

We have therefore redoubled our commitment to helping institutional foodservice directors leverage their procurement dollars to build strong regional food systems, thus creating both local economic opportunity and equalized access to nutrient-dense foods. We are focused primarily on supporting public institutions serving significant proportions of vulnerable populations, however we understand that other institutions, such as corporate cafes and private event venues, are vitally important because they may be more nimble and able to exercise leadership in the profession.

We are joined in this work by a robust set of capable partners, notably Healthcare Without Harm, the Oregon Department of Agriculture, Oregon Tilth, and Multnomah County, as well as trailblazing school districts, hospitals, assisted living facilities and individual chefs at institutions across the region. Many of these partners have already come together in an emerging collaboration called the "Northwest Food Buyers' Alliance[220]". We also believe there is significant opportunity to develop partnerships with existing food distributors and buying entities, to the extent that they are open to investing time and energy to help develop important enabling tools and systems, and to support local producers in meeting the necessary food safety, liability, and supplier requirements.

This body of interventions is aimed directly at helping institutional foodservice directors overcome barriers to differentiated local sourcing. Our long-term ambition, together with the partners described above and others across the region, is to develop a network of regional foodservice directors that can function like an institutional-scale CSA[221] (Community Supported Agriculture), who start with the bounty seasonally available in the region, and fill gaps in supply from beyond as necessary. Developing the Redd Campus[222] in Portland's Central Eastside Industrial District is a key building block in the foundation of our vision to serve institutions, and their most vulnerable customers.

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219 See "A School District Unites Around Food", four-minute video featuring the Salem-Keizer School District in Oregon, where 40,000 students are eating and learning in school gardens, cafeterias, and classrooms. Introduced are the diverse partners who brought this program to life.

220 www.food-hub.org/NWFBA

221 Credit for a key component of this strategy goes to Eecole Copen, Sustainable Food Programs Coordinator at Oregon Health Sciences University (OHSU), who suggested development of ISAs—Institution-Supported Agriculture.

222 http://www.ecotrust.org/project/the-redd-on-salmon-street/

Continue outreach and education to mainstream consumers. The incredible momentum at the national level toward production practices that are better for human health and the environment (such as the elimination of antibiotics important to human disease treatment in livestock) has come as a direct result of broad consumer demand. The more consumers understand about how the food system operates, the more informed choices they can make.

Help maintain the integrity of certifications. This research indicates that one of the biggest risks to the viability and success of differentiated local producers is that key aspects of their differentiation getting diluted by bigger brands making broad claims. Certifications and regulated claims help consumers make informed choices at the point of sale, but those markers simply add to the confusion if their meaning is diluted.

Make it easy. Consumers cannot be expected to become food-system experts simply to make smart choices about what to serve for dinner or where to have lunch. Creative, collaborative problem solving among producers, distributors and buyers is needed to make healthful, community-minded, resource-renewing choices the default in our system.

12.3. For Further Research

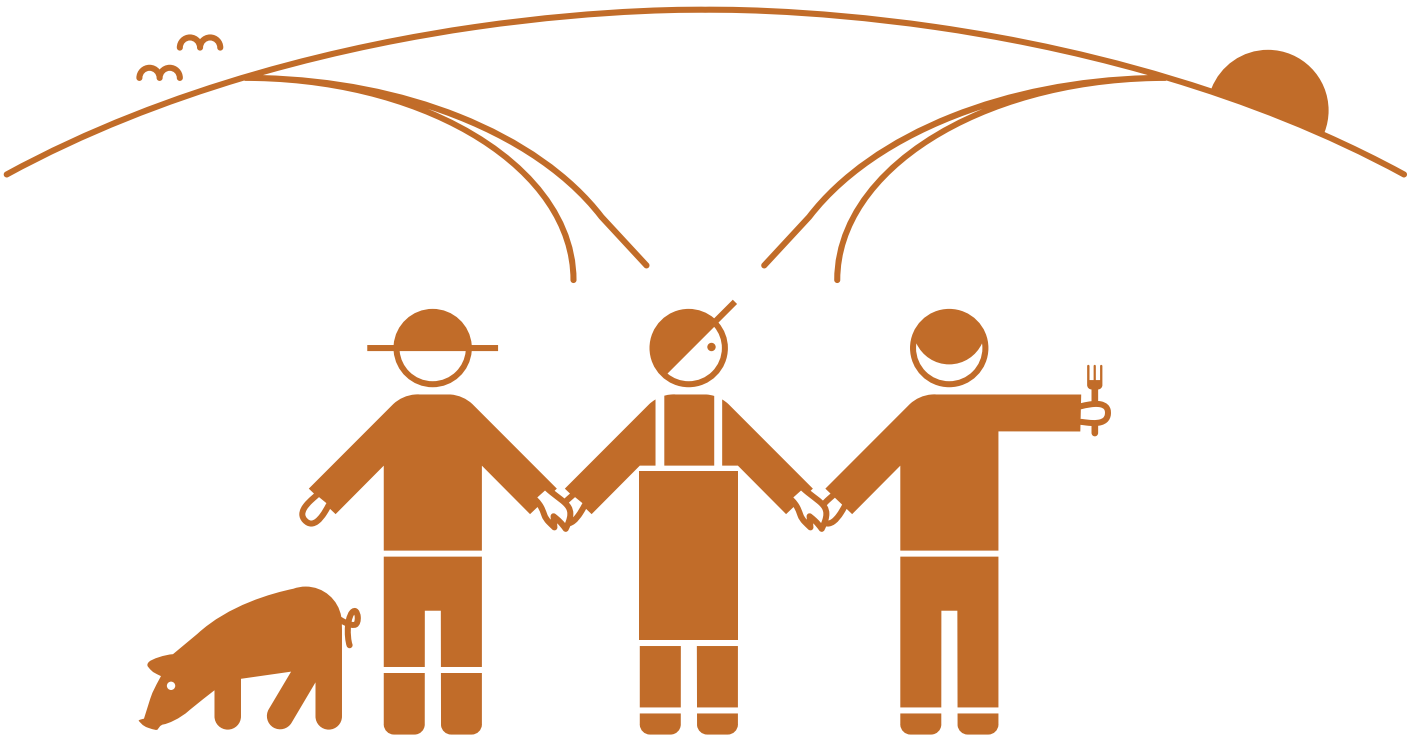
Develop key performance indicators (KPIs). The development of a robust domestic food system that also creates incentives for values-based supply chains could be advanced with the creation of indicators to measure and evaluate progress along economic, social, and environmental dimensions.

Execute further economic analysis. As illustrated by the case study **"Toward a Profitable Supply Chain for Pastured Poultry"** in the chapter on chicken, analysis of the costs of differentiated production systems is vital to identifying opportunities where efficiencies may be gleaned or market value harvested to support increased cost, given that product differentiation often requires production practices or product features that are less financially efficient. We would recommend such analysis for chicken at a larger production scale than that featured in our case study, and similar analysis for beef, pork and small grains and legumes, which also showed potential to be developed as local systems.

Research niche product categories. As noted above, the product categories studied in this report all face strong conventional competition, which has shown signs of adjusting production practices in response to consumer demand. Thus, the best categories for further investment for regional food system development may be some not studied—lamb, goat, buffalo, hazelnuts (filberts), unique berry and vegetable varieties, etc.—or subcategories within those studied—heritage and other small grains, perennial wheat varieties, specialty onions such as cipollini onions and shallots, etc.

Understand export implications. As is the case between product categories, the paths of professionals focused on local/regional market development and those focused on international trade don't often cross. To effectively serve

Ag of the Middle producers and processors, an understanding of interstate and international market potential and trade dynamics is vital. The fertility of Oregon's rich soils generates far more food than our relatively small population can absorb on our own, and the influx of money generated by the sale of high-quality and diverse food products beyond our borders is critical to our state's economy. That said, we risk unintended consequences, potentially in the form of supply gaps or price spikes, for our local eaters in the face of virtually insatiable global demand. Additional research into the interplay of regional and global food systems would facilitate meaningful communication and collaboration for the benefit of eaters, producers and processors alike.



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14

Appendices

14.1. Approach and Methodology

14.1.1. Supply

14.1.1.1. Food Production Regions

We delineated production regions by drawing on parallel and ongoing research in which we defined agricultural zones for the entire western US using a modified agro-ecological zone approach. Over the last two decades, the United Nations Food and Agriculture Organization (FAO) has developed the agro-ecological zone methodology for describing the cumulative effect of geophysical factors on agricultural regimes or, conversely, the appropriateness of various types of agricultural activity for specific regions. Drawing on this dataset, we then aggregated zones with contiguous agricultural production in Oregon to define Oregon's agricultural production regions.

Once defined, we redistributed data aggregated to counties across the production regions by utilizing more highly resolved ancillary data. We used the USDA Cropland Data Layer (CDL) coupled with the North American Land Cover dataset (NALC), both derived from satellite imagery that estimate the locations of major crop categories and land cover types. Using these data we were able to estimate the proportion of activity per production region by crop category and then distribute a wide array of county scale variables from the census of agriculture across the production regions. We also used the production regions to overlay a wide variety of other spatially explicit data, such as institutional demand (schools, hospitals, prisons, etc.), population density, and existing infrastructure. These data are presented throughout the report.

14.1.2. Demand

14.1.2.1. Determination of Population-Based Demand

We used two primary sources of data to evaluate this volume based demand: 1) national average consumption (per capita) from (Putnam, et al, 2012) and 2010 Census data to represent demand across geographic space. To correlate production of crops across Oregon to the quantity of those items consumed, a bridge table of commodities served as an intermediary list to effectively join the two datasets. This allowed us to express demand and supply in terms of the same units and crop types.

In addition to raw product values, we estimated demand for input commodities to support the end products consumed by Oregon residents. For many crops, this was a one-to-one relationship. Arriving at an effective production value for dairy and beef (and other pasture-raised animal products) based on consumption was slightly more complex because units consumed represent proportions of multiple products on the landscape (e.g., milk production includes grazing and pasture land as well as inputs from other agricultural crops such as alfalfa, silage, and other haylage). Furthermore, consumption of dairy products such as milk or cream is expressed in volume units rather than weight.

To estimate the inputs required to support dairy production we converted these numbers to poundage using the density of the particular item (Jones, 2002).

All dairy products were then summarized to get a total dairy consumption value per person in pounds. We then separated dairy consumption into the commodities that contribute to its production on the landscape: grain, alfalfa, silage, corn silage, and pasture (Reed, 2004). Of the total poundage of dairy consumed, a proportional value was assigned to each of these commodities based on the effective amount that gets used in dairy consumption. These proportional estimates were based on case studies of farms with similar agro-ecological characteristics as those found in Oregon (Gates, Dapper, 2003).

Similarly, we divided total beef, pork, and poultry consumption into the commodity codes for alfalfa and other feed multiplied by their own proportional values (Forero, et al, 2004)[223]. In short, dairy and beef, poultry and other livestock were treated both in terms of their own categories and were incorporated into the summary value of the commodities that would support their resultant production.

14.1.2.2.2. Institutions (methodology for calculating demand in schools, hospitals, and prisons in Oregon)

14.1.2.2.1. Schools

There are over 1,300 public and private schools in Oregon (K–12) serving approximately 20 million meals a year. The average school serves approximately 15,500 meals a year, averaging just under 95 meals per day whereas some of the larger schools serve upward of 1,000 meals per day (e.g., David Douglas SD in Portland served roughly 1,600 lunches per day during the 2013–2014 school year). The location of schools closely matches population density, however the number of school lunches varies depending on the number of qualifying students for free and reduced lunches within school boundaries (rural districts often have higher rates of free and reduced). The USDA Food Buying Guide for Child Nutrition Programs sets strict guidelines for the components of a school lunch. These include:

Vegetable and fruit (one-half to three-fourths cup of each)
Meat/meat alternate (one and a half to two ounces, depending on grade level
Grains (one-half cooked or one to two slices bread)
Milk (one cup)

This roughly translates to a total demand for 2,500 tons of fruits and vegetables, 1,250 tons of both meat and wheat or some other small grains, and approximately 1.25 million gallons of milk per year. Map 4.1 shows the estimated density of lunches served (lunches/square mile) during the 2013–2014 school year.

14.1.2.2.2. Hospitals

[223] "Cost of Organic Pork Production: A Seasonal Analysis and Needed Price Premium for Continuous Production," James Kliebenstein, Sean Hurley, Ben Larson, and Mark Honeyman, American Agricultural Economics Association Annual Meeting, 2004.

Hospitals serve food both through in-patient service (based on number of beds occupied) as well as to staff and visitors through hospital cafeterias. There are 78 medical centers in Oregon, 53 private hospitals, and a total of 8,105 licensed beds and 6,674 staffed beds. In addition there are 12,403 beds in Oregon's licensed nursing care facilities. While there is no data on the actual number of meals served, given an average occupancy rate of 57.9 percent (Oregon databank program 2013), at three meals a day this equals 11,592 meals a day or 4.2 million meals a year. If we use the same product proportions as required in school lunches listed above, this translates to a total of 510 tons of fruits and vegetables, 255 tons of meat, 255 tons of wheat or other grains, and 255,000 gallons of milk each year. This does not include the meals served in nursing facilities across the state or the meals served through hospital cafeterias to visitors and hospital staff, which could easily represent 3 times as much demand.

14.1.2.2.3. Prisons

There are 17 state-run correctional facilities in Oregon, not including county or municipal jails. The inmate population has averaged 14,391 full-time inmates since 2012 (Oregon Department of Corrections). At three meals a day, this translates to 15.8 million meals per year. No data currently exists that specifies portions of products in individual meals, therefore we used USDA daily food plan for an average inmate as follows:

Grains: 10 oz (.625 pounds)
Vegetables: 3.5 cups (roughly .95 lbs)
Fruits 2.5 cups (roughly .75 lbs)
Dairy: 3 cups
Protein: 7 oz.(.437 lbs)
This translates to roughly 1,641 tons of grains, 2,495 tons of vegetables, 1,970 tons of fruits, 1,050,543 gallons of dairy, and 1,242 tons of meat each year.

14.1.3. Infrastructure

The ODA food handlers' dataset consisted of more than two thousand records, and included data that allowed us to segregate the data into categories that facilitated interpretation relevant to regional food systems. These categories included:

Table 14.1: Oregon Department of Agriculture Food Handlers' dataset by license type.

License Type	Number of Facilities
Custom Meat Processor	89
Custom Mobile Slaughter	59
Custom Stationary Slaughter	14
Food Processing Establishment	1,288
Grain Warehouse	7
Food Storage Warehouse	481
Non-Slaughtering Processor	147
Poultry and Rabbit Slaughter	19
Refrigerated Locker Plant	10
Slaughterhouse	10
Total	**2,124**

Note that most of the meat-processing and custom-slaughter facilities are "exempt," meaning they fall below the volume threshold requiring federal USDA inspection. For a complete and current list of meat processing facilities in Oregon, please refer to Oregon State University. [224]

Certain facility types, including meat processing and cold storage, fall into more than one license type (both processing and storage, for example). In general, most facilities fell either under the "food processing establishment" license type (1,288) or the "food storage warehouse" license type (481).

From the 1,288 processing facilities, we removed all beverage facilities (breweries, wineries, tea, coffee, etc.), bakeries and candy shops, resulting in a total of 496 processing facilities. We did not consider egg handlers, nut processors, or seafood markets in subsequent analyses, but maintained these data in the database for potential future use.

Table 14.2: Breakdown of Food Handlers' license types used in analysis.

Distributor type	Number of Facilities	First Mile	Last Mile
Custom Meat Processor	89	X	
Custom Mobile Slaughter	59	X	
On-farm processing	48	X	
Produce processing and packers	37	X	
Poultry and Rabbit Slaughter	19	X	
Slaughterhouse (USDA)	13	X	
Food banks or food safety	11	X	
Grain Warehouse	7	X	
Refrigerated Locker Plant	28	X	X
Non-Slaughtering Processor	147		X
Secondary value added processors	55		X
Produce distribution	42		X
Meat distributors	17		X
Flour milling	12		X
Custom Stationary Slaughter	11		X
Unidentified processors	294		
Egg handlers	5		
Seafood markets	30		
Nut processors	15		
Unidentified storage and distribution	148		
Storage omitted	180		
Vertically integrated wholesale buyers	6		
Specialty foods	27		
Vertically integrated	32		
Processor omitted	792		
Total omitted	1529		
Total included	595		
Total	**2124**		

[224] http://www.extension.org/pages/26087/oregon-facilities#.VSFzdUJdXZd

As with processing, all storage facilities related to beverage categories (e.g., beer, wine, spirits, coffee) were removed, including bottling companies and beverage distribution companies (e.g., dairies, breweries, wineries). From the distribution category we eliminated candy, coffee, baked goods, seafood, and specialty foods distributors (primarily moving tea, spices, and imports).

This resulted in a total of 595 facilities across the state used in the analysis.

In the analysis that includes travel time to urban areas, travel time was estimated using a cost/distance approach following road networks, in which the cost to traverse a given area varies depending on the type of road available (e.g., freeway, state highway, arterial, etc.). We evaluated time distances to areas with the following populations:

At least 2,500 people per square mile
Greater than 10,000 people per square mile
Greater than 50,000 people per square mile
Greater than 100,000 people per square mile

Out-of-state metro areas were included in the analysis (e.g., Boise, Redding, and the Tri-Cities). Note that the time distances to smaller urban areas are important in understanding the strength of backward linkages (e.g., production inputs, equipment, financial services), whereas distance to larger urban areas represents potential barriers to forward linkages (e.g., sales).

14.2 Data Narrative and Dictionary

To develop the Viewer, we first searched for and collected spatial data on agricultural supply and production, infrastructure (e.g., processing, storage, transportation, etc.), and demand across Oregon for all agricultural food products, with a specific focus on beef, pork, chicken, grains, storage crops, and greens. We gathered any available data from a variety of sources and in a variety of formats. Many of these datasets came from our contacts within the food and agricultural community, often from internal assessments or databases. We supplemented this locally and regionally sourced data with federal- and state-published data; in addition, some of our institutional local data were crowd-sourced and publicly available online. We obtained most datasets in tabular format with addresses included; only two datasets were already in spatial format.

For tabular data, we reviewed the given addresses, formatted them for analysis, and created a spatial dataset using Esri ArcGIS 10.1 geocoding functionality. Through this process we used the World Geocode Service (ArcGIS Online) address locator to identify the geographic coordinates of each input address. Once the data were mapped, we visually checked a subset against aerial imagery as well as in Google Maps to confirm accuracy.

One Oregon hospital dataset[225] and the Cropland Data Layer[226] (CDL) were available in a spatial format. The CDL is a crop-specific land-cover data layer available for the United States. We downloaded the data for Oregon and classified it by major crop category. Once all datasets were in a spatial format, we standardized each to the same projection. Several were added to the Viewer; some were removed for clarity, and others were held for possible future inclusion. The Viewer currently includes data from the 2012 Ag Census,[227] and the Oregon Department of Agriculture's license dataset.[228]

It is important to understand some of the significant limitations of these datasets. Some capture only a subset of the population they were intended to measure—the data gathered may have been limited in geographic scope,[229] by membership in a group,[230] or was self-reported. The 2012 Ag Census deliberately obscures data where proprietary information could be linked to a specific producer.[231] Although valuable in illuminating the regional food system landscape, the missing data points make it difficult to get a comprehensive understanding of gaps in aggregation, processing, or distribution infrastructure. A user of the viewer would not be able to tell, for example, if a perceived lack of processing facilities in eastern Oregon was due to their physical absence, or if they were simply not captured in the original data collection effort.

Other datasets were originally collected with different goals than our assessment, and contained limited information specific to our overall needs. For example, the Oregon Department of Agriculture License dataset[232] (2014) identifies the location of some types of food processing and storage facilities across the state. For some products, like beef, there exist a wide range of specific and clearly relevant licenses (Custom Mobile Slaughter, Custom Stationary Slaughter, Custom Meat Processor, Non-Slaughtering Processor, and Slaughterhouse), as well as licenses that are likely, but not exclusively, related (Refrigerated Locker Plant, Food Storage Warehouse). However, although these licenses contain location and contact information, the state does not collect information on the size of the operation, minimum supply thresholds, or other information that would help us to assess their availability to local ranchers.

For other products, like fruits, vegetables, and grains, potential license categories are so broad—e.g., Food Storage Warehouse; Food Processing Establishment—that useful inferences are difficult to make. For example, the Food Storage Warehouse license does not differentiate operations by size or product, making it difficult for a producer to target only businesses relevant

225 "Oregon Hospitals: Map, Phone, and Directions," Oregon Data, 2008.

226 "Cropland Data Layer," USDA, NASS, RDD, GIB, SARS, 2013.

227 "Ag Census," USDA, NASS, 2013.

228 "ODA License Data," Katie Pearmine, ODA, 2014.

229 "Community Food System Scores," Matt Buck, (n.d.).

230 "Food Alliance Client Contacts," Matt Buck (n.d.).

231 "Cropland Data Layer," USDA, NASS, 2013.

232 "ODA License Data," Katie Pearmin, ODA, 2014.

to their product; there are 1,288 Food Processing Establishment licenses that apply to processors of all sizes and for a variety of products, including small-scale candy makers, breweries, and supermarkets, as well as to the contract processors in which producers would be most interested.

In addition to the inherent limitations in any individual dataset, there are limitations in the stories that they can tell collectively. While the distribution of processing and storage facilities and their spatial relationship to farms and ranches are important factors in a producer's approach to markets, these are not the only factors to consider. The complexities of the regional food system mean that farmers and ranchers make decisions based on more than location, but also relationships and values.

That said, filling in the significant lack of information available on our regional food system would help producers, consumers, and investors alike make more informed decisions about how best to support each other.

There is a wealth of information about our regional food system that is not currently collected, or at least published. Production data is largely summarized by county; a more spatially explicit mapping of crops, while data intensive, would help to identify local patterns that could more directly inform this work. Additionally, while some data is available on the number of farms and acreages in production, more specific information on the value of those crops, their timing, and volume would be extremely helpful in laying a foundation for identifying infrastructural needs and meeting demand.

Even with those limitations, the most complete data we have is for production. For food infrastructure—processing, storage, and transportation—we relied largely on ODA license data, the limitations of which are mentioned above. A more comprehensive census of infrastructural components, with detailed information regarding size of operation, availability to independent growers, minimum processing volumes, and seasonal availability would be very beneficial in future analyses.

Demand for agricultural products is fundamentally related to population—the more people there are, the more demand for a product there will be. However, there are likely local variations in demand for specific agricultural products. The data we relied on for demand are summarized at the national or regional scale. If we are interested in identifying how Oregon-grown food can best feed Oregonians, then information on local consumption patterns is essential. Also, our data on institutional demand by prisons, hospitals, schools, etc., would be more valuable if we had information on volume requirements, like number of beds for hospitals, or meals served, at schools.

14.3 Data Narrative Citations

Table 14.3: Data narrative citations.

Name	Source	Citation
Ag Census	Public data	USDA National Agricultural Statistics Service. 2013. Census of Agriculture Volume 1, Chapter 2: County Level Data for Oregon. Text files. Washington, DC: USDA National Agricultural Statistics Service. http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Oregon/
Community Food System Scores	Matt Buck	Buck, Matt. n.d. Community Food System Scores. Unpublished Excel spreadsheet.
Cropland Data Layer	Public data	United States Department of Agriculture (USDA), National Agricultural Statistics Service (NASS), Research and Development Division (RDD), Geospatial Information Branch (GIB), Spatial Analysis Research Section (SARS). 2013. USDA, National Agricultural Statistics Service, 2012 Oregon Cropland Data Layer. Raster digital data. Washington, DC: USDA National Agricultural Statistics Service. http://nassgeodata.gmu.edu/CropScape/index.jsp?state=OR
Food Alliance Client Contacts	Matt Buck	Food Alliance Client Contacts. n.d. Confidential, unpublished Excel spreadsheet. Portland, OR: Food Alliance.
NWFPA	Member directory access	Northwest Food Processors Association. Ecotrust is a member of NWFPA.
ODA License Data	Katie Pearmine	Oregon Department of Agriculture. 2014. License Dataset. Unpublished Excel spreadsheet. Salem, OR: Oregon Department of Agriculture. Oregon Department of Agriculture. 2014. ODA License Types. Unpublished Excel spreadsheet. Salem, OR: Oregon Department of Agriculture.
Oregon Agripedia	Public data	Oregon Department of Agriculture. 2013. Oregon Agripedia. Salem, OR: Oregon Department of Agriculture. http://www.oregon.gov/ODA/shared/Documents/Publications/Administration/Agripedia.pdf
Oregon Colleges	Public data	College Navigator - Search Results: Colleges in Oregon. 2014. Spreadsheet. US Department of Education, Institute of Education Sciences, National Center for Education Statistics. Accessed December 2. http://nces.ed.gov/collegenavigator/?s=OR&l=91
Oregon Food Bank Community Food System inventory	Spencer Masterson	Oregon Food Bank. n.d. Oregon Community Food Systems Inventory. Unpublished Excel spreadsheet. Portland, OR: Oregon Food Bank.
Oregon Hospitals	Public data	"List of Hospitals in Oregon." 2014. Wikipedia, the Free Encyclopedia. Accessed December 2, 2014. http://en.wikipedia.org/wiki/List_of_hospitals_in_Oregon Oregon Hospitals Map, Phone, and Directions | Oregon Data. 2008. Spreadsheet. Opening Oregon's Data. Data.Oregon.gov. Accessed December 2, 2014. https://data.oregon.gov/dataset/Oregon-Hospitals-Map-Phone-and-Directions/kgct-xvne Oregon Hospitals. 2014. KML file. Oregon Association of Hospitals and Health Systems. Accessed December 2, 2014. http://bit.ly/1awIz3D
Oregon Prisons	Public data	Oregon Prisons | Oregon Data. 2014. Spreadsheet. Opening Oregon's Data. Data.Oregon.gov. Accessed December 2, 2014. https://data.oregon.gov/Public-Safety/Oregon-Prisons/dsje-kuhw
Oregon Public Co-packer list	Josh Monifi	Oregon Department of Agriculture. 2013. Oregon Public Co-Packer List. Unpublished Excel spreadsheet. Salem, OR: Oregon Department of Agriculture.
USDA Certified Organic	Public data	2013 List of Certified USDA Organic Operations. 2014. Spreadsheet. USDA Agricultural Marketing Service. http://apps.ams.usda.gov/nop/

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14.5. Summary of Community Food System Cohort Input

Infrastructure Gap Analysis: Community Food System Review: What We Have and What We Need, as Reported from Communities
December 2014

14.5.1. Overview

In October and November 2014, Ecotrust conducted interviews with each Meyer Memorial Trust (MMT) Community Food System Grantee to discuss food systems infrastructure in their communities. These grantees are leaders in community food systems work in Oregon, are geographically dispersed throughout the state, and work to support and connect the farmers and food businesses within their region of focus.

The goal of these calls was to (a) better understand the food aggregation, processing, and distribution **infrastructure that already exists,** which could be available to support local producers interested in accessing regional supply chains, and (b) better understand **where there are gaps** that we should collectively focus on filling, via investment, programmatic activities, or other strategies.

Ecotrust Interviewers:

Amanda Oborne, VP of Food & Farms
Stacey Sobell, Farm to School Manager
Katy Pelissier, Farm to School Coordinator
Angela Hedstrom, Farm to School Assistant

Community Food System Interviewees:

Wendy Siporen, Thrive (Rogue Valley)
Philip Yates and Hannah Ancel, ACCESS (Jackson County)
Jared Pruch, Berggren Demonstration Farm, Cascade Pacific Resource Conservation & Development (Lane County)
Lynne Fessenden, Willamette Farm and Food Coalition (Lane County)
Dave Johnson, Sprout!, Neighborhood Economic Development Corporation (Lane, Marion, and Clackamas Counties)
Sarah Cantril, Huerto de la Familia (Lane County)
Harry MacCormack, Ten Rivers Food Web (Linn, Benton, and Lincoln Counties)
Shelly Bowe, Food Roots (Tillamook County)
Teresa Retzlaff, North Coast Food Web (North Oregon Coast & Lower Columbia Pacific)
Katrina Van Dis, Central Oregon Intergovernmental Council (Crook, Deschutes, & Jefferson Counties)
Sarah Sullivan, Gorge Grown Food Network (Columbia River Gorge)
Thomas Stratton, Oregon Rural Action (Umatilla, Union, Wallowa, Baker, and Malheur Counties)
Jill Kuehler, Friends of Zenger Farm (Multnomah County)

14.5.2. Key Findings

Infrastructure is top of mind. Every interviewee identified hard infrastructure as a barrier to moving locally grown food from farm to wholesale market. While needs and challenges vary to some extent by product and region, **aggregation** was identified across the state as a top need, followed closely by **processing**, such as canning, dehydrating, chopping, milling, and USDA-licensed meat slaughter and processing.

Some regions lack infrastructure altogether. Despite the identified need, most communities have some amount of infrastructure that is currently being utilized to support local food systems. But, notably, communities in eastern Oregon and the Oregon coast have major gaps in almost all kinds of infrastructure (aggregation, processing, warehousing, cold storage, distribution, commercial kitchens, etc.). These communities are home to many of Oregon's ranchers, fishers, and grain growers, and have a vital role to play in growing Oregon's regional food security.

There are clear examples of infrastructure that is working. Canneries that co-pack, such as Sweet Creek Foods in Elmira, a certified organic facility, make it possible for farms to produce value-added products at a scale large enough to enter wholesale markets. Distributors such as Organically Grown Company, Organic Produce Warehouse, and Emerald Fruit & Produce are able to maintain source-identification through the supply chain, thereby allowing wholesale buyers to opt for local and regionally grown product. Cold storage facilities such as SnoTemp, with two facilities along the I-5 corridor, rent storage space to farms and businesses at all scales. Individual farms and

businesses such as Stahlbush Island Farms and Camas Country Mill have begun vertically integrating infrastructure in order to freeze and mill their own products, respectively.

Two commonalities amongst successful local food systems infrastructure: (1) the infrastructure is conveniently located very near the producers it is intended to serve, or on a major arterial roadway such as I-5, and (2) the farm, business, or organization that owns the infrastructure has identified supporting local and regional food systems as a core business principle.

14.5.3. Verbatims

The following list of farms and businesses were mentioned by MMT Grantees as possible contributors to community food systems infrastructure. Ecotrust has not researched or vetted this list, and it is not intended to be comprehensive. Rather, these were names captured verbatim during interviews, and could serve as a starting point for researching infrastructure with potential to contribute to a more vibrant regional food system.

Aggregation

Azure Standard
Diamond
Duckwall
Oregon Cherry Growers
Organic Produce Warehouse
Organically Grown Company
White Salmon

Processing

Alvador Dryer
Amy's Kitchen
Ancient Heritage Dairy
Bartell's
Blue Heron French Cheese Company
Bornstein
Buoy Crab
Butcher Boy
Butte Creek Mill
Cada Dia
Camas Country Mill
Cinder Butte Meats
Columbia Gorge Organic
EcoTeas
Emerald Fruit & Produce
Gartner's
Hensel Family Farms
Hentze Farm
Lochmead Dairy
Mineral Springs Processing
Mohawk Valley Meats

Muirhead Cannery
Oregon Beef Company
Oregon Cherry Growers
Powder Pure
Rapture Creek Farm
Reed and Hertig
Rising Sun Farms
Rogue Creamery
Ryan's Juice
Scio Poultry Processing
Scratch A Lot
Skipanon Brand Seafood
Springfield Creamery
Stafford Meat
Stahlbush Island Farms
Sweet Creek Foods
Thompson Road Processors
Tillamook Cheese
Tillamook Country Smoker
Tillamook Creamery
Truitt Brothers
Umpqua
Werner Meats
White Salmon

Warehousing/Cold Storage

Camas Country Mill
Central Point Cold Storage
Community College in the Dalles
Food for Lane County
GloryBee
Hummingbird Wholesale
McDonald Wholesale
Medford Ice
Organic Produce Warehouse
SnoTemp
Southern Oregon Select
Space LLC
NEDCO/Sprout!

Distribution

Aloha Produce
Aramark
Azure Standard
Blackwell
Columbia Produce
Duck Delivery
Emerald Fruit & Produce
Food Services of America

Fresh Express
General Produce
GloryBee Foods
Hood River Organics
Hummingbird Wholesale
McDonald Wholesale
OMG (Oregon Made Goods)
Organic Produce Warehouse
Organically Grown Company
Siskiyou Sustainable Cooperative
Sysco
UNFI

Other (commercial kitchens, etc.)

Cousin Jack's Pasties
Food for Lane County
Gold Hill Kitchen
Hummingbird Wholesale's commercial kitchen
Rent-A-Kitchen
Rogue Valley Kitchen
NEDCO/Sprout!,
Wilson School

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