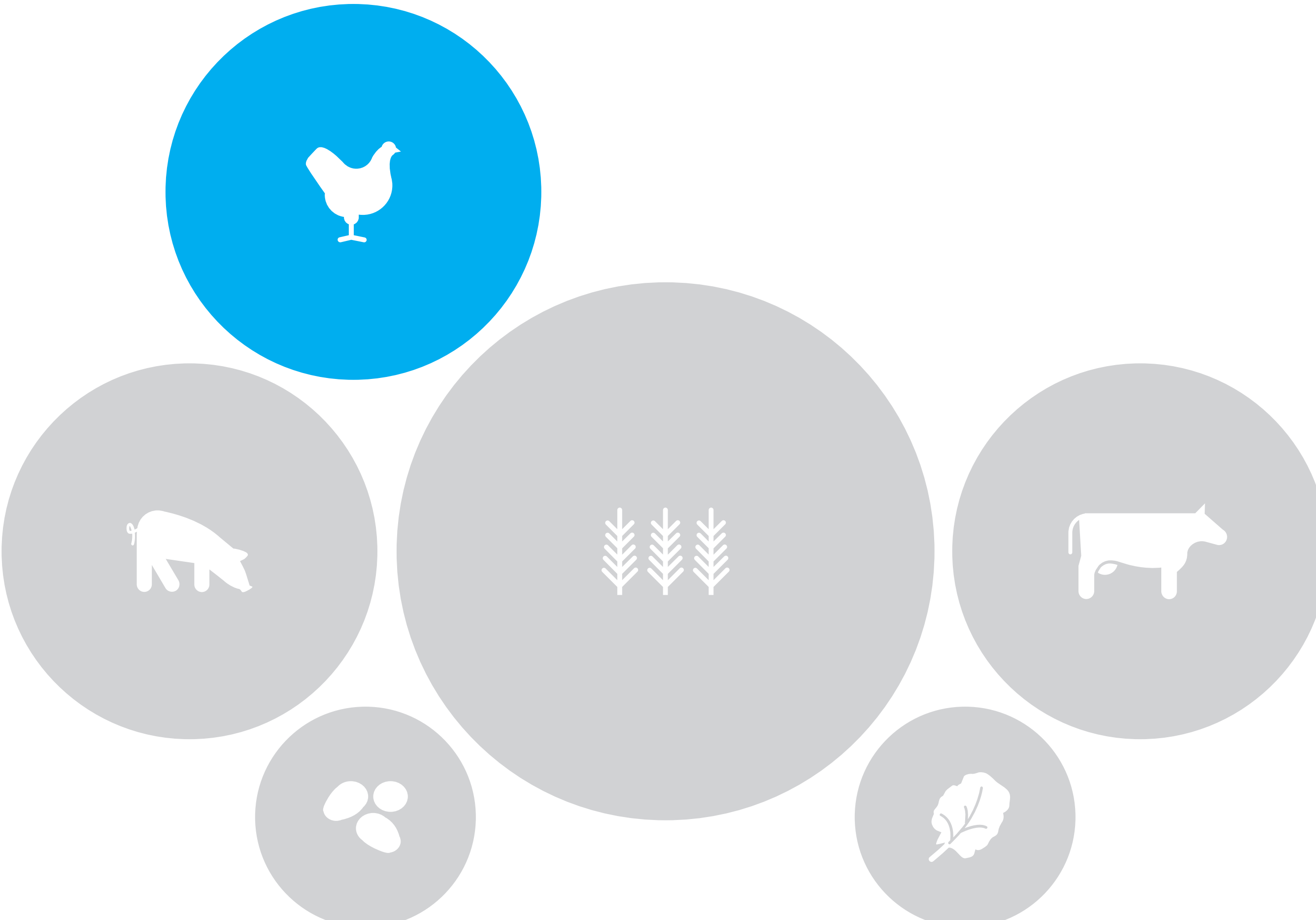

Differentiated Cost of Production in the Northwest:

An Analysis of Six Food Categories

CHICKEN / June 2016

ecotrust

This research was commissioned by the Cascadia Foodshed Financing Project, a project of Philanthropy Northwest, and made possible by generous grants from JPMorgan Chase Foundation, the Greater Tacoma Community Foundation and the Thread Fund. Ecotrust appreciates the thoughtful support and partnership of these organizations to pursue reliable prosperity for all Oregonians and Washingtonians.

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TABLE OF CONTENTS

Project Background

Consumers have demonstrated a willingness to pay a premium for food attributes such as “free range,” “antibiotic-free,” “organic,” and “local.” However, when production systems designed to yield those attributes are authentically implemented on the ground, such methods also tend to bear higher production and processing costs in comparison to conventional production methods. As a result, higher retail prices do not always ensure a sufficient income to the producer, nor constitute a viable supply chain.

Further, institutions such as schools, hospitals, colleges, and jails are noticeably slower as a buyer segment (versus restaurants, retailers, and manufacturers) to respond to customer interest in differentiated products for a variety of reasons, including high price sensitivity. Such buyers are vital players in the quest to get fresh, nutrient-dense food to vulnerable populations, however, so creating frameworks that allow them to access minimally processed, regionally produced food at reasonable prices would serve farmer and eater alike.

Understanding the costs of differentiated production systems in comparison to conventional approaches is vital to identifying opportunities where efficiencies may be gleaned or market value harvested to support a viable regional food ecosystem.

Ecotrust is conducting cost of production analysis in six distinct food product categories, including this one on beef. In each category we define an “ag of the middle” scale and a “differentiated production system” for analysis purposes, meaning: a specific alternative production system (one that spawns product attributes about which consumers care, such as organic, pastured, or grass fed) will be defined at a particular scale of operation (big enough to participate meaningfully in an institutional supply chain), and be assessed relative to the conventional/commodity/industrial model of production for that category.

While there are certainly many variations of both production systems and scales of operation possible in a thriving regional food system, singling out a specific system allows us to create an economic model that facilitates sensitivity analyses and high level conclusions regarding which regional food sectors could make efficient and effective use of investment.

Note, this project builds on the foundation laid by the Oregon Food Infrastructure Gap Analysis report, released in May 2015. The full report and executive summary can be accessed here: http://www.ecotrust.org/publication/regional-food-infrastructure/, or a quick digital summary of highlights is available at http://food-hub.org/intrepid. The beef chapter from that report is included with this model/report as an addendum.

What is Poultry of the Middle?

Defining the appropriate scale of operation to study for chicken, the "Poultry of the Middle," poses a unique challenge. First, it is helpful to understand that egg-laying chickens and chickens destined for consumption as meat are of two different types. Chickens raised for eggs are known as "layers" and meat birds are known as "broilers". This study focuses on the latter, chickens raised for meat.

The U.S. broiler poultry industry has undergone a period of dramatic consolidation over the last several decades, in which an increasingly large share of production is conducted on very large poultry raising operations. Tables 1 and 2 below demonstrate this breakdown using data from the 2012 U.S. Agricultural Census (NASS 2015). The ranges shaded in grey represent the size classes we considered for inclusion as "Poultry of the Middle," based on secondary and primary research. Table 1 indicates that, broadly defined, the "middle" could include farms producing between 2,000 and 199,999 birds (roughly nine percent of all farms).

Size Class	# Operations	% Total
1 - 1,999	16,514	50.1%
2,000 - 15,999	457	1.4%
16,000 - 29,999	82	0.2%
30,000 - 59,999	*175*	0.5%
60,000 - 99,999	*373*	1.1%
100,000 - 199,999	1,810	5.5%
200,000 - 299,999	2,577	7.8%
300,000 - 499,999	4,615	14.0%
500,000 +	6,332	19.2%

Table 1. Number of Broiler Poultry Farms by Size Class, U.S., 2012

Table 2 below demonstrates that the broiler poultry farms classified broadly as the "middle" produce a very small portion of the total value of the U.S. poultry industry: adding together the value of all the categories between 2,000 and 199,999 birds yields 3.72% of the value of the industry.

Size Class	# Head Sold	% TOTAL
1 - 1,999	1,818,029	0.02%
2,000 - 15,999	2,274,309	0.03%
16,000 - 29,999	1,759,100	0.02%
30,000 - 59,999	7,627,130	0.09%
60,000 - 99,999	29,357,429	0.35%
100,000 - 199,999	273,093,537	3.23%
200,000 - 299,999	631,801,712	7.47%
300,000 - 499,999	1,744,451,076	20.61%
500,000 +	5,771,012,472	68.19%

Table 2. Broiler Poultry Sales (# Head), by Farm Size Class, U.S., 2012

In the Pacific Northwest, this pattern is even more pronounced: as shown in Table 3 and Table 4, farms definable as "Poultry of the Middle" are almost nonexistent in Oregon and Washington.
Farms in the size class ranges from 2,000 - 199,999 birds total 1.2% of all farms and produce 2.4% of all broilers sold. The small farm sector is more important in the Pacific Northwest than in the country as a whole: as Table 3 shows, small farms with less than 2,000 birds are numerous (93.5% of all farms). However, Table 4 reveals that these farms produce a very small proportion (0.1%) of the total number of birds sold. The largest farms, those raising more than 500,000 birds/year, constitute less than 4% of the number of farms but produce more than 80% of the total number of birds raised in the region.

 # Operations with Sales

Size Class	OR	WA	Total	% Total
1 - 1,999	463	485	948	93.5%
2,000 - 15,999	4	4	8	0.8%
16,000 - 29,999	0	0	0	0.0%
30,000 - 59,999	0	0	0	0.0%
60,000 - 99,999	0	0	0	0.0%
100,000 - 199,999	1	3	4	0.4%
200,000 - 299,999	1	3	4	0.4%
300,000 - 499,999	2	9	11	1.1%
500,000 +	16	23	39	3.8%

Table 3. Number of Broiler Poultry Farms by Size Class, U.S., Pacific Northwest, 2012

Broiler Sales in # Head

Size Class	OR	WA	Total	% Total
1-1,999	70,292	87,101	157,393	0.1%
2,000-15,999	109,185	45,833	155,018	0.1%
16,000-29,999	0	0	0	0.0%
30,000-59,999	0	0	0	0.0%
60,000-99,999	342,081	0	342,081	0.2%
100,000-199,999	1,137,849	3,103,799	4,241,648	2.1%
200,000-299,999	3,604,369	5,919,410	9,523,779	4.7%
300,000-499,999	8,605,606	17,206,170	25,811,776	12.6%
500,000+	67,693,461	96,269,307	163,962,768	80.3%

Table 4. Broiler Poultry Sales (# Head), by Farms Size Class, U.S., Pacific Northwest, 2012

Where does Poultry of the Middle fit along this spectrum? The Agriculture-of-the-Middle Initiative (Greenberg 2007) attempted to define "Poultry of the Middle" by profiling a small number of integrator firms (which could be thought of as "aggregators" for the moment, a full discussion of the role of integrators is included in the next section). The integrators profiled were not the largest, and sourced from growers that did not (usually) fit into the largest scale categories. Table 5 below summarizes the sizes of these integrators and growers, and demonstrates the high degree of variability in integrator and grower sizes considered candidates for "Poultry of the Middle."

Table 5. Examples of Poultry Firms Considered "Poultry of the Middle" (Greenberg 2007)

Company	Birds/wk	Birds/yr	# farms	Birds/farm/wk	Birds/farm/yr
Bell & Evans	704,000	36,608,000	125	5,632	292,864
MBA	275,000	14,300,000	26	10,577	550,000
Gerber's	300,000	15,600,000	80	3,750	195,000
Petaluma	126,923	6,600,000	19	6,680	347,368
Organic Valley	1,154	60,000	1	1,154	60,000
Pollo Real	385	20,000*	1	385	20,000

The diversity of poultry firm sizes cited above proves to be of limited use for our purposes, for two reasons: it is too broad (ranging from 20K to 36M birds produced per year), and the farms being profiled are too large to focus on local and regional markets. In our primary research, we find few to no locally/regionally oriented poultry growers in Washington and Oregon operating at a scale that approaches the majority of the growers profiled in the table above (the only exception being Pollo Real). Most locally/regionally oriented poultry growers that we have identified in the Pacific Northwest operate at scales at or below 10,000 birds.

Our effort to narrow that range pursued multiple avenues of consideration:

- Minimum scale of production necessary to sustain farm livelihoods. A recent study conducted at Ecotrust (McAdams 2015) finds that the minimum scale at which farmers reach viability is at gross sales of roughly twice the federal poverty level, or $250,000–$499,999. Such producers are most likely to be financially viable while focused on selling into local and regional markets, and benefit from additional business services, capital, technical assistance, and market access: though they may be financially viable, they tend to be under served by existing providers. However, that rule of thumb may prove too low for poultry production, as poultry requires greater investment in infrastructure than other sectors of agriculture and the margins may be lower, especially at smaller scales of production.
- The Ag of the Middle Working Group (www.agofthemiddle.org) has described "AOTM farms" as being roughly associated with

gross annual sales of $50,000 to $500,000. They go on to explain however, that the specific scale of operation that is too big for direct markets but too small for commodity markets (which is the conceptual definition of "ag of the middle") varies with crops produced, geography and market. Thus, depending on the category, $500,000 as a ceiling may be way too low.

- USDA Economic Research Service defines small family farms as having less than $250,000 in gross farm sales, while mid sized farms are classified at $350,000–$999,999.

Finally, one regulatory issue must be considered in defining the appropriate scale of operation to study, which relates to processing costs. A producer processing more than 20,000 chickens in a year must do so in a USDA licensed facility. Those producing fewer than 20,000 may operate under a state license, which is significantly less expensive.

Finally, we considered the scale of operation necessary, as a solo business, to generate gross sales between $250,000 - $499,999. For pastured poultry, that number is estimated to be about 12,500 to 25,000 birds processed per year. A typical pastured chicken of the fast-growing Cornish Cross variety yields about 4.5 lbs. of meat (Conner 2010). A possible range of farmgate- to-retail prices for whole pastured Cornish Cross chickens is $3.75- $4.50/lb (Blankenship 2015, Sturtevant 2015, Berggren Demonstration Farm 2014). Direct farm-to-consumer prices vary from $4.25 (Blankenship 2015), to $5.89/lb (Kookoolan Farms 2015). We chose a farmgate price that lies between these two extremes of $4.50/lb (Sturtevant 2015). Under these assumptions, a pastured poultry grower raising no other animals or crops for sale would need to raise and sell about 12,500 - 15,000 birds through retailers, or 12,500 direct from the farm to consumers, to reach the $250,000 gross sales threshold.

Thus, the data model presented below assumes 15,000 chicks raised per year; due to mortality during brooding or grow-out, the number of marketed birds will be closer to 13,000 per year. This scale falls within the range of Agriculture of the Middle defined above. It lies conveniently within the range of scales modeled by existing enterprise budgets (Neufeld 2002). And it seems to be within reach for the small group of broiler poultry producers we have interviewed, who currently produce 6,000 – 10,000 birds per year and are optimistic about scaling up. At the moment, actual production at this scale appears to be virtually missing in the Pacific Northwest, as Table 3 above demonstrates. Yet our research suggests that there exist pastured poultry producers with the skills, expertise, and access to land, capital, labor, and inputs to potentially reach this scale.

The next section defines the alternative poultry production system modeled for this analysis, the field pen system, which can be successfully operated at the 12,500 – 25,000 bird scale, and compares it with the conventional poultry raising system that currently dominates U.S. broiler production.

Conventional and Alternative Poultry Systems

The conventional broiler poultry industry is made up of two types of firms: growers and integrators. Integrators advance inputs including chicks and feed, and provide technical assistance to growers, and guarantee the purchase of the full-grown broilers. Growers who work for integrators tend to sign exclusive contracts with a single integrator. Conventional broiler poultry systems are examined in greater detail below.

"Differentiated," or alternative broiler poultry systems work fundamentally differently from the conventional industry. Alternative poultry producers purchase their own chicks, purchase or mill their own feed, and often slaughter and process some portion of the full-grown birds on the farm. Producers may also sell to multiple buyers including wholesalers, retailers, or direct to customers through on-farm sales or farmer's markets.

Alternative poultry producers use a variety of production systems including the field pen system; the net-range (also known as day range) system; free-range systems; and yarding or "yard and coop". Each of these alternative production systems has its own set of production costs and optimum scales. These systems differ from conventional, industrial poultry along several dimensions: they offer each animal a larger amount of land area or square footage; there is little to no use of antibiotics; and manure and other wastes are composted or land-applied through rotational pasture grazing.

In the study that follows, we have chosen to focus on the field pen system for pastured poultry, as the differentiated model of study. We chose to focus on the field pen system for three main reasons. First, it is the alternative poultry production system for which enterprise budget data are most readily available through university extension departments, public agencies, and nonprofit organizations. Second, the field pen system proved to be the best for ground-truthing in the Pacific Northwest: it was the most commonly used system by the poultry producers we contacted (Blankenship 2015, Sturtevant 2015, Pruch 2015). Third, the field pen is the most widely known alternative poultry system in the U.S. due to the extensive outreach, workshops and publications of famous Virginia-based poultry farmer Joel Salatin, profiled in Michael Pollan's best-seller *The Omnivore's Dilemma* (Pollan 2007).

The field pen system at Botany Bay Farm, Brush Prairie, WA
Photo by Matt Ziegler

Given these choices of assumptions, we chose to answer the following questions:

- Can the field pen system operate at Poultry of the Middle scale?
- Can the price of poultry raised using the field pen system reach a range that is palatable to consumers seeking a differentiated product?

Estimating Regional Consumer Market Size

In this section, we estimate regional consumer market size at the retail and farmgate levels, for conventional and organic chicken in the Pacific Northwest. Our analysis in this paper has focused on the production system for pastured poultry; ideally, we would estimate the market size for poultry produced using this method. However, there is no data on the market share of pastured chicken/poultry specifically. We focus instead on the market for organic certified chicken, for which there are published estimates. The market share of organic certified chicken at the retail level has been estimated as about 2% (Meatingplace 2016). Since retail sales data for organic and conventional chicken is proprietary, we cannot verify this data point directly, but we believe it is a good enough rule of thumb.

The most recent region-specific estimates of consumer expenditure on poultry is from the 2014 Consumer Expenditure Survey (BLS 2014), which estimates that consumers in the Western United States spent an average of $169 on poultry for at-home consumption. The poultry category comprises chicken and turkey. Based on the relative number of pounds of turkey and chicken consumed reported by USDA (Economic Research Service 2015), we estimate that chicken comprises about 85% of the poultry market by value. Per capita chicken consumption in the Western United States is thus about $144. We assume population size of 4.01 million for Oregon, and 7.06 million for Washington, following the most recent population size estimates for those states. Our estimates for the total and organic retail market size for chicken in the Pacific Northwest are given below. Under the above assumptions, the total retail market size for chicken is about $1.6 billion, and the retail market size for organic chicken alone is about $32 million.

Table 6. Estimated Retail Market Size, Total and Organic Only, Oregon and Washington (2014)

	Annual Per Capita Expenditure, Total	Annual Per Capita Expenditure, Organic	Total Retail Market Size ($ million)	Organic Retail Market Size, ($ million)
Chicken (All)	$144	$2.88	$1,594.08	$31.88

Before concluding, two related points are in order. First, the market for organic chicken is growing fast: Nielsen estimates growth of 29.3% by value between 2014 and 2015 (Sustainable Food News 2016). Second, larger players are entering the market: this year, Pilgrim's Pride, one of the largest poultry processing companies (integrators) in the United States, plans to convert one of its large-scale vertically integrated chicken raising/processing facilities into a USDA Organic certified plant (Meatingplace 2016). While the overall increase in the organic market should be hopeful to pastured poultry operations, the entry of the biggest players into the organic market should give a pastured poultry producer cause for concern.

Data Model for Field Pen System, Pastured Poultry

The following narrative provides an example of the data model constructed to estimate production costs for pastured poultry producers using the field pen system.

In this model, we make a number of assumptions about the cost of inputs, equipment, and supplies that are based on line item estimates from the literature. Whenever possible, we ground truthed these estimates with material from interviews and site visits with pastured poultry producers.

We assumed a field pen production system that started with 15,000 chicks per year purchased. This number of birds can be achieved through a growing season of 25 weeks lasting from May to October. Each bird is raised in a small brooder house for the first three weeks of its life, and then transferred to a field pen for the last five weeks of its life. Each brooder can thus be used eight times, and each pen five times, over the course of the growing season. We assume that birds suffer a 10% mortality rate in the brooder house (Neufeld 2002). Table 7 below provides the model's assumptions for the brooding stage.

Table 7. Model Assumptions: Brood Stage

Chicks Raised	15,000
Chick Mortality Rate	10%
Chicks/Brooder	200
Weeks Brooding Period	3
Weeks/Season	25
Total Brooding Cycles/Season	8
Number of Brooders Needed	9
Total Chicks/Brooder/Season	1667

A brooder at Lazy B Ranch, Chiloquin, Oregon.

Table 8 below provides the key assumptions for the grow-out stage. Given the chick mortality rate of 10%, the total number of birds raised to slaughter will be 13,500. Depending on their size, field pens can hold as few as 75 birds (Sturtevant 2015), or as many as 100 birds (Neufeld 2002). We assume each pen contains 80 birds, requiring 34 total pens. If each brooder house holds 200 birds, then 9 brooder houses will be needed over the course of the season.

Birds Raised	**13,500**
Birds/Pen	**80**
Weeks Grow-Out	**5**
Weeks/Season	**25**
Total Grow-Out Cycles/Season	**5**
Number of Pens Needed	**34**
Total Birds/Pen/Season	**400**

Table 8. Model Assumptions: Grow-Out Stage

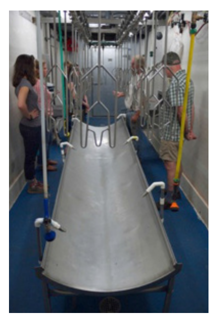
The remaining model assumptions are given below in Table 9. We assume that each day-old chick costs $1.10, including shipping and handling (Sturtevant 2015). We assume that each bird eats 15 pounds of food over its lifetime (Fanatico 2002), and feed costs $700/ton, reflecting farmers' self-reported internal costs of milling and/or mixing their own feed (Blankenship 2015, Sturtevant 2015). With prices for commercial organic poultry feed in the Pacific Northwest exceeding $1,100/ton (Painter, et al. 2015), pastured poultry farmers are increasingly creating their own feed blends. Pasture rental costs are assumed to be $280/acre/year, based on a recent estimate from the Pacific Northwest (Painter, et al. 2015).

Regarding labor and management, we assume that the farm is owner-operated and compensation is a residual. We assume that for each bird, 15 person-minutes are spent engaged in labor and management tasks over the course of its life. These tasks include picking up chicks from the hatchery, feeding and watering, transferring birds from brooder to field pens, moving the field pens, and transporting birds to the slaughterhouse. Person-minutes per bird is the most common unit of analysis for computing field labor requirements for pastured poultry (Fanatico 2002, Neufeld 2002, Salatin 2001). Estimates of the number of person-minutes per bird needed to raise pastured chickens ranges from 10 minutes/bird to over an hour/bird, depending on the level of experience and expertise of the farmer (Fanatico 2002). We use the assumption of 15 minutes to indicate a moderately experienced grower.


Poultry growers Phil & Amanda Blankenship (left) and Caleb & Heidi Sturtevant (right)

During the grow-out stage, bird mortality due to predation by local predators such as foxes and owls is fairly common. Following recent studies, we assume a 5% mortality rate due to predation in the grow-out stage (SARE 2012). This assumption is reasonably conservative; our pastured poultry contacts cited a much lower mortality rate during grow-out of 0.3 – 0.5%.

We assume that after slaughter, each bird yields 4 lbs. of meat (Sturtevant 2015). This is a reasonable assumption to make for high-yielding poultry varieties such as Cornish Cross, for which existing enterprise budgets assume yields ranging up to 4.5 lbs. Processing costs off-farm range from $3.25 (Blankenship 2015) to $5.35 (Schuller 2015) per bird. We used a cost that fell in between these two ends and assume processing is undertaken off-farm at a fixed rate of $4.00/bird (Sturtevant 2015).


Poultry processing plant in Scio, Oregon

Outdoor plucker and scalder at Botany Bay

The last and most important assumption is the purchase price. We assume a purchase price of $4.50 per pound for whole chickens. This price is only currently available from one of the NW producers we interviewed, but that grower (Botany Bay) was also the producer whose inputs and scale most closely matched the model. Other farms selling at a higher farm gate price were either operating at a smaller scale of production, buying feed at retail, or selling primarily via farmers' markets, traditionally the highest priced venue (or some combination of those). A $4.50/lb sale price seems perfectly reasonable for a pastured pen system producing roughly 15K birds per year for wholesale buyers. This price could also reflect an average price per pound of each cut sold separately.

Table 9. Additional Data Model Assumptions

Cost / Day Old Chick	$1.1
Lbs Feed / Bird	15
Feed Cost / Short Ton	$70
Pasture Rental Costs / Acre / Year	$28
Person-Minutes / Bird Raising	15
Mortality Rate from Predation	5%
Lbs. Dressed Weight	4.0
Processing Costs / Bird	$4.0
Purchase Price / Lb	$4.5

We have made several additional assumptions about the cost of permanent buildings, portable buildings, and farm equipment, based on the enterprise budget for pastured poultry developed at University of Wisconsin, Center for Integrated Agricultural Systems (CIAS) (Schuster 2003).

We assume costs of $500 per brooder house and $350 per field pen, and miscellaneous farm equipment costing about $15,000 that includes tractor, watering system, feeders, feed trailers, a utility trailer, and crates. We have made additional assumptions about the salvage value, lifespan, and interest rate that give rise to an annual Capital Recovery Charge. For instance, we assume each brooder house has a useful life of 7 years and a salvage value of $100. For all fixed cost items, we assume that the interest rate is 5%. For details of these assumptions, please see the data model assumptions in the Appendix.

We also make some assumptions about the economies of scale in fixed inputs: as production increases, some input costs increase linearly, and others increase less than one-for-one. These assumptions are also explained in the Appendix.

Finally, we have assumed additional variable costs including bedding (litter), utilities costs, marketing costs such as advertisements and product demo equipment, and miscellaneous costs such as cleaning supplies, repair tools, replacement parts, and other costs involved in running an agricultural enterprise. The details of these assumptions are listed in the Appendix.

Results are displayed below in Table 10. Gross receipts, costs, and returns are displayed per bird started in the second column, per pound of bird marketed for the third column, and for the total enterprise for the fourth column. The percentage of the total cost absorbed by each cost category is displayed in the fifth column on the right-hand side of the table. It is worth noting that even at the lower feed cost of $700/ton, feed costs (which include pasture land rental) are still the largest single cost item in the budget at 42.8% of total costs, or $5.29/bird started.

Table 10. Receipts, Costs, and Returns to Labor and Management for Pastured Poultry

Returns By Category	Per Bird Started	Per Pound / Bird Marketed	Per Enterprise	% Total Cost
Gross Receipts	$15.39	$4.50	$230,850	--
Feed costs	$5.29	$1.38	$70,875	42.8%
Other Variable	$2.81	$0.98	$50,530	22.8%
Fixed Costs	$0.82	$0.24	$12,330	6.7%
Processing Costs	$3.42	$1.00	$51,300	27.7%
Total Cost	$12.34	$3.61	$185,035	--
Total Returns and Management	$3.05	$0.89	$45,815	--

Table 11 presents returns to labor and management. The first row of Table 11 reproduces the last row, first and fourth columns, of Table 10. The second row estimates the number of labor and management hours needed for the enterprise, based on the person-minutes per bird. The third row divides total returns by number of hours to derive the implicit "wage" per hour of labor or management. The fourth row divides the number of labor and management hours by 2080 (the number of hours in a work-year) to arrive at the number of people employed, measured in FTE (full-time equivalent). The farm described by the assumptions in this model yields total returns to labor and management of $45,815; it employs its owner-managers at $13.57/hour at an annual FTE salary of $25,412. The farm employs 1.8 FTE workers.

Table 11. Returns to Labor and Management

Total Returns to Labor and Management	$45,815
# Labor and Management Hours / Enterprise	3,375
$/Labor and Management Hour	$13.57
Employment in FTE	1.8
Returns / FTE (Annual Salary)	$25,412

Sensitivity Analysis: Feed Costs and Purchase Prices

The results presented above rest on a large number of assumptions. How good are those assumptions? If one or more assumptions turns out to be inaccurate, how will the results of the model change? Could a single variable, such as the price of feed, make the difference between a farm family thriving and failing? To answer this question, we conduct a sensitivity analysis on two important variables: the largest single cost item in the farm budget, the price of feed, and the farmgate price per pound of bird sold.

Table 12 provides the results of a sensitivity analysis on feed costs based on the model assumptions above. It examines total costs, and returns to labor and management hour, resulting from changes in the cost of feed per short ton. We examine break-even price per pound and hourly returns to labor for feed costs ranging from $500 to $1,200 per ton. At a feed cost of $700 (the default assumption), the break-even cost for a farmer to produce pastured poultry is $3.61 per pound. If the farmgate price is $4.50/lb, the farmer earns $0.89 for every pound of chicken sold. If the feed cost is $1,100, the break-even cost rises to $4.40/lb, and the returns fall to $0.10/lb.

Feed costs influence the hourly returns to labor and management significantly. At a feed cost of $700/ton and a purchase price of $4.50, the hourly returns to labor and management are $13.57, which exceeds the living wage threshold for one adult in both Oregon ($10.68/hour) and Washington ($10.34/hour), as reported by the MIT Living Wage Calculator (Glasmeier 2015).

By contrast, consider cases where feed costs are $1,100 per ton, as described in Painter et al (2015). In such a case, under the assumptions we have presented, the hourly return to labor and management would be $1.57/hour – far below both the Oregon state minimum wage of $9.10/hour and the Washington state minimum wage of $9.47/hour, as well as the “Poverty Wage” for both Oregon and Washington, defined in Glasmeier (2015) as $5.00/hour.

Table 12. Sensitivity Analysis, Feed Costs per Short Ton

	Results			
Feed Cost	Total Cost / Bird Started	Cost / Pound Sold	Returns / Pound Sold	Returns to Labor and Management / hr
$500	$10.99	$3.21	$1.29	$19.57
$600	$11.66	$3.41	$1.09	$16.57
$700	$12.34	$3.61	$0.89	$13.57
$800	$13.01	$3.80	$0.70	$10.57
$900	$13.69	$4.00	$0.50	$7.57
$1,000	$14.36	$4.20	$0.30	$4.57
$1,100	$15.04	$4.40	$0.10	$1.57
$1,200	$15.71	$4.59	($0.09)	($1.43)

Farmgate prices also significantly influence the hourly returns to labor and management, as demonstrated below in Table 12. Holding feed costs constant at $700/ton, if farmgate prices drop from $4.50 to $4.00 per pound, then hourly returns fall from $13.57 to $5.97 – more than a 50% drop. At a purchase price of $3.50, hourly returns are a negative $1.63 and the enterprise can be considered a hobby. At a higher purchase price of $5.50, hourly returns are $28.77, well above the living wage threshold.

Table 13. Sensitivity Analysis, Farmgate Price per Pound

Farmgate Price	Total Returns / Bird Started	Total Returns / Pound of Bird Sold	Returns to Labor and Management / hr
$3.50	($0.37)	($0.11)	($1.63)
$3.75	$0.49	$0.14	$2.17
$4.00	$1.34	$0.39	$5.97
$4.25	$2.20	$0.64	$9.77
$4.50	$3.05	$0.89	$13.57
$4.75	$3.91	$1.14	$17.37
$5.00	$4.76	$1.39	$21.17
$5.25	$5.62	$1.64	$24.97
$5.50	$6.47	$1.8	$28.77

Comparison to Conventional Broiler Production

How do the production costs and returns to the pastured poultry system we have examined compare to those of the conventional, industrial production of broiler chickens? This section compares the enterprise budget model described above with a standard, industrial model of poultry production, based on a recent enterprise budget developed at Oklahoma State (Doye, et al. 2012).

Commercial broiler producers tend to locate in close proximity to large-scale poultry companies known as integrators. Integrators own and operate chick hatcheries, feed mills, and processing facilities. They contract out production to producers (growers), provide growers with chicks and feed upfront, supervise growth of broilers, and purchase the entire production of the grower for processing and sale at a fixed price. Growers are paid by pound of usable meat, with possible incentives for efficient use of feed or low production costs in general. The per-pound price that integrators pay growers tends to be very low (in our example, just under $0.06/lb). Integrators tend to specify in production contracts detailed production practices that growers must follow, including building design, required equipment, and location of production. Typically, a grower will build one or more 20,000 square foot houses, each housing approximately 26,400 broilers per flock. A typical growing season will consist of 5 flocks.

The conventional model differs from the pastured model in three fundamental ways. First, the production is undertaken at much larger scale: about nine times as many chicks purchased per year compared to the pastured model (132,000 vs. 15,000). Second, the costs of many of the key inputs – such as chicks, feed, and processing – are not included in the grower's budget. The grower undertakes no marketing; land requirements are very low, and land costs are thus (by assumption) minimal. Third, the labor requirement for chicks in the conventional model is very low. The model assumes that growers work 3 hours per day, 308 days per year, to grow 132,000 birds at a 5.5% mortality rate (124,740 finished birds). This timeframe works out to 4.2 person-minutes per bird, less than one-third the amount of labor per bird assumed in the pastured model.

Table 14. Conventional Poultry Production: Key Assumptions

Number of chicks advanced per year	132,000
Mortality rate	5.5%
Person-Minutes / Bird Raising	4.2
Lbs. Dressed Weight	6.5
Contract Price / Lb	$0.0585

The conventional model assumes that labor is hired at a fixed wage of $10/hour. Returns to management are a residual after accounting for all costs, including labor. The hourly "wage" from management depends upon the amount of time needed to manage the operation. Fixed costs are treated as straight-line depreciation. Assumptions about the annualized fixed costs for buildings and equipment are stated in the "Notes" section of the conventional data model.

Table 15 below presents the results of the conventional model. Though the unit costs are much lower than in the pastured model, so are the returns. Under these assumptions, the average profitability of the enterprise is one cent per bird. Returns per pound of bird marketed must be measured in fractions of a cent: the producer earns $0.0013 – just over a tenth of a cent – per pound of poultry marketed. The only way for a producer to earn significant returns in the conventional model is to produce at a very large scale. Labor, too, makes a relatively low wage: at a wage of $10 per hour and a work-year of 924 total hours, the laborer earns an annual salary of $9,240, or an FTE-equivalent salary of $20,800.

Table 15. Receipts, Costs, and Returns for Conventional Poultry

Returns by Category	Per Bird Started	Per Pound / Bird Marketed	Total Returns / Costs	% Total Cost
Gross Receipts	$0.38	$0.0617	%50,040	-
Feed Costs	$ -	$ -	$ -	-
Variable Costs	$0.19	$0.0313	$25,408	52%
Fixed Costs	$0.18	$0.0291	$23,610	48%
Processing Costs	$ -	$ -	$ -	-

According to the 2013 U.S. Agriculture Survey, the national industry average price received for poultry is $0.61/lb (NASS 2015). The conventional poultry budget given above assumes that the integrator pays the grower $0.0585/lb, thus earning approximately $0.55/lb on a very large volume of poultry. Since we do not know the integrator's cost of production, we cannot compare this figure directly to the returns earned by pastured poultry growers. However, we can say with reasonable certainty that net returns per bird for integrators are lower than for pastured poultry growers. Integrators' incomes stem from economies of scale in hatching chicks, milling feed, and processing and marketing finished birds. Integrators' volumes can be very large: Pilgrim's Pride, the largest integrator in the United States, processes 182 million pounds of poultry per week (Greenberg 2007).

We can compare costs and returns per bird, and per pound marketed, between conventional and pastured poultry producers if we subtract the costs of chicks, feed, and processing from the pastured producers' budget, and subtract the cost of hired wage labor from the conventional producers' budget. Results are displayed below in Table 15. Clearly pastured poultry producers' costs are much higher than conventional producers. For example, pastured poultry producers' cost per pound of bird marketed are $0.84/lb higher than conventional producers.

Table 16. Comparisons of Unit Costs for Patured and Conventional Poultry

Producer Type	Cost Per Bird Started	Per Pound / Marketed
Pastured	$2.53	$0.91
Conventional	$0.30	$0.05

Further Work

Three important questions arose during discussions that were out of scope for our model to address.

1. Nutrient Management. Farmland conditions can vary dramatically across the Pacific Northwest. Pastured poultry producers must take into account the nutrient balance in the soil to ensure a healthy mix of pasture grasses to nourish birds. Both pastured and conventional producers must also take into account potential nutrient runoff if the land is sloped or borders a riparian area. Chicken manure is one source of nutrients that can provide the basis for healthy pasture; however, pastured producers may need to engage in additional nutrient management, which carries its own set of costs in terms of labor time and potential input or equipment purchase.

2. Multiple Products. Many alternative agricultural producers in the Pacific Northwest produce more than one crop or animal on the same land. A pastured poultry producer may use the same land for layer hens, dairy or beef cattle, hogs, rabbits, or other production animals. Raising more than one animal product may be a source of cost savings, since the land rental costs are split among the budgets for each animal. However, it may also be a source of increased costs, as the amount of labor-time per animal may increase due to the time necessary to switch tasks.

3. Integrators' Costs of Production. Poultry integrators hatch chicks, mill feed, process birds, and market meat at a large scale. We were not able to examine in any depth the primary cost factors that ensure low production costs and high returns for poultry integrators. In particular, integrators' feed costs are still unknown to us. It is likely that the feed blends milled by integrators make use of large volumes of heavily subsidized grains, including corn and soybeans. Further work might conduct scenario analyses of the production costs that integrators would face, were subsidies for conventional U.S. grains to be removed.

Conclusions

Pastured poultry production holds the potential for growth in the Pacific Northwest. There exist at least a few producers with the skills, land, and market access to produce poultry on pasture at price points that can satisfy consumers seeking differentiated products. However, it is very unlikely that pastured poultry will be competitive to conventional poultry on price. The unit cost of production of pastured poultry is higher than that of conventional poultry, and as we can see from the data, wages for labor and returns to farmers are highly sensitive to the farmgate price garnered. Retailers and consumers buying direct from the farm have shown a willingness to pay the $4.50/lb farmgate price modeled in this analysis, but it remains to be seen whether institutions will be willing/able to make trade-offs in other areas of their menu to pay what amounts to a significant difference between the price of conventional and pastured poultry.

Our research suggests that the primary cost factors that make pastured poultry more expensive to produce are the higher cost of feed, higher land and labor requirements, and scale factors. It is possible that the cost of production for pastured poultry can be reduced by smart interventions in key links of the supply chain, thus making the poultry both a viable product for producers and affordable to institutions.

Potential investments include the following:

1. Invest in existing small-scale poultry operations to support growth to at least 15,000 net birds per year harvested, with a focus on increasing margins. This could include investments in infrastructure, such as additional pasture pens and brooding houses, or for feed-milling equipment, if producers are currently buying feed at retail feed stores. Support for technical assistance, including best practice sharing with regard to efficient use of labor, could help reduce time spent per bird.

2. Invest in shared infrastructure for multiple farms. Further research seems warranted to determine whether investing in community-based infrastructure, such as feed milling or poultry processing, to be shared by a group of midscale producers in close geographic proximity, would reduce costs and increase viability for multiple producers at once.

3. Invest in "intellectual infrastructure". Software for inventory tracking, shared sales and marketing programs, brokerages or collaborative buying approaches (such as coordinating poultry purchasing by institutions with different needs, i.e. schools buy drumsticks, hospitals buy breasts, correctional institutions buy thighs, etc.) offer potential for investment that could increase the overall consumption of local pastured poultry produced by midscale farms in the Northwest.

Botany Bay Farm's ingenious feed machine. Innovations like these can provide alternatives to expensive retail feed inputs and bring down the costs of production for midscale growers.

Although this project didn't assess demand, the chicken chapter of the Oregon Food Infrastructure Gap Analysis suggests demand for more than 20 million pounds of poultry by wholesale buyers (including retail, restaurant and institutions) in Oregon alone. Ecotrust's work to convene the NW Food Buyers' Alliance, a peer-to-peer network of institutional foodservice directors, suggests that a much of that demand could be converted from conventional poultry products to those from regional, pasture-based production systems, if frameworks can be developed and investments made to narrow the pricing gap.

The next product categories to be analyzed in this project are pork and small grains, and we believe that there may be parallels and synergies to be explored between pastured chicken and pork production systems, as well as between each of those two categories and the production of local grain for feed.

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Appendix A. Data Model Assumptions

Default Assumptions	
	Chicks
Number of Chicks Purchased	The default assumption is 15,000. This number places the producer within the range considered “Agriculture of the Middle.” This is a key input to the model. Neufeld (2002) models production scales from 5,200 to 15,600 birds/year. Fanatico (2002) focus on a smaller scale of production, from 1,000 to 6,000 birds/year. Botany Bay Farm (Sturtevant 2015) currently raise 6,000 birds/year and Lazy B (Blankenship 2015) raise closer to 11,000 birds/year.
Cost Per Day Old Chick	The cost of chicks varies. For northwest Oregon/southwest Washington, assume $1.10 per chick (Sturtevant 2015) from Jenks hatchery, including shipping and handling. Enterprise budget studies (Neufeld 2002, Fanatico 2002) assume day old chicks cost $1.14 per bird ($0.57 in 2002 USD). As a high estimate, a group of Washington State researchers (Painter, et al. 2015) assume $1.65/chick.
Mortality Rates for Chicks	Assume a 10% mortality rate for chicks due to injury, piling, disease, or inadequate nutrition (SARE 2012). This is a standard assumption for a relatively skilled, experienced pastured poultry producer. This assumption can be adjusted based on the experience of the farmer. Sturtevant (2015) cites a 9% mortality rate for chicks. A recent paper on pastured poultry (SARE 2012) notes: “New producers typically have high rates of mortality—sometimes as high as 10-30 percent; experienced farmers often have mortality rates of 2 percent or lower.”
	Feed
Feed Costs	The feed price variable can be adjusted to conduct sensitivity analysis. Examples of feed prices vary widely. Sturtevant (2015) produce feed on-farm using an ingenious feed mill system designed in-house. They cite $17-18 per 50 lb bag for broiler feed, which translates to $680-720/ton or $0.34-$0.36/lb. This is roughly consistent with the low estimate cited by a Kansas State study (Neufeld 2002) of $325/ton for organic feed in 2002 USD, corrected to $650 for 2014 USD. A good middle estimate comes from Botany Bay Farm (Sturtevant 2015), who cite their next-best feed alternative as $22 per 50 lb bag, which comes to $880/ton ($0.44/lb). A high estimate comes from Painter et al (2015) who find $1,183/ton for starter feed and $1,122/ton for grower feed. Lazy B Ranch (Blankenship 2015) noted that it costs them $700/ton to grow, direct source, and mix their own feed, but had paid as much as $1,400 per ton in the past when purchasing feed from other sources. Innovations in feed technology such as those employed by Botany Bay Farm (Sturtevant 2015) can help bring down feed costs.
Feed Per Bird	The default assumption is that each bird requires 15 pounds of feed over its life. This is the assumption given by Fanatico et al (2002). Botany Bay Farm (Sturtevant 2015) cites a ratio of 3.5 lbs feed / 1 lb meat. At a dressed weight of 4 lbs/bird, this works out to 14 lbs of feed/bird; at a dressed weight of 4.5 lbs/bird, it works out to 15.75 lbs of feed/bird.

Land and Labor	
Person-Minutes of Labor Per Bird	The default assumption is 15 person-minutes per bird. The number of person-minutes spent per bird in the raising process varies by skill and experience level. We can make low, medium, and high estimates for amount of labor required to raise birds. The key variable is "person-minutes" per bird over the course of its lifetime. Salatin (2001) assumes a low estimate of 9 person-minutes (0.15 hours) per bird for 4,500 raised birds, adding in 1 minute/bird to account for mortality. Botany Bay Farm (Sturtevant 2015) reports that over the course of the growing season from May to October (27 weeks), approximately 2 people are in the field, 3 hours/day, 5 days/week, to raise 6,000 birds. That works out to about 8 minutes per bird - a very low estimate! The high estimate, following Neufeld (2002) is an hour per bird for an inexperienced farmer.
Land Rental Cost / Acre / Year	This variable can be adjusted to account for local conditions. As a default, we use a land rental value of $280/ac/year (Painter, et al. 2015). If the same land is used for multiple crops or animals, the pro-rated land value for pastured poultry may be less than the total per-acre rental rate.
Fixed Costs	
Brooder House Unit Cost and CRC/RTI	This variable can be adjusted to account for local production systems. As a default, loosely following Neufeld (2002) assume a portable brooder house that holds 200 birds worth $500 in 2002 USD ($1,000 in 2014 USD). For each 5,000 birds grown, 3 houses will be needed. Assume that the salvage value is $100 and the lifespan of the building is 7 years with straight-line depreciation. Assume 5% interest; assume insurance rates of 5% and property taxes of 2% of total asset value. Under those assumptions, the Capital Recovery Charge plus (Non-Use-Related) Repairs, Taxes, and Insurance (CRC + RTI) is about 22.5% per year (Schuster 2003).
Field Pen Unit Cost and CRC/RTI	This variable can be adjusted to account for local production systems. As a default, loosely following Neufeld (2002), assume eleven pens for each 5,000 birds. Each pen is worth $325 in 2002 USD ($650 in 2014 USD). Botany Bay Farm (Sturtevant 2015) claim that their pens cost only $350/pen Cost and in 2015, so this number can be adjusted. Following Fanatico et al (2002), CRC/RTI we assume these pens each last five years, with straight-line depreciation, and have no salvage value. Assume 5% interest; assume insurance rates of 5% and property taxes of 2% of total asset value. Under those assumptions, the CRC + RTI is about 30% per year (Schuster 2003).

Equipment and CRC/RTI	This variable can be adjusted to account for local production systems. As a default, loosely following Neufeld (2002) , assume the following pieces of equipment are necessary for 5,000 birds: fencing ($500), broiler feeders ($300), a water system ($500), a tractor ($4000), a feed trailer ($1,500) and a utility trailer ($500). Total cost in 2002 USD is $7300. Total cost in 2014 Equipment and USD is about $14,600 per 5,000 birds. Loosely following Neufeld (2002), CRC/RTI assume that the economies of scale are such that each doubling of production raises equipment costs by only 50%. Assume that the lifespan of these pieces of equipment is seven years with straight-line depreciation, the total salvage value is $1000. Assume the interest rate is 5%; assume insurance rates of 5% and property taxes of 2% of total asset value. Based on these assumptions, the CRC + RTI is about 23% per year (Schuster 2003).
Processing and Sales	
Mortality Rate from Predation	The default assumption is 5% mortality rate from predation (SARE 2012). This rate can be adjusted to fit the experience of the farmer. These birds will be assumed to incur all costs except processing.
Processing Cost	This variable can be adjusted to conduct sensitivity analysis. Botany Bay Farm (Sturtevant 2015) cite $4.00/bird for off-farm processing. In their model of a processing plant, Fanatico et al (2002) find a break-even processing cost of $1.53/bird in 2002 USD ($3.06/bird in 2015 USD). Neufeld (2002) assume off-farm processing at fixed fee of $2.70 per bird ($1.35 in 2002 USD). For a high estimate, use $5.35/bird, a quote from a processing plant in Scio, OR (Schuller 2015)
Dressed Weight	The dressed weight, also known as the “hanging weight”, is the weight of the bird after slaughtering and processing. 4.5 lbs/bird, dressed weight, is a standard assumption for Cornish Cross chickens. Botany Bay Farm (Sturtevant 2015) cite 4 – 4.5 lbs/bird.
Purchase Price	The purchase (farmgate) price variable can be adjusted to compute the returns to labor and management for pastured poultry raising under various assumptions. Estimates from the literature vary widely. Botany Bay Farm (2015) sells whole chicken direct from the farm at $4.50/lb, while Lazy B Ranch (Blankenship 2015)sells for $4.25/lb (or $3.75/lb if >1,000 birds per year are purchased), and Berggren Demonstration Farm sells pastured whole chickens for $4/lb or $4.50/lb for those raised on a diet that is GMO-, corn-, and soy-free (Berggren Demonstration Farm 2014). The price quoted by Neufeld (2002) was $1.60 in 2002 USD ($3.20 in 2014 USD).

Other Variable Costs	
Acreage	Loosely following Neufeld (2002), assume 10 acres to raise each 5,000 birds in pens. Sturtevant (2015) cite approximately 12-15 acres of pasture for 6,000 birds in pens, while Blankenship (2015) cite approximately 20 acres of pasture for 10,700 birds in pens
Bedding	Following Fanatico et al (2002), assume that bedding (wood chips or other litter used for brooder house/s) cost $150/year for each 1000 birds in 2002 USD ($300 in 2014 USD).
Marketing	Following Fanatico et al (2002), assume $400 marketing costs for 1000 birds in 2002 USD ($800 in 2014 USD). Following Neufeld's (2002), analysis of farm labor as a whole, assume that for each doubling of production, marketing costs go up by only 50%.
Miscellaneous	Fanatico et al (2002) include a line item of $400 (2002 USD) for one thousand saleable birds (at 10% death loss) for miscellaneous items such as repairs and cleaning supplies. Assume constant returns to scale (CRS) in these items, such that costs remain constant at $400/thousand birds. Multiply by 2 to convert from 2002 USD to 2014 USD. Thus, for each 5,000 birds miscellaneous costs will be $800 in 2014 USD.
Utilities	Following Fanatico et al (2002), assume $20 for utilities to serve each 1,000 birds in 2002 USD ($40 in 2014 USD).
Labor	Assume labor is a residual, and labor and management come together (family operated or owner-operated farm). Returns to labor and management will be an important "outcome variable" of the model.

Appendix B. Data Model User Instructions

Model Inputs	This section explains how to enter inputs into the model.
Number of Chicks Purchased	Enter the number of chicks that you purchased or expect to purchase over the growing season.
Cost / Day Old Chick	Enter the average price per chick that you paid or expect to pay for day-old chicks over the growing season.
Chick Mortality Rate	Not all chicks will survive to maturity. Enter the percentage of chicks who perished, or who you expect will perish, during brooding. A good default assumption is 10%.
Feed Costs / Ton	Enter the average cost of purchased feed per (short) ton that you paid or expect to pay. If you only know the cost per pound, multiply by 2000.
Lbs Feed / Bird	Enter the number of pounds of feed that you expect to use in raising each bird over the course of its life. A good default assumption is that each bird will eat 15 pounds of feed over its life. Enter your best guess of how many minutes of labor you expect to spend raising each bird. The best way to derive this number is: how many days per week, hours per day do you expect to work over the course of the season? How long is the season in weeks? How many people will be working this number of hours? And how many birds are you raising?
Person- Minutes / Bird Raising	For example, suppose that the growing season runs May through October; you expect to have two people (including yourself) in the field each working three days per week, eight hours per day; then your expected work hours will be 1,296 (=27 work weeks * 3 days/week * 8 hours/day * 2 workers). Suppose you are raising 6,000 birds on that schedule. Then you will be spending 1,296/6,000 = 0.216 person-hours, or about 13 person-minutes, raising each bird. Poultry farming guru Joel Salatin insists that pastured birds can be raised with only 9 person-minutes per bird; however, most poultry growers are not at his skill level.
Pasture Rental Costs / Acre / Year	Enter the average land rental costs per acre, per year, in your area. Some growers will be able to obtain land at costs lower than the average through family, friends, goodwill agreements with neighbors, and the like. Some growers will face higher land rental costs due to proximity to urban areas or other factors.
Brooder House Unit Cost	Enter the approximate total cost of the brooder houses you use to raise chicks. The cost will be factored in on an annual basis, based on assumptions about the useful life of the brooder house. See Default Assumptions for details.

Field Pen Unit Cost	Enter the approximate total cost of the field pens you use to raise birds to full weight. The cost will be factored in on an annual basis, based on assumptions about the useful life of the brooder house. See Default Assumptions for details.
Equipment Total Cost	Enter the approximate total cost of the equipment used in the production of pastured poultry. Equipment could include: waterers, feeders, fencing, trailers, and tractor. The cost will be factored in on an annual basis, based on assumptions about the useful life of the brooder house. See Default Assumptions for details.
Mortality Rate From Predation	During the grow-out phase, birds are often predated upon by foxes, owls, coyotes, or other local predators. Enter the percentage of birds you expect might be captured by local predators. A good default assumption is 5% of all birds.
Processing Costs / Bird	Assume that processing will be conducted off-farm. Enter the cost of processing whole birds for the nearest plant in your area. A good default assumption is $4/bird. If you process birds on-farm and know your approximate costs, you can enter it as a line item here.
Lbs. Dressed Weight	Enter the number of pounds of meat that each bird will yield, on average. This is the “dressed weight” or “hanging weight” of each bird. A good default assumption for White Cornish Cross hens is 4.5 lbs.
Purchase Price / Lb	Enter the purchase price you expect to receive, or would like to receive, for each pound of meat that you sell. The purchase prices may differ across parts (breasts, wings, thighs, drumsticks); to choose one number, enter the per- pound price which you expect to receive for the whole chicken.

Model Outputs	This section explains how to read and interpret the outputs from the model.
Gross Receipts	This is the total revenue earned from sales of birds over the growing season.
Feed costs	This is the total amount spent on feed over the growing season.
Other Variable Costs	This subtotal refers to the sum of the following variable costs: land rental, bedding/litter, marketing, miscellaneous supplies including use-related repairs, utilities, and interest on variable costs. Each variable cost is assumed to be incurred each year.
Fixed Costs	This subtotal refers to the total capitalized fixed costs for brooder houses, field pens, and equipment. Each year the Capital Recovery Charge, plus Repairs, Taxes, and Insurance, (CRC+RTI) is applied to calculate the annual cost of providing for these plant and equipment. Please consult the Default Assumptions section on “Fixed Costs” for details.
Processing Costs	This is the total amount spent on slaughtering and processing birds over the growing season.
Total Cost	This is the sum of all costs associated with raising the birds over the growing season.
Total Returns	This is the difference between gross receipts and total costs.
$/Labor and Management Hour	This is the average return per labor/management hour; it is the total returns divided by the number of person-hours devoted to raising the birds over the growing season.
Employment in FTE	This is the number of full-time equivalent employees your farm will support, assuming a work-year of 2,080 hours. For instance, if the labor required to run your farm is 3,160 hours, then your FTE will be 3,160/2,080 = 1.5.
Returns / FTE	This is the annual salary per FTE that owner-managers on your farm will earn. For instance, if your farm has total returns of $50,000, and employs 1.5 FTE, the returns/FTE are $50,000/1.5 = $33,333.

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