



# Pastured Poultry Enterprise Analysis

**A FINANCIAL COMPARISON OF MAIN STREET PROJECT'S PASTURED POULTRY SYSTEM AND UNIVERSITY OF MINNESOTA'S POULTRY TRIAL**

Authored by Ryan Pesch



Photo courtesy of Main Street Project



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**A special thanks to all growers who participated in this research and shared information about their operations. We hope this research helps existing growers improve their operations and assists prospective operators with planning their pastured poultry businesses.**

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## EXECUTIVE SUMMARY

A University of Minnesota Extension study of two pastured poultry production systems found that, while both operate profitably, some input costs vary significantly. This report provides an objective financial comparison of the two production systems—one a free-range broiler system using large paddocks and the other a pastured poultry system in which broilers are confined in moveable pens. The purpose of this report is to assist existing and prospective poultry growers with business planning and benchmarking.

Main Street Project (MSP) is a non-profit organization in Minnesota committed to developing a regenerative agricultural production system through demonstration farms and grower training. Main Street Project growers raise between 800 and 1,500 broilers per batch in stationary coops in large paddocks, while the University of Minnesota raises up to 300 broilers in nine transportable pens moved daily in pastures. MSP operators garnered \$3.76 in operating revenue for each chicken sold (an average of \$13.26 in gross sales per bird) where operating revenue is total sales minus variable expenses, such as chicks, feed, and processing. In comparison, the University of Minnesota system is more profitable, averaging \$25.07 in gross sales per chicken and retaining \$13.48 after deducting all variable costs.

A higher profit for University of Minnesota operators is, in part, due to a higher sale price (\$4.50/lb. for a U of M chicken vs. \$3.19/lb. for a MSP chicken). The moveable pen system was also more profitable than the free-range system, even when controlling for sale price differences. U of M operators, however, spent significantly more time per broiler to realize higher profit margins. Operating revenue per hour worked was very close when comparing the two systems—\$22.63 for MSP and \$20.87 for U of M, although U of M operators received higher net revenue per hour, since the cost of moveable pens was significantly less than MSP's stationary structures.

## METHODOLOGY

Extension conducted a basic enterprise analysis, based on the data provided by four study participants, and calculated costs and returns for the average broiler sold and for each of the four flocks in the study. The primary interest of this analysis is to compare the financial performance of two types of pastured poultry production systems—Main Street Project's stationary housing and paddock system and U of M's moveable paddock or 'chicken tractor' system.

### Data collection procedure

MSP provided detailed information about the startup and operating costs of three of its cooperating growers. One grower also tracked the hours spent tending his flock to calculate returns to labor. As a point of comparison with MSP's poultry system, the University of Minnesota also tracked its annual expenses and labor inputs for its poultry operation.

### Calculations and comparisons

Since many questions about pastured poultry operations concern annual direct expenses and return per pound of finished product, this analysis focuses on annual inputs and labor—but with a special emphasis on feed conversion as the largest annual input. Since the two production systems use different types of shelters, Extension also compared the capital cost associated with poultry housing.

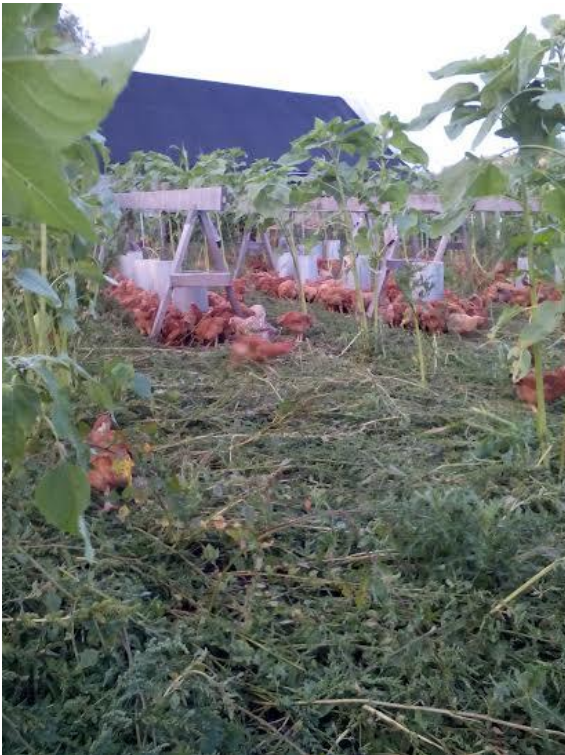
## PASTURED POULTRY ENTERPRISE FINDINGS

A University of Minnesota Extension study of two pastured poultry production systems found that, while both operate profitably, some input costs vary significantly. Current and prospective operators should consider the differences in financial returns and daily management before adopting a system, or elements of a system, that best fits their current situation.

### About Main Street Project's pastured poultry production system

Main Street Project has developed a model for poultry that uses stationary housing and a large (100 x 200 foot) attached paddock (see Figures 1 and 2). Perhaps best described as a free-range production system, the paddock provides outdoor access for birds, as well as a growing space for woody plants that benefit from the poultry's nutrient cycle. Growers using this system also use sprouted grain, which is broadcast in the paddock to feed the broilers, in addition to a traditional feed ration.

**Figure 2: MSP paddock with broilers**



**Figure 1: Antonia in the interior of MSP poultry housing**



MSP built two types of housing structures, seasonal and year-round. Both include the 100 x 200 foot paddock space, but the year-round structure includes a larger indoor area (1,760 vs. 1,120 square feet) and an insulated night shelter and solarium. The seasonal and year-round housing cost \$12,000 and \$25,000, respectively.

Extension used the seasonal unit for analysis in this report.

Since one of MSP's primary interests is supporting the business development of new growers, the organization takes on some tasks associated with the pastured poultry enterprises to assist growers. For example, MSP cleans the coops, and it also stores and distributes the finished birds for a fee.

## About University of Minnesota's pastured poultry system

The University of Minnesota has operated a pastured poultry broiler flock since 2010. Its system uses moveable pens or “chicken tractors” that are relatively small (8 x 8 or 8 x 12 feet) and moved on a daily basis to provide fresh pasture (See Figure 3). The clover-based pasture supplements the broilers' diet, and daily rotations keep the birds generally clean while providing fertility for next year's soil through their droppings.

The structures are quite simple—a box on wheels—although the roof (made of a hog panel) is sheathed in plastic vinyl siding for strength and protection. The fully covered pens protect the broilers from predators, which are quite common on campus. (See the “Housing Costs and Return on Investment” section for details on returns to housing.)

**Figure 3: Wayne Martin moving broilers on St. Paul campus**



## Farm enterprise glossary

Since Extension authored this publication for a general audience with varying experience in farm business management, a glossary of the key terms is provided:

**Gross Revenue:** Total sales before deducting any expenses (also known as gross sales).

**Variable Expenses:** Cash outlays for inputs used in production (also known as direct expenses).

**Operating Revenue:** Gross sales minus cash variable expenses, such as feed, processing, chicks, and bedding.

**Gross Margin:** A common way of presenting operating revenue and calculated as operating revenue divided by gross revenue. Gross margin is a percentage of gross sales after deducting direct expenses to produce a product. For example, a gross margin of 50% means that a producer retains 50 cents for every dollar of sales.

**Depreciation:** Cost of a capital asset—in this instance, poultry housing—prorated over its expected life.

**Net Revenue:** Financial returns after deducting all costs. For this report, net revenue is gross revenue minus cash variable expenses and depreciation.

## Product marketing

Both MSP and U of M operators sold their broilers directly to customers. MSP arranged for all broilers to be processed at a facility near its cooperating growers and direct marketed them through various local outlets. The Meat Lab on the St. Paul campus processed all broilers raised by the U of M and acted as the pick-up point for customers from the same facility. Under this arrangement, the U of M had a higher processing cost, but no cost for storage and distribution—functions assumed by the Meat Lab (see Table 1).

Gross sales per bird varied between the two production systems mainly due to the difference in price and weight of finished broilers. MSP growers saw an average carcass weight of 4.16 pounds per broiler, which they marketed at \$3.19 per pound. In comparison, U of M grew broilers to an average carcass weight of 5.56 pounds and marketed their birds at \$4.50 per pound. Considering the average-sized chicken, MSP’s broilers garnered \$13.26 in gross revenue compared to \$25.07 for the U of M (see Table 2). To overcome this price and weight difference, Extension calculated costs and returns by pound of carcass weight and compared returns based on U of M marketing its chickens at \$3.19 per pound—the same price as MSP (see Table 2).

### Overall operating costs and returns by grower

Gross revenue, or sales, for each grower ranged from \$12,003 to \$16,030 for their flock(s) in 2015. The U of M raised two batches totaling 576 finished broilers, whereas each MSP grower raised between 818 and 1,244 broilers per batch (see Table 1).

Removing variable costs necessary to raise the birds (seed, feed, chicks, processing, bedding, and utilities), all operators had positive operating revenue (gross revenue minus variable costs). Participants took in between \$3,093 and \$7,763 in operating revenue (see Table 1).

**Table 1: Operating Costs and Revenue by Grower**

	Grower A	Grower B	Grower C	U of M
<b>Revenue</b>	<i>Per Flock</i>	<i>Per Flock</i>	<i>Per Flock</i>	<i>Per Flock</i>
Sales	\$12,003	\$16,030	\$11,776	\$14,441
No. of birds purchased	1,000	1,500	1,000	600
No. of birds finished	818	1,244	941	576
Survivor rate	82%	83%	94%	96%
Lbs. of finished weight	3,763	5,025	3,691	3,200
Avg. finished weight/bird	4.60	4.04	3.92	5.56
<b>Variable Expenses</b>				
Chicks	\$1,230	\$1,825	\$1,230	\$858
Bedding	\$246	\$555	\$206	\$280
Feed	\$3,670	\$4,391	\$3,371	\$3,208
Utilities*	\$413	\$578	\$350	\$ -
Processing	\$2,731	\$3,973	\$3,055	\$2,332
Storage and distribution	\$409	\$622	\$471	-
Total expenses	\$8,700	\$11,944	\$8,682	\$6,678
<b>Operating Revenue</b>	\$3,303	\$4,086	\$3,093	\$7,763
Gross margin	28%	25%	26%	54%

\*MSP growers paid MSP for electricity and propane used in their coop, as well as cleaning. U of M employed no utilities in its moveable paddocks, but did start the chicks in a heated building (a cost not reflected here).

The largest variable expense was feed, followed by processing and chicks. Feed and processing accounted for 72% of total variable expenses for MSP growers and 83% for U of M growers.



## Operating costs and returns by type of production system

To best create an equal comparison between the production system of MSP and the U of M's moveable pen system, Extension calculated the average costs and revenue per broiler and per pound of carcass weight (See Table 2). Extension compiled the data from all three MSP growers to calculate these averages for MSP production and for both batches from the U of M. Since MSP priced its chickens at \$3.19 per pound and U of M priced its chickens at \$4.50 per pound, Extension also calculated a scenario in which the U of M sold chicken at the same \$3.19/lb. sale price.

**Table 2: Operating Costs and Revenue by Production System**

<b>Revenue</b>	<b>Main St. Project</b>		<b>U of M</b>		<b>U of M Scenario</b>
	<i>Average per Finished Bird</i>	<i>Average Per Pound of Carcass</i>	<i>Average per Finished Bird</i>	<i>Average Per Pound of Carcass</i>	<i>Average Per Pound of carcass weight</i>
Sales	\$13.26	\$3.19	\$25.07	\$4.50	\$3.19
Overall survivor rate	86%		96%		96%
No. of birds finished	3,003		576		576
Lbs. of carcass weight	12,479		3,200		3,200
Avg. carcass weight/bird	4.16		5.56		5.56
<b>Variable Expenses</b>					
Chicks	\$1.43	\$0.34	\$1.49	\$0.27	\$0.27
Bedding	\$0.34	\$0.08	\$0.49	\$0.09	\$0.09
Feed	\$3.54	\$0.85	\$5.57	\$1.00	\$1.00
Utilities/cleaning	\$0.45	\$0.11	-	-	-
Processing	\$3.25	\$0.78	\$4.05	\$0.73	\$0.73
Storage and distribution	\$0.50	\$0.12	-	-	-
Total expenses	\$9.50	\$2.29	\$11.59	\$2.09	\$2.09
<b>Operating Revenue</b>	\$3.76	\$0.90	\$13.48	\$2.41	\$1.10
Gross margin	28%	28%	54%	54%	34%

Even at the same sale price per chicken and spending more per pound for feed (see Table 3), the U of M flock still brought in higher operating revenue per pound of carcass weight. This suggests the moveable pen system is a bit more efficient in transforming variable costs into weight (see "Feed Conversion" section), even though more labor is involved per broiler (see "Returns to Labor" section). Comparing the variable costs per pound of carcass weight, a few highlights stand out:

- **Chicks:** This cost was higher since MSP growers had a lower survivor rate (86% overall compared to the U of M's 96%). The low survivor rate for MSP growers, however, was not indicative of their historical performance. Two growers who supplied data for this project were trainees and experienced some chick health issues, which affected their operating costs. The last two MSP batches in 2015, however, had an overall survivor rate of 94%.
- **Processing:** Since the Meat Lab stored, processed, and served as a pick-up point for the U of M chickens, combining the storage, distribution, and processing costs of MSP makes for a better comparison. At \$0.90 per pound of carcass weight, this cost is significantly more than the \$0.73 at the U of M. Since processors charge per bird, this cost MSP more per pound for processing.

- **Utilities:** MSP growers paid for electricity and propane, whereas the moveable pens at the U of M had no utility costs.

### Feed conversion

Since growers purchased feed at different costs per pound, a comparison of the total feed used for the carcass weight provides a better “apples to apples” comparison between feed inputs. Called a feed conversion ratio, producers typically compare the amount of feed given to the live weight of broilers before butcher. Since MSP tracked only the final carcass weight, Extension calculated a feed conversion ratio for each grower based on pounds of feed needed to gain one pound of carcass weight (see Table 3).

**Table 3: Feed conversion rates per pound of carcass weight for 2015 by grower**

	Growers A	Grower B	Grower C	MSP Overall	U of M
Total Feed (lbs.)*	16,800	24,500	15,800	57,100	12,600
Total carcass weight	3,763	5,025	3,691	12,479	3,200
Price/lb*	\$0.218	\$0.179	\$0.213	\$0.204	\$0.255
Conversion ratio (lbs. of feed per lb. of carcass wt.)	4.46	4.88	4.28	4.58	3.94

\*Includes all paddock grain and seeds used in the MSP production system. MSP growers spent less per pound for feed since they received a bulk discount by getting a larger amount.

Extension found that the U of M flock used the least amount of feed to produce a pound of chicken. The overall average conversion ratio (pound of feed per pound of carcass) for all MSP growers stood at 4.58, whereas the U of M rate was 3.94. Table 2 shows that MSP growers also had differences between them as well, ranging from 4.28 to 4.88.

A potential reason for the difference between the two production systems is the amount of space allotted the broilers. In the moveable pen system, birds are confined to a smaller space than in the large paddock of the MSP system. Although moved daily to receive fresh pasture, the moveable pens restrict their amount of exercise, and the birds gain weight quicker.

Another difference between the two systems is MSP’s use of paddock feed or scratch grains. MSP operators routinely spread sprouted barley in the open 100 x 200 foot paddock for broilers to eat at will. These paddock grains were a small portion of the feed bill (about 2 percent of total feed costs); however, we cannot measure whether the consumption of these grains contributed greatly to broiler weight gain. This may be a feed cost without much weight benefit, since we cannot measure feed consumption or its value to the system.

The time taken to reach butcher weight was nearly the same for the two systems. The two U of M flocks were butchered at 76 and 78 days; the MSP flocks were butchered at an average of 74 days (three flocks done at 77, 68, and 70 days). In the same space of time, the U of M raised birds to a 5.56 lb carcass weight, whereas MSP carcass weight averaged 4.26 lbs.

### Housing costs and return on investment

One of the most common concerns for a prospective farm operator is return on investment. As outlined at the beginning of this report, the two production systems used very different chicken housing facilities. MSP constructed stationary coops within large paddocks. The U of M built moveable pens, or chicken tractors on wheels, sheathed in plastic vinyl. Both of these coop types are

durable and built to last many seasons. With this in mind, Extension calculated the annual capital cost, or depreciation, using a 15-year life span, the standard depreciation expense for a single-use agricultural building under the Alternative Depreciation System (ADS). Arguably, the moveable pens at the U of M are closer to a piece of agricultural equipment (typically depreciated at seven to 10 years), but we depreciated both coop types at the same rate for an equal comparison.

**Table 4: Housing type and cost comparison**

	<b>MSP</b>	<b>U of M</b>
<b>Housing Description</b>		
Type of housing	Seasonal coop with paddock	Moveable pen or chicken tractor
No. of units	1	9
Total square feet	1,120*	608
Construction cost	\$12,000	\$4,100
Cost per square foot	\$10.71	6.74
<b>Financial Cost and Return</b>		
ROI	21%	183%
Annual depreciation at 15 years	\$800.00	\$273.33

\*Does not include 100 x 200 enclosed paddock

Calculated as net revenue divided by start-up costs, return on investment (ROI) was an average of 21% for the MSP coops and 181% for the U of M pens. The U of M ROI is more than 100% because the net revenue for their two batches in 2015 was greater than the total amount spent to construct the nine pens in operation. Depreciating the cost of the pens at seven years (for an annual depreciation cost of \$586), decreases the ROI to 175%. Likewise, raising two batches of broilers per year

in a MSP coop would increase its ROI from 22% to 52%, based on average operating revenue of the three participating growers.

## Net revenue

The primary measure of financial performance for any enterprise is net revenue, calculated as gross

**Table 5: Net Revenue by Grower**

	<b>Grower A</b>	<b>Grower B</b>	<b>Grower C</b>	<b>U of M</b>
Gross sales	\$12,003	\$16,030	\$11,776	\$14,441
Variable expenses	\$8,700	\$11,944	\$8,682	\$ 6,678
Capital expense (depreciation)	\$800	\$800	\$800	\$277.33
Net revenue	\$2,503	\$3,286	\$2,294	\$7,486

revenue minus both capital and operating (variable) expenses. In this instance, the annual depreciation expense (capital costs) and annual operating expenses were subtracted, such as feed and processing (operating costs) from

gross sales (Table 5).

All growers had positive net revenue after subtracting the capital, or depreciation expense, of the coop. In reality, though, the MSP growers did not face these capital costs, since MSP constructed the coops and charged growers an annual rental rate of \$100—far below the annual depreciation expense. The depreciation expense is listed in this report both to create an equal comparison between the U of M moveable paddock system and to inform potential operators who may adopt the MSP pastured poultry production system.

## Labor inputs and returns

Each poultry operator was asked to keep a time log to track the hours tending their flock. One MSP trainee and U of M manager submitted their hours for this analysis. Although the work per day is similar when comparing the two systems (two hours per day at MSP vs. 2.4 hours per day at the U of M), the amount of time invested per bird is greater for the U of M moveable pen system. This translates to a similar financial return per hour.

**Table 6: Return to Labor per Flock**

	<b>MSP</b>	<b>U of M</b>
Hours per flock	146	372
Gross sales per hour	\$82.21	\$38.82
Operating revenue per hour	\$22.63	\$20.87
Net revenue per hour	\$17.15	\$20.13

The returns to labor illustrate one of the fundamental differences between the two production systems. While one MSP grower spent a total of 146 hours finishing a single flock of 818 broilers, the U of M spent 372 hours to raise 576 birds in two batches. Therefore, the MSP operator is spending less time per flock and certainly investing less time per broiler. This is reflected in the gross sales per hour calculation, where MSP growers realized more than \$80 per

hour worked—double the amount of the U of M operators. After subtracting annual variable expenses, the MSP operator earned \$22.63 per hour as compared to the U of M's \$20.87 (see Table 6). The nature of labor is also different when comparing the two production systems. U of M operators physically exert themselves more due to moving the chicken tractors daily.

It should be noted, however, that the MSP study participant who tracked her hours was a trainee tending her first flock and not necessarily representative of the time invested by others at MSP. Bob Kell, training director at Main Street Project, reported that more experienced growers are more efficient and spend an average of 125 hours tending their flocks per batch and managing their operation, which would further increase the return to labor.

## Other benefits of pastured poultry production

The scope of this analysis focused only on the economic value of broilers, but other important reasons also motivate operators to undertake a pastured poultry enterprise. For example, the production system developed by MSP is intended for perennial crops, such as hazelnuts, to grow in the paddocks. During the 2015 season, one of MSP's paddocks had hazelnuts growing. While these perennial crops have an obvious monetary value, they were not incorporated into this particular analysis. Likewise, both enterprise systems have the added benefit of capturing fertility from the broilers. This fertility has monetary and biological value for future crops, but it was also not included in this analysis. Lastly, operators in both systems raised their poultry in pastures for the health and well-being of the animals, which is a system trait difficult to quantify.

## FUTURE RESEARCH

Future financial and marketing research regarding pastured poultry should consider the following:

- Activities and facility modifications that maximize the efficiency of broiler care.
- How the measurement of broiler activity and exercise affects butcher weight.
- The increase in the value of ancillary crops due to fertility inputs from broilers.