

# Cost of Production Comparisons from Three Different Cow-Calf Systems in Iowa

## A.S. Leaflet R3313

Denise Schwab, Joe Sellers, Russ Euken, ISU Extension  
Livestock Specialists

### Summary and Implications

This project was designed to evaluate cow herd cost of production based on three different systems. Outcomes from this project were consistent with prior production cost reports, including large variation in production costs among all beef herds, regardless of system type. Feed cost represents roughly half of the direct (cash) production costs. All three systems have the potential to be low cost operations provided managers optimize feed and ownership costs. There are potential economies of scale benefits to all three system types. The most important implication is the importance of producers keeping and analyzing their own costs. Even with 62 records, this is still a limited dataset and simply represents 24 operations over the three years of the project (2015-2017).

Additional details on the full project can be found in the *Iowa Cow-Calf Production-Exploring Different Management Systems* available at [www.store.extension.iastate.edu](http://www.store.extension.iastate.edu).

### Introduction

This project was designed to identify cow herd production costs from Iowa cow-calf operations based on three production systems. Twenty-four producers from across the state partnered with the Iowa Beef Center at Iowa State University to collect and summarize direct and indirect production costs. Cooperating producers were categorized into one of three production management systems: 1. limited or no grazing (grazing less than 25 percent of the year), 2. traditional grazing (grazing approximately 50 percent of the year); or 3. extensive grazing (grazing 75 percent or more of the year).

### Materials and Methods

Twenty-four cooperators submitted enterprise records of their cow herd over the three years of the project (2015, 2016, and 2017). Eighteen cooperators completed all three years of the project and 6 cooperators participated for one or two years. Each year for every cooperator was considered a separate record. In total 62 herd years of data, or annual records, were available for comparison. There were 21 herd years of limited grazing records, 28 traditional grazing and 13 extended grazing.

Cooperators provided cow herd inventory, feed usage and costs, operating costs, machinery and building values, and completed two questionnaires throughout the project related to their management practices. As is typical for many cow calf operations some of the data is an estimation, particularly on feed quantities that are not weighed when delivered and costs that are allocated among various enterprises like equipment costs. All costs were calculated per breeding female, which included all cows and replacement heifers, and averaged for the beginning and ending inventory. Bulls were not included in the breeding female numbers, but the costs for bulls was included.

There are many ways to calculate ownership or indirect costs. For the operations in this project depreciable assets like buildings and equipment were valued at a current market value. For machinery or equipment that is used for other purposes in addition to the cow herd the value allocated to the cow herd was calculated by taking the value multiplied by an estimated percent use in the cow herd. Machinery and equipment used for feed harvest was not included with the assumption that machinery was reflected in the cost of the home raised feedstuffs.

The annual ownership cost which would represent depreciation and an opportunity cost on the value of the asset was calculated by taking the value times a percentage. No salvage value for the asset was used in the calculation. For machinery and equipment a 10% factor was used and for buildings a 7% factor was used.

For breeding stock, either the value the cooperators reported for breeding stock or an assigned value from published ISU Ag Decision Maker Closing Inventory Prices was used and multiplied by 10% to calculate an annual cost representing depreciation and opportunity costs on the breeding stock investment. While this category is titled depreciation, it is really a broader component of total ownership costs which would include components of tax depreciation, interest, annual repairs, value depreciation, etc.

### Results and Discussion

Table 1 shows the average and the range of total cost of production including a cost for asset ownership and unpaid labor for all records and by system. As in previous beef cow summaries there is large variability in costs but the averages do provide some evidence of key differences in costs. On average, limit grazed herds had the highest cost of production in this project, followed by traditional herds, and extensive grazed herds had the lowest cost.

**Feed Costs:** Many prior studies of cow-calf costs report feed costs are the single largest cost for beef cow-calf producers, and this project also supports this. A 13-year summary of the ISU Beef Cow Business Records in 1997 and the Kansas Farm Business records summary from 2012-2016 both showed that feed and pasture cost accounted for 48% of total cost of production. In this project total feed cost across all systems was 63% of direct (cash) costs and 39% of total costs.

Cooperators were asked to put a market value on the feedstuffs produced on farm instead of the production cost.

Feed costs are separated into three categories – “stored”, “pasture”, and “residue grazing”, where “stored” basically represents all “non-pasture” feed costs (i.e., hay, supplements, harvested crop residues, grain, etc.) and “residue grazing” includes both crop residue and cover crops grazed.

Feed cost for limited grazing operations was higher than that of traditional operations, and the lowest cost was extensive grazing operations. Half of the limited grazing production systems reported a creep feed cost (\$112 per female per year), one-third of the traditional herds fed creep feed, while none of the extensive grazing cooperators fed creep feed. Where creep feed was fed the cost was included in the stored feed category and charged against the cow herd. Post weaning feed and costs were not included in any cow herd costs.

Pasture costs were calculated based on the rent actually paid or ownership costs provided by the cooperator. Actual reported pasture costs ranged from a low of \$42 per female per year to a high of \$482 per female per year. The average annual pasture cost per female was \$117 per female per year. The average number of pasture acres per female was 1.8 acres for traditional grazing operations and 4.0 acres per female for the extensive grazing operations reflecting the increased pasture needed for extended grazing. Grazing operations in the north half of the state averaged 1.6 acres per female, and those in the southern half of the state average 2.7 acres of pasture per cow, which is consistent with a recent statewide survey conducted by the Iowa Beef Center of rented pastureland. This survey reported an average stocking density of 2.1 acres per cow-calf pair per grazing season with a range from 1.0 to 3.2 acres per pair (Jamison et al., 2018), with an average pasture rental rate of \$58/acre, and an average annual pasture cost per female of \$122.

Grazing of crop residue or cover crops can help control feed costs. The 15 cooperators who grazed crop residue grazed an average of 59 days at a cost of \$12/female or only \$0.20/female/day. Some of the cooperators did not graze crop residue because they simply didn't have any in their region.

When the cost of residue grazing is added to the feed and pasture cost, the average total feed cost was \$430 per female per year across all cow-calf systems.

**Herd size and feed costs:** There was about a \$60 difference in stored feed costs based on herd size. The average cow herd size in this data set was 196, so records with less than 200 cows (38 records) were compared against records with more than 200 cows (24 records) in Table 2

Table 2 also compares feed and pasture costs for those herds in the cornbelt region (northern Iowa) versus the grassland region (southern Iowa). Twenty three of the records were from operations north of Interstate 80 which was labeled the cornbelt of Iowa, and 39 records were from south of I-80 labeled as the grassland of Iowa. Stored feed costs were higher in the cornbelt region where many producers feed more harvested feed. The data also showed higher pasture cost per female for the grassland areas, where pasture and land rent is generally less expensive, but where more pasture acres and grazing days are available. Also more than half of the northern records were limit grazed operations with no pasture costs. The key message is that both northern and southern herds had about the same total feed costs.

**Non-Feed Operating Costs:** The average of total non-feed costs did not vary significantly by system, but the components of operating cost did. Custom and hired labor and benefits was the largest non-feed expense for the limited grazing and traditional grazing systems but much smaller for the extensive grazing systems. Across all systems, veterinary medicine was the next largest expense averaging \$43 per female per year. There was less variation across systems in vet costs, although there was still much variation between producers. Other operating costs tended to vary by system. For the limited grazing systems, bedding and maintenance & repairs tended to be higher than in other systems. Traditional grazing and extensive grazing systems have higher expenses in pasture related costs such as fencing, fertilizer, seed, lime and herbicides. Again there was a large range in non-feed operating costs reported with a low of \$118 per female per year to \$744 per female per year across all operations.

In this project, those herds with more than 200 cows had a \$26 lower non-feed operating cost per female compared to herds with less than 200 cows. Two of the biggest differences are supplies and miscellaneous, where small operations have fewer cows to disburse the expense across. Larger herds had higher rent (other than pasture rent), hired or custom labor, fuel, and veterinary costs.

Operating cost differences by region was very similar in most categories, but again slightly higher prices in those general categories that are likely attributed to fewer enterprises to allocate general expense against, therefore

most general operating expenses were charged to the cow enterprise.

**Cost of Asset Ownership:** Table 5 shows the asset valuation and annual costs per cow overall and by system type and size of operation. On average limited grazing systems had higher machinery and building values and annual costs which would reflect newer buildings and more equipment for feeding and manure handling. But again we saw huge variation depending on the amount and age of iron, and other enterprises that share the machinery costs. On breeding stock value and annual cost it should be noted that some operations had much higher breeding stock value than others. Those were typically seedstock operations or other value added operations many of which were in the limited grazing category. Herd size also had a significant impact on machinery/equipment and building ownership costs, nearly doubling that expense in small herds. A minimum amount of tractor power, manure spreader and feeding equipment is required regardless of herd size, making a much larger impact on smaller operations.

**Labor:** Most operations in this project relied on family labor for the cow herd, although some operations had paid labor. Several cooperators recorded hours for short periods throughout the year and those were extrapolated for an annual labor amount. Family labor hours were charged at \$14 per hour. Those operations with hired labor reported that cost of labor as a cash operating expense as included in the direct costs. Limited grazing systems reported 9 hours of labor per female, traditional systems reported 11 and extended grazing systems averaged 10. Herds with less than 200 cows average 12 hours per female and herds with more than 200 cows averaged 8 hours.

The ISU Ag Decision Maker Livestock Enterprise Budgets use an estimate of 8 hours of labor per cow. The overall average of 10 hours of total labor per cow per year did not vary greatly by system but there was a large range from 2 to 22 hours reported per cow. That probably reflects the difficulty in tracking and allocating labor used across enterprises. The range in labor by cow herd size could reflect that for some tasks it takes about the same time requirement for a larger number as it does a smaller number.

**BMP's & Low-Cost Producers:** The key to profitability is not necessarily knowing an average cost of a group of producers, but understanding what makes them low-cost and establishing targets for individual operations. Many production record datasets separate the top and bottom third of operations to make some comparisons. Table 6 shows the cost comparison of all operations in this dataset, the 21 records with the lowest

direct cost per cow per year, and the 21 records with the highest direct costs. Records from all three production systems were included in both the low-cost and high-costs groups, indicating that management is more strongly associated with cost than is system type.

Remember these observations are based on the limited operations included in this project, and thus may not be reflective of all operations. There was a large range in costs regardless of herd size which is consistent with the 1997 ISU Beef Cow Business Record summary.

The low cost group averaged \$163 per female per year for stored feed and \$123 for pasture for a total feed cost of \$292 per female per year. All used some form of hay as the base for their feed program, although several used more haylage or baleage rather than dry hay as the foundation. All herds utilized additional feedstuffs to keep the ration cost effective, with most using corn silage (78%) or small grain silage (39%), and 61% used a corn co-product. Surprisingly, only 2 utilized corn stover in the ration. All provided a mineral supplement, averaging \$32 per female in salt and mineral. Only 9 of the 23 low cost records (39%) provided creep feed, at a cost of \$13 per female. Low cost producers provided an average of 3676 pounds of stored feed per female on a dry matter basis, ranging from 951 to 7196 pounds. This is considerably lower than the overall average of 6626 pounds of stored feed on a dry matter basis. This stored feed savings could be attributed to several management practices including extending the grazing season, limit feeding more nutrient dense rations, or reducing feed waste. Most of these low cost operations also utilized pasture grazing to a large extent, with an average of 2.3 acres per female and a pasture cost of \$123 per female per year. Seventy percent of low cost operations utilized crop residue grazing to help control costs. Many of the low cost operations also have multiple cattle enterprises such as feedyards or background calves, allowing them to take advantage of large quantities of inexpensive feeds, and to share the use of a feed wagon and tractor, spreader, and other equipment.

These low cost operations also had lower non-feed operating costs which are shown in Table 7. The majority of the savings came from lower labor, supplies and miscellaneous expenses. These savings may be a result of economies of scale, or from diversification of the operation.

While the low cost records were identified based on direct costs, these same operations also had lower than average indirect costs particularly looking at the machinery and building assets which is shown in Table 8. With lower asset valuation in the low cost group, these operations may have older facilities and older or less equipment. The annual cost difference between the low cost group and overall is about \$100 per cow emphasizing the importance of controlling investments and fixed costs.

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**Table 1. Production costs per female**

	All records		Limited grazing		Traditional grazing		Extensive grazing	
	Avg.	Range	Avg.	Range	Avg.	Range	Avg.	Range
Direct costs								
Stored feed	\$306	\$45-955	\$543	\$318-955	\$217	\$59-375	\$118	\$45-192
Pasture	\$117	\$0-482	\$22	\$0-108	\$149	\$42-482	\$203	\$93-324
Residue	\$6	\$0-82	\$1	\$0-11	\$12	\$0-82	\$2	\$0-7
Total feed	\$430	\$167-955	\$566	\$322-955	\$378	\$167-857	\$323	\$192-520
Operating <sup>1</sup>	\$254	\$118-744	\$248	\$133-400	\$274	\$118-744	\$218	\$133-306
Indirect Costs								
Ownership	\$286	\$509-1059	\$443	\$195-1059	\$210	\$142-333	\$195	\$140-245
Unpaid family labor	\$116	\$0-313	\$97	\$0-218	\$121	\$22-313	\$135	\$92-221
Total cost/female	\$1095	\$615-2340	\$1353	\$909-2340	\$984	\$615-1978	\$869	\$746-1017

<sup>1</sup>Non-feed

**Table 2. Feed costs by herd size and region**

	Average all records	<200 cows	>200 cows	Cornbelt	Grassland
Stored feed costs	\$306	\$330	\$269	\$363	\$273
Pasture costs	\$117	\$123	\$108	\$62	\$150
Residue cost	\$6	\$8	\$3	\$4	\$8
Total feed cost	\$430	\$461	\$381	\$429	\$431

**Table 3. Non-feed operating costs by system**

	Average all records	Limited grazing	Traditional grazing	Extended grazing
Bedding	\$22	\$25	\$19	\$17
Custom, contract, and hired labor	\$108	\$140	\$100	\$21
Pasture fence, fertilizer, and seed	\$39	\$12	\$47	\$25
Cattle supplies and general supplies <sup>1</sup>	\$28	\$21	\$39	\$16
Fuel, oil, and gas <sup>1</sup>	\$20	\$23	\$18	\$22
Insurance <sup>1</sup>	\$21	\$21	\$21	\$20
Maintenance and repairs <sup>1</sup>	\$24	\$29	\$23	\$17
Rent expense	\$29	\$0	\$34	\$22
Semen and AI supplies	\$24	\$22	\$24	\$27
Taxes <sup>1</sup>	\$19	\$5	\$22	\$34
Trucking and feed processing	\$7	\$9	\$6	\$6
Utilities <sup>1</sup>	\$11	\$8	\$11	\$20
Veterinary and medical supplies	\$43	\$49	\$32	\$55
Dues, subscriptions, and misc.	\$46	\$36	\$45	\$19
Total	\$253	\$248	\$274	\$216

<sup>1</sup>Cow herd share

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**Table 4 Non-feed operating costs by herd size and region**

	<200 cows <sup>1</sup>	>200 cows <sup>2</sup>	Cornbelt	Grassland
Bedding	\$20	\$22	\$12	\$28
Custom, contract, and hired labor	\$102	\$101	\$140	\$69
Pasture fence, fertilizer, and seed	\$45	\$31	\$31	\$41
Cattle Supplies and general supplies <sup>3</sup>	\$37	\$9	\$18	\$31
Fuel, oil, and gas <sup>3</sup>	\$19	\$22	\$21	\$20
Insurance <sup>3</sup>	\$21	\$20	\$23	\$20
Maintenance and repairs <sup>3</sup>	\$27	\$19	\$29	\$21
Rent expense	\$32	\$14	\$14	\$32
Semen and AI supplies	\$26	\$22	\$20	\$27
Taxes <sup>3</sup>	\$24	\$13	\$8	\$21
Trucking and feed processing	\$8	\$5	\$10	\$6
Utilities <sup>3</sup>	\$16	\$7	\$8	\$15
Veterinary and medical supplies	\$42	\$42	\$43	\$41
Dues, subscriptions and misc.	\$58	\$30	\$27	\$53
<b>Total</b>	<b>\$268</b>	<b>\$231</b>	<b>\$220</b>	<b>\$268</b>

<sup>1</sup>n=38

<sup>2</sup>n=24

<sup>3</sup>Cow herd share

**Table 5. Asset value and ownership costs per cow**

	Average all records	Limited grazing	Traditional grazing	Extensive grazing	Records <200 cows	Records >200 cows
Average breeding female value	\$1,758	\$2,113	\$1,615	\$1,496	\$1,863	\$1,593
Machinery value/cow	\$691	\$1,243	\$398	\$431	\$773	\$562
Building value/cow	\$583	\$1,531	\$126	\$37	\$727	\$356
Cow herd depreciation (10%) <sup>1</sup>	\$176	\$211	\$161	\$186	\$186	\$158
Machinery depreciation	\$69	\$124	\$40	\$43	\$77	\$56
Building depreciation	\$41	\$107	\$9	\$3	\$51	\$25

<sup>1</sup>Value based on producers' valuation

**Table 6. Average costs for low cost operations**

	Average all records	Average of low cost records <sup>1</sup>	Average of low cost using standardized feed value <sup>1</sup>
Stored feed cost	\$306	\$163	\$179
Pasture cost	\$117	\$123	\$136
Residue cost	\$6	\$6	
Total feed cost	\$430	\$292	
Non-feed operating cost	\$254	\$201	
Depreciation	\$295	\$212	
Unpaid family labor	\$116	\$112	
Total cost/female	\$1095	\$816	

<sup>1</sup>n=23

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**Table 7. Non-feed operating costs of all records versus low cost records**

	Average all records	Low cost records
Bedding	\$21	\$22
Custom hire and contract labor	\$104	\$63
Pasture fence, fertilizer, and seed	\$39	\$31
Cattle supplies and general supplies <sup>1</sup>	\$28	\$14
Fuel, oil, and gas <sup>1</sup>	\$20	\$16
Insurance <sup>1</sup>	\$21	\$21
Maintenance and repairs <sup>1</sup>	\$24	\$14
Rent expense	\$29	\$0
Semen and AI supplies	\$24	\$22
Taxes <sup>1</sup>	\$19	\$20
Trucking and feed processing	\$7	\$5
Utilities <sup>1</sup>	\$12	\$10
Veterinary and medical supplies	\$42	\$37
Dues, subscriptions, and misc.	\$48	\$21
<b>Total</b>	<b>\$254</b>	<b>\$201</b>

<sup>1</sup>Cow herd share

**Table 8. Comparison of indirect costs of all records versus low cost records**

	Average all records	Low cost records
Average breeding female value	\$1,758	\$1,454
Machinery value/cow	\$691	\$346
Building value/cow	\$583	\$85
Cow herd depreciation (10%) <sup>1</sup>	\$176	\$145
Machinery depreciation	\$69	\$35
Building depreciation	\$41	\$6
Unpaid family labor	\$126	\$112

<sup>1</sup>Value based on producers' valuation

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