



# managed grazing for dairy profits

## Profitability Centers on Managed Grazing Dairies

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### The Purpose and Some Background on the Study:

In 2017 the Green Lands Blue Waters Perennial Forage Working Group teamed up with Dairy Grazing Apprenticeship, Inc. on a project titled “Testing Reduction of Dairy Financial Risk Through Grazing and Insurance” (funded by a grant from the United States Department of Agriculture Risk Management Education Partnership Program). The objective of the project was to determine input categories that grazing dairies use to reduce overall costs and improve net profit. The project also looked at the potential for using the USDA-RMA Pasture, Rangeland, Forage Pilot Insurance Program to help mitigate some of the risk associated with feeding the dairy herd.

In order to determine the cost of production portion of the project, seven dairy farms from the upper Mississippi watershed (Minnesota, Wisconsin, Iowa and Illinois) that have had a history of effectively using MiG with their dairy herds agreed to share their 2017 cost of production information

and have it pooled with the other six farms in the study. The average of those seven farms was then compared to dairy farm benchmark numbers of dairy farms of similar size from one of the benchmarking sources commonly used in the upper Midwest, the Wisconsin Agricultural Financial Advisor (AgFA) program managed by the University of Wisconsin Center for Dairy Profitability (CDP), <https://cdp.wisc.edu/agfa-farmbench>. Neither the farms in this project, nor those involved in the benchmark database were randomly selected so the results cannot be extrapolated to grazing dairy farms in general but they do give an indication of which categories of inputs have the greatest potential to be minimized on grazing dairies and what the trade-offs may be for different cost reduction strategies.

### How the Study was Done:

The data collection methodology and software used for this project was the same for all seven farms. Project partners in each of the four states agreed to collect the 2017 tax return information (Form 1040F) and any changes during

the year in the value of livestock, feed on hand and current asset and liability accounts providing an accrual adjustment to the cash accounting typically used in farming. There was one farm from Illinois, one from Iowa, two from Wisconsin and three from Minnesota. These numbers were then entered into a common Excel spreadsheet input sheet that fed into two reports; a Cost of Producing Milk per Hundredweight Equivalent (CWT EQ) originally created by University of Wisconsin Extension Economist Gary Frank (Spreadsheets 1&2), and a dairy enterprise budget



which can be used to do financial projections using the Center for Farm Financial Management (CFFM) FINPACK farm financial analysis and planning software (Table 1) that compares the numbers on a per cow basis. The CWT EQ spreadsheet is an example of handy tool that has been used for a number of years in Wisconsin for comparing benchmark numbers with a farmer's personal records.

An important part of this analysis was comparing how the dairy graziers involved in the project compared to their contemporaries around the country using data from the AgFA financial benchmarks at the University of Wisconsin. Each year farm financial advisors and tax preparers from around the country, but primarily in Wisconsin for the AgFA database, enter farm financial information in the UW-Madison Center for Dairy Profitability (CDP) online AgFA program. From this data the CDP is able to develop financial benchmarks that anyone can access online, modifying a variety of parameters they may be interested in looking at, including farm size and production. (It should

be noted that the AgFA program is in the process of being changed for 2018 and more information can be found at <https://cdp.wisc.edu/agfa-farmbench>). The University of Minnesota CFFM offers a similar analysis but it was decided to work with the CDP program for this project. For this analysis the only criteria that was used in selecting the benchmark farms was herd size. The volunteer farms in the study ranged from 45 to 288 cows so an upper limit of 350 cows was used in selecting the benchmark farms. AgFA also uses three years of data in creating benchmarks so the numbers included are from the 2015 (292 records), 2016 (273 records) and 2017 (166 records) tax years, totaling 731 farm records.

To protect the participating farmers' privacy, only the averages of the seven farms have been used. While this method masks the differences between the farms that may provide some useful "lessons learned" information, it does smooth out those differences, essentially doing the same thing the benchmark numbers do.

Notes on the Cost of Producing Milk per Hundredweight Equivalent (CWT EQ) spreadsheets and comparison table:

- The per CWT EQ used as the divisor in the calculations is made up of all of the income on the dairy farms, including cull cows, calves, other income and any accrual adjustments for feed and livestock inventory over the years in question. The spreadsheet was originally developed to help dairy farmers determine how to contract the sale of their milk on farms that get nearly all of their income from the dairy herd. As the developer, Gary Frank notes in his description of the methodology, "The most meaningful divisor when calculating cost of milk production on a dairy-crop is an output (income) equivalent unit. This measure is calculated by summing the income from the sale of all products produced on the farm and then dividing by the price of milk. The resulting value is the milk production (hundredweight) required to generate an equivalent income. That is, if the farm produced only milk, how much milk would it have had to produce in order to have an identical income?" Frank goes on to note that "This method does not generate satisfactory results when cropping enterprises income exceeds 20

percent of total income.” None of the farms used in any of our benchmarks or on the dairy graziers’ farms exceeded the 20 percent level.

- The Basic Cost per CWT EQ does not include depreciation claimed, interest and wages & benefits paid; those are added back in for the Total Allocated Costs calculation. The Basic Cost per CWT EQ amount is comparable to the “cost of goods sold” used in other businesses.
- Very few dairy farms keep track of financial information related to their youngstock so all costs (vet, feed, etc.) are counted against the dairy cow and income is entered as supplemental income.

## What We Discovered:

### In What Ways do Graziers Reduce their Financial Risk?

The one glaring difference between the AgFA benchmark farms and the sample farms in our study is the Net Farm Profit in lines 36 of both Spreadsheets 1 and 2. The sample farms were 10 times more profitable than the benchmark farms, at \$49,156 compared to \$4,824, with that improved profitability coming from a few areas where graziers tend to do a bit better than dairy farmers in general.

One area of competitive advantage is in savings on anything related to crop production costs. The sample of graziers in our study spent less money on chemicals, fertilizer, seeds and plants purchased and farmland rent. Those four categories combined came to \$1.19 per CWT EQ, or \$32,545, for the sample farms and \$2.28, or \$82,286, for the benchmark farms; a \$49,741.00 difference. This is very similar to what Kriegl found in his study where graziers spent 6.56% of their income on these line items while confinement dairies spent 10.07%.

Other line items where graziers tend to do better than the industry in general are those related to overall animal health and longevity. For health, our sample farms spent about \$0.39 per CWT EQ on Veterinary, breeding and medicine, or \$10,631, compared to the benchmark farms at \$0.68 per CWT EQ, or \$24,403; a difference of \$13,722 in

favor of the sample farms. This also agrees with the Kriegl numbers where he found that graziers spent about 1.86% of their income on Vet and Breeding costs while confinement dairies spent 2.74%.

For an indication of longevity and retention, its common to look at two different line items; Form 4797 income, which is the sale of breeding animals, and Livestock Depreciation, which is an indication of the money spent on replacement breeding animals. In our study the graziers did better than



the benchmark farms in both categories. They had nothing to claim for livestock depreciation, which meant they didn't have to buy any breeding animals, compared to \$0.20 per CWT EQ, or \$7,097 for the benchmark farms. At the same time they were able to sell more breeding stock, bringing in \$40,857 compared to \$33,583 for the benchmark farm, a \$7,274 improvement. Combining those two line items improves the sample farms bottom line by \$14,371. This too is similar to what Kriegl found from a depreciation perspective. In his study he found that spent 0.75% of their income on livestock depreciation compared to 2.15% for the confinement dairies.

And finally, where the difference between our sample grazing farms and the much more capital intensive conventional dairies really shows up is in the depreciation related to equipment and buildings, line 16 - Total Depreciation, in both Spreadsheets 1 and 2. For the sample farms, there was no Livestock Depreciation so the Total Depreciation line is only for equipment and building

depreciation, which came in at \$0.91 per CWT EQ, or \$24,994. At the same time, the benchmark farms claimed \$2.00 per CWT EQ, or \$72,557, for depreciation. Although the depreciation line item is made up of the money spent on buildings and equipment over a longer period of time, it is money that went out the door at some time, \$47,564 more dollars for the benchmark farms than our grazing sample. This is different than what Kriegl found. In his study, the graziers spent about 10.58% of their income on non-livestock depreciation while the confinement dairies



claimed 10.82%, nearly identical. Where Kriegl's study looked at all of the grazing dairies in the AgFA database over 16 years, our study did select farms that had been in business for a while and were what could be referred to as "depreciated out".

## Are Feed Costs Lower?

Like most economic studies, the answer to the question as to whether or not graziers spend less money on feed, or any line item for that matter, than the average dairy farm in their neighborhood starts with an "it depends". But, before discussing the difference between the AgFA benchmark farms and our seven selected grazing farm lets first take a look at how the AgFA dairies did. Spreadsheet 1 contains the Cost per CWT EQ results using the numbers received from AgFA when it was asked to provide the benchmark data from all of the dairies in its database for the years 2015, 16 and 17 with a herd size range of 10-350 cows. The report included data from 731 farm records over those 3 years and included all dairies regardless of production

system or whether or not they were organic. The herds included in that summary had about 119 cows on average and produced about 23,364 pounds of milk per cow. They purchased \$139,600 worth of feed, which came out to \$3.86 per CWT EQ. The average price they received for their milk was \$17.58 and their basic cost per CWT EQ to produce that milk was \$11.83 leaving them with \$5.75, or \$1,745 per cow, to spend on everything else.

The reason for the "it depends" answer to the question as to whether or not dairy graziers spend less money on feed than their dairying neighbors can be found in Spreadsheet 2 and Table 1. In terms of total feed costs per farm, they are almost the same. Our seven farms spent, on average, \$136,797 on feed in 2017 compared to the benchmark farms of \$139,600, so slightly less. The seven farms also spent less per cow on feed. While the benchmark farms spent about \$1173.11 on feed, our graziers averaged \$907.69, or 22.6% less (Table 1). On the other hand, this is where the "it depends" comes in, on a per CWT EQ of milk sold basis, the graziers spent nearly 30% more on purchased feed than their counterparts. The seven farm average came in at about \$5.00 per CWT EQ while the benchmark farms were at \$3.86, and the reason for this difference is pretty simple. The grazing herds produced one third less milk per cow, 15,058 pounds compared to 23,364 (Table 1). That same trend carries over into other line items as well so when looking at the basic costs per CWT EQ the graziers spent about \$13.40 to produce a hundred pounds of milk equivalent compared to \$11.83 for the benchmark farms. Even after adding in all of the allocated costs, which would include interest, labor and depreciation, the seven farms spent 9.5% more per CWT EQ, \$17.96 compared to \$16.41, than the benchmark farms.

The results of this small study are very similar to what other studies have found out. In a 16 year study performed by Tom Kriegl at the University of Wisconsin CDP<sup>1</sup>, using the AgFA database, he found that percent of income spent on feed for grazing herds was about 23.57% while the confinement herds in the study spent about 22.67%. He also found similar results on a per cow basis where the graziers

<sup>1</sup> Kriegl, T.S., "The Financial Performance of Wisconsin Grazing, Organic and Confinement Dairy Farms from 1999-2014", University of Wisconsin Center for Dairy Profitability, University of Wisconsin-Extension, Madison, WI, December 2015

spent \$771.38 compared to \$1,009.08 for confinement herds, or 24% less, which is very similar to the difference seen in our study of 22.6% less.

A University of Minnesota study (<http://www.extension.umn.edu/agriculture/dairy/grazing-systems/grazing-and-confinement-returns>) found similar results when looking at them from a cost per hundred weight basis. The graziers in their study spent about 39% of the price they received for their product on purchased feed costs, \$5.50 feed costs per CWT compared to a price of \$14.08, while the confinement herds spent slightly less at 37.93%, or \$5.24 per CWT out of their milk income of \$13.81 per CWT. The Minnesota study also found that about 50% of the total expenses on a per CWT basis could be attributed to purchased feed costs for both confinement and grazing farms.

So the “it depends” has to do with the question that is asked. Do graziers spend less on purchased feed than the industry in general? The answer is definitely yes if you are looking at a per cow basis. It is a maybe if you are looking at things from a whole farm perspective. But, if you are looking at it in relation to the product that is sold, the answer is a no. Feed costs are lower but so is milk production per cow so the cost per product sold is higher. What that means is graziers focus on a range of cost savings across all of their other expenses to achieve profitability. And which of those items is very dependent

on a particular farm’s situation. The study did find quite a bit of variation between the farms on all of the line items, including feed cost (which ranged from \$1.34 per CWT EQ for a well-established herd to \$11.11 for one converting to organic) so while the study finds some trends, every farm needs to look at its own situation. One of the things that this and the studies that were referenced do make clear is that looking at the amount of a particular item in total is not as meaningful from a management standpoint as relating it to the value of the products sold. It may not do much good to cut an important item related to production, such as feed costs, to reduce total costs if it negatively impacts the amount and quality of the final product. And because the cost of feed is clearly the largest single expense item per hundredweight of product sold, finding ways to mitigate the impact of increases in feed costs caused by weather or markets are definitely worth exploring.

So what is the bottom line? Graziers do spend as much if not more on feed as conventional dairies but where they make up the difference is in lower cropping costs, less money spent on housing and managing the herd, and having animals that are healthier and stay in the herd longer, all of which come at a lower cost. That is the competitive advantage for grazing dairies.

SPREADSHEET 1:

# AgFA BENCHMARK FARMS

## Cost of Producing Milk

per

### Hundredweight Equivalent (CWT EQ)

Name: 2015-17 AgFA Dairy Farms, 1-350 Cows

Average Number of Cows in Herd 119

Total Schedule F Income	\$593,185
Form 4797 Income	\$33,583
Change in Feed Inventories	\$4,487
Change in Breeding Livestock Inv.	\$4,654
Chg in Other Current Assets	(\$774)
Total Farm Income	\$635,135

Average Milk Price	\$17.58
Total Schedule F Expenses	\$588,361
Change in Accouts Payable	(\$315)
Change in Prepaid Expenses	\$4,718
Total Allocated Costs	\$592,764

Total Interest Paid	\$24,940
Wages & Benefits Paid	\$60,664
Depreciation Claimed	\$79,654

Schedule F input form and footnotes are below.

BASIC COST per CWT EQ
<b>\$11.83</b>

Avg Basic Cost 2015-17, 731 farm records, 10 to 350 cows = \$11.83

Total \$'s available for non-basic costs	\$207,629	per cow	<b>\$ 1,745</b>
Total Allocated Costs per CWT EQ		Goal=\$1,200	
Total \$'s available for all unallocated costs			<b>\$42,371</b>

Opportunity Cost of operator and operator family's labor and management **\$39,132**  
 Dollars of Wages and Benefits shown on Schedule F that were paid to family members **\$8,480**

Total Allocated plus unpaid labor and management costs per CWT EQ	<b>\$17.25</b>
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Income (From Schedule F)

1 Sales of livestock and other items you bought for resale	\$1,917
2 Cost or other basis of livestock and other items reported on line 1	\$0
3 Subtract line 2 from line 1	\$1,917
4 Sales of livestock, produce, grains, and other products you raised minus 4797 income	\$556,361
5a Total cooperative distributions	\$6,646
6a Agricultural program payments	\$8,852
7 Commodity Credit Corporation (CCC) Loans	\$0
8 Crop insurance proceeds and certain disaster payments	\$3,047
9 Custom hire (machine work) income	\$6,473
10 Other income, including Federal and state gasoline or fule tax credit or refund	\$9,889
11 Gross Income. Add amounts in the right column for lines 3 through 10	\$593,185

Your cost \*\*\* Not correct if all income has not been entered.\*\*\*  
 Per Cwt Eq AgFA 2015-17

Expense (From Schedule F)	Your cost	AgFA 2015-17
12 Car and truck expenses	\$2,594	\$0.07
13 Chemicals	\$9,698	\$0.27
14 Conservation expenses	\$86	\$0.00
15 Custom hire (machine work)	\$26,471	\$0.73
16 Total Depreciation	\$79,654	\$2.20
16A Lstock Depreciation	\$7,097	\$0.20
17 Employee benefit programs	\$9,972	\$0.28
18 Feed purchased	\$139,600	\$3.86
19 Fertilizers and lime	\$23,657	\$0.65
20 Freight and trucking	\$6,517	\$0.18
21 Gasoline, fuel, and oil	\$16,111	\$0.45
22 Insurance (other than health)	\$10,566	\$0.29
23a Mortgage interest	\$9,915	\$0.27
23b Other interest	\$15,025	\$0.42

Your cost  
 Per Cwt Eq AgFA 2015-17

24 Labor hired	\$50,642	\$1.40
25 Pension and profit sharing	\$50	\$0.00
26a Rent or lease (equipment)	\$2,517	\$0.07
26b Rent or lease (other)	\$25,585	\$0.71
27 Repairs and maintenance	\$35,083	\$0.97
28 Seeds and plants purchased	\$23,346	\$0.65
29 Storage and warehousing	\$126	\$0.00
30 Supplies purchased	\$18,923	\$0.52
31 Taxes	\$5,765	\$0.16
32 Utilities	\$15,673	\$0.43
33 Veterinary, breeding, medicine	\$24,403	\$0.68
34 Other expenses	\$36,382	\$1.01

35 Total expenses. Add lines 12 through 34	\$588,361
36 Net farm profit or (loss). Subtract line 35 from line 11	\$4,824

**SPREADSHEET 2:**

# SEVEN FARM AVERAGE COST PER CWT EQ

## Cost of Producing Milk per Hundredweight Equivalent (CWT EQ)

Name: **Seven Farm Average**

Average Number of Cows in Herd **151**

Total Schedule F Income	\$540,695
Form 4797 Income	\$40,857
Change in Feed Inventories	\$10,914
Change in Breeding Livestock Inv.	(\$13,240)
Chg in Other Current Assets	(\$7,032)
<b>Total Farm Income</b>	<b>\$572,194</b>

Average Milk Price	\$20.91
Total Schedule F Expenses	\$491,539
Change in Accouts Payable	\$0
Change in Prepaid Expenses	(\$170)
<b>Total Allocated Costs</b>	<b>\$491,709</b>

Total Interest Paid	\$25,298
Wages & Benefits Paid	\$82,964
Depreciation Claimed	\$24,994

*Schedule F input form and footnotes are below.*

<b>BASIC COST per CWT EQ</b>
<b>\$13.10</b>

Avg Basic Cost 2015-17, 731 farm records, 10 to 350 cows = \$11.83

Total \$'s available for non-basic costs	\$213,741	per cow	\$ 1,418
Total Allocated Costs per CWT EQ	\$17.96	Goal=\$1,200	
Total \$'s available for all unallocated costs	\$80,485		

Opportunity Cost of operator and operator family's labor and management **\$39,132**  
Dollars of Wages and Benefits shown on Schedule F that were paid to family members **\$17,879**

Total Allocated plus unpaid labor and management costs per CWT EQ	<b>\$18.74</b>
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**Income (From Schedule F)**

1 Sales of livestock and other items you bought for resale . . . . .	\$0
2 Cost or other basis of livestock and other items reported on line 1 . . . . .	\$0
3 Subtract line 2 from line 1 . . . . .	\$0
4 Sales of livestock, produce, grains, and other products you raised . . . . .	\$509,675
5a Total cooperative distributions . . . . .	\$3,567
6a Agricultural program payments . . . . .	\$6,672
7 Commodity Credit Corporation (CCC) Loans . . . . .	\$0
8 Crop insurance proceeds and certain disaster payments . . . . .	\$1,044
9 Custom hire (machine work) income . . . . .	\$193
10 Other income, including Federal and state gasoline or fule tax credit or refund . . . . .	\$19,544
<b>11 Gross Income. Add amounts in the right column for lines 3 through 10. . . . .</b>	<b>\$540,695</b>

Your cost \*\*\* Not correct if all income has not been entered. \*\*\*  
Per Cwt Eq **AgFA 2015-17**

Your cost  
Per Cwt Eq **AgFA 2015-17**

Expense (From Schedule F)	Your cost	Per Cwt Eq	AgFA 2015-17
12 Car and truck expenses . . . . .	\$4,603	\$0.17	\$0.07
13 Chemicals . . . . .	\$1,521	\$0.06	\$0.27
14 Conservation expenses . . . . .	\$0	\$0.00	\$0.01
15 Custom hire (machine work) . . . . .	\$19,729	\$0.72	\$0.73
16 Total Depreciation . . . . .	\$24,994	\$0.91	\$2.20
16A Lstock Depreciation . . . . .	\$0	\$0.00	\$0.20
17 Employee benefit programs . . . . .	\$6,993	\$0.26	\$0.28
18 Feed purchased . . . . .	\$136,797	\$5.00	\$3.86
19 Fertilizers and lime . . . . .	\$7,599	\$0.28	\$0.65
20 Freight and trucking . . . . .	\$6,688	\$0.24	\$0.18
21 Gasoline, fuel, and oil . . . . .	\$15,415	\$0.56	\$0.45
22 Insurance (other than health) . . . . .	\$8,171	\$0.30	\$0.29
23a Mortgage interest . . . . .	\$16,252	\$0.59	\$0.27
23b Other interest . . . . .	\$9,046	\$0.33	\$0.42

24 Labor hired . . . . .	\$75,972	\$2.78	\$1.40
25 Pension and profit sharing . . . . .	\$0	\$0.00	\$0.00
26a Rent or lease (equipment) . . . . .	\$2,898	\$0.11	\$0.07
26b Rent or lease (other) . . . . .	\$10,732	\$0.39	\$0.71
27 Repairs and maintenance . . . . .	\$46,513	\$1.70	\$0.97
28 Seeds and plants purchased . . . . .	\$12,693	\$0.46	\$0.65
29 Storage and warehousing . . . . .	\$0	\$0.00	\$0.00
30 Supplies purchased . . . . .	\$14,218	\$0.52	\$0.52
31 Taxes . . . . .	\$16,029	\$0.59	\$0.16
32 Utilities . . . . .	\$14,448	\$0.53	\$0.43
33 Veterinary, breeding, medicine . . . . .	\$10,631	\$0.39	\$0.68
34 Other expenses . . . . .	\$29,600	\$1.08	\$1.01

35 Total expenses. Add lines 12 through 34 . . . . .	\$491,539
36 Net farm profit or (loss). Subtract line 35 from line 11 . . . . .	\$49,156

TABLE 1:

# SEVEN FARM AVERAGE COMPARED TO AgFA BENCHMARK FARMS

PER COW ENTERPRISE BUDGET			
	Seven Farm Average		2015-17 AgFA Farms
Number of cows	151		119
<b>Income Per Cow</b>			
Quantity - Pounds milk	15058		23364
Price (cwt)	\$20.91		\$17.58
Product	\$3,147.89		\$4,107.02
Cull	\$271.09		\$282.21
Miscellaneous	\$125.97		\$143.37
<b>Total Income:</b>	<b>\$3,544.94</b>		<b>\$4,532.60</b>
<b>Expenses Per Cow</b>			
Purchased feed	\$907.65		\$1,173.11
Breeding fees	\$21.85		\$75.60
Veterinary	\$48.68		\$129.47
Marketing	\$19.92		\$40.18
<b>Total Expenses:</b>	<b>\$998.11</b>		<b>\$1,418.36</b>
<b>Net Income:</b>	<b>\$2,546.84</b>		<b>\$3,114.24</b>
<b>Total Crop Acres per Cow:</b>	<b>4.89</b>		<b>3.40</b>
<b>Pasture Acres per Cow:</b>	<b>2.32</b>		<b>0.36</b>
<b>PER HUNDRED WEIGHT EQUIVALENTS COMPARISONS</b>			
Basic Cost	\$ 13.10		\$ 12.63
Purchased Feed	\$ 5.00		\$ 3.86
<b>Purchased Feed as % of:</b>			
Basic Costs	<b>38.16%</b>		<b>32.63%</b>
Total Allocated Costs	<b>26.67%</b>		<b>23.52%</b>
Average Milk Price:	<b>23.91%</b>		<b>22.96%</b>

*This project was conducted by members of the Midwest Perennial Forage Working Group of Green Lands Blue Waters, with funding from USDA-Risk Management Agency.*

