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AT THE CROSSROADS

An Economic Comparison of Grass-Based and Confinement Dairying in Wisconsin

A joint project of the
Wisconsin Rural Development Center
and
UW-Madison CALS,
Center for Integrated Agricultural Systems



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Wisconsin Rural Development Center

Farm Analysis Project Summary

1991-1992

Introduction

As Wisconsin dairy farmers struggle with the burden of rising input costs, declining milk prices and tighter profit margins, they have begun to question some long-held assumptions about conventional farm economics. Many now survive with off-farm income, more are leaving dairy farming than entering, and, in response to sagging prices and lower profits, most are following trends to increase herd size and crop acres. A number of farmers, however, are beginning to challenge traditional management approaches which say, "high inputs equals more production," or "a high rolling herd average means more profits". They question the wisdom of borrowing to finance high-capital investments in the face of tight credit and short repayment terms, and they question the drive for short-term profits at the expense of the long-term health of soil and water resources and their animals.

Over the last several years, this has led many farmers to look at alternative production and management practices -- specifically, intensive rotational grazing (IRG). Farmers are finding that grazing can help minimize capital investments and input costs, reduce labor requirements, increase profitability and protect natural resources. These benefits may make it an attractive alternative to traditional Wisconsin style confinement dairying.

One of the obstacles faced by many farmers in making the switch to IRG, however, is the lack of available farm-level information: in particular, information on the transitional economic impacts of IRG for Wisconsin farmers. Although a number of grazing proponents and farm publications have suggested that IRG holds significant economic benefits over confinement systems, most analyses are based on hypothetical or projected earnings or generalize data which reflect different climate, production strategies, or capital investment approaches than those normally found in the Midwest. For many dairy farmers, this still leaves a number of questions about whether grazing is the best use of their labor and land resources, how grazing will effect production and/or change capital investment strategies (making some fixed investments obsolete).

This analysis examined the economics of low-input, reduced-chemical production and management alternatives on 45 western Wisconsin dairy farms from 1989 to 1991. As the project continued we found that many farmers who had adopted lower-chemical methods also began to incorporate IRG into their overall production strategies -- with encouraging results. This project then re-focused on the evaluation of the economic benefits and challenges IRG presented to Wisconsin dairy farmers as they made the transition from confinement to grass-based dairying.

Project Description

The economic analysis used in this study compared all farm costs and returns collected on 16 single-family dairy farms in western Wisconsin and southeastern Minnesota over a two year period (1991-1992). The eight confinement dairy farms analyzed in this study used mechanical methods to harvest forage, while the eight pasture-based farms studied used IRG as the main method of harvesting grasses and legumes during the growing season (average of six months from May through October).

The farmers provided annual detailed information about field work (machine use, hours of labor, estimates of fuel use, etc.), purchased inputs and production. Similar information was also provided on livestock enterprises and included raised and purchased feed use, purchased livestock services and inputs, labor requirements, and equipment and facility use. In addition, machinery and equipment inventory values along with assessed land, building and facility values were provided and updated annually. From these each farm's variable, labor and asset ownership costs (depreciation plus interest) were calculated. This analysis focuses on gross margins (net cash return or gross returns less direct costs) and net returns (gross returns less direct, fixed and opportunity costs).

It is important to emphasize that most pasture-based farmers consider themselves in transition from conventional confinement operations to IRG. On average, this group of farmers had been practicing IRG for a period of three years. While this may not present a clear picture of the full potential of IRG, it does provide an estimate of the performance of these farms during this transition period.

Although both types of farms employed reduced-input strategies, the IRG dairies' overriding motivation appears to be the system's potential to make deeper cuts in cash input costs -- even at the expense of some production (as long as reduced costs were low enough to offset lower production).

General Farm Information

Overall, pasture-based dairies were somewhat larger in both herd size and crop and pasture acres. On average, pasture-based dairies milked 10 more cows and farmed 22 more acres. However, milk production per cow was nearly 15 percent higher on the confinement dairies. Trends over several years indicate that pasture-based dairies are increasing herd size in order to make better use of pasture acres. Herd size increased from 49 head in 1991 to 57 head in 1992, while confinement herd numbers remained unchanged. As pasture management skills increased and additional crop acres were diverted into permanent pasture, pasture-based dairies reported more than adequate pasture acres to support and justify increases in herd size. While total investment in land, machinery and facilities was \$32,154 higher for pasture-based farms, the pasture-based dairies' per cow investment levels remained comparable due to higher cow numbers (Table 1).

Description of Pasture-based and Confinement Dairies (1991-92 Aug.)

| | Pasture | Confinement |
|--------------------|-----------|-------------|
| Total Acres | 211 | 197 |
| Tillable Acres | 194 | 172 |
| Pasture Acres | 67 | 0 |
| Cow Numbers | 53 | 43 |
| Production/Cow | 153 | 186 |
| Total Investment | \$240,423 | \$208,269 |
| Investment per cow | \$4,725 | \$4,843 |

Table 1

Crop Enterprise Comparisons

Since all crops were grown for livestock use on both types of farms, crops were treated as a raised feed expense (Table 2*). However, in order to compare crop production, crop yields were assigned a market price and reflect a dollar value on that basis (corn grain @ \$2.29/bu and forage @ \$50/tdm [tons of dry matter]). Corn enterprise comparisons reveal that confinement dairies had higher yields and planted more acres than pasture-based dairies. On average, confinement dairies raised 48 acres of corn with yields of 136/acre compared to 24 acres of corn with yields of 102/acre for pasture-based dairies. Although acres were similar (76 and 77 acres) for mechanically harvested alfalfa and hay, yields were once again higher for confinement dairies, (4.6 tdm for confinement dairies compared to 3.5 tdm for pasture-based dairies).

Overall, confinement dairies generated \$350 more per cow crop value (\$976/cow compared to \$626/cow) than pasture-based dairies. Cash costs, however, were 38 percent lower for pasture-based dairies (see Table 2, lines 2, 3, 4). Cash costs were kept low by partially grazing alfalfa and small grain crops and by limiting high expense row crop enterprises. On average, confinement dairies reported 5 main crop enterprises per farm (corn grain after alfalfa, corn grain after corn, corn silage after alfalfa, small grain, and alfalfa), whereas pasture-based dairies reported 3 main enterprises (small grain, alfalfa, and permanent pasture). Of the 8 pasture-based dairies, only 4 reported some type of corn enterprise for 1992. Pasture-based farms decreased total corn acres from 229 in 1991 to 163 in 1992.

In general, the trend to eliminate row crops and shift acreage into small grain and pasture is directed, in part, by the attractiveness of lower input costs, reduced labor requirements and reduced investments in machinery and storage facilities. The greatest savings were realized in pesticide and fertilizer costs (Table 2, line 2) and fuel and repair costs (Table 2, line 3). Total cash costs per permanent pasture acre were \$7.58. Pasture acres averaged 67 acres per pasture-based farm with reported yields of slightly over 2 tdm per acre.

* Table 2 is located on pages 7 and 8.

Dairy/Crop Enterprise Comparisons

Pasture-based dairies received slightly higher gross dairy income than confinement dairies in spite of over 3,300 pounds less production per cow. This was achieved primarily by higher cow numbers. Like crop input costs, the trend among the pasture-based dairies has been to contain dairy-related costs and services as well (Table 2, lines 8, 9, 10). Cash costs were nearly \$.28/cwt (hundredweight) below confinement dairy costs for dairy-related inputs. Pasture-based dairies reported little difference in costs for veterinary services (\$.28/cwt vs. \$.29/cwt), but had lower costs for breeding services (\$.16/cwt vs. \$.20/cwt), DHIA testing services (\$.07/cwt vs. \$.10/cwt) and miscellaneous costs (\$.10/cwt vs. \$.22/cwt). Purchased feed costs were \$.17/cwt higher due to purchased corn grain inputs. Total raised and purchased feed costs, however, (Table 2, lines 2, 3, 4, 5) were \$.21/cwt lower for pasture-based dairies. Overall, the total cash costs (including cash overhead and raised/purchased feed costs) were \$.49/cwt below confinement dairies' costs (Table 2, line 20). Despite lower production, lower cash costs resulted in a net cash return of \$.45/cwt above confinement dairies (Table 2, line 30).

Although pasture-based dairies in 1992 were able to reduce cash costs below 1991 levels, there was a slight increase in dairy and crop fixed costs (capital recovery costs, labor costs and land costs) from \$45,077 in 1991 to \$46,273 in 1992. Capital recovery costs remained unchanged. However, due to higher cow numbers and a rise in land values, labor and land costs increased. On a per cwt basis (Table 2, line 18) there was no difference between pasture-based and confinement dairies' fixed costs. The slight increase in fixed costs of the pasture-based dairies (Table 2, line 28) were once again offset by lower cash costs and resulted in a \$.36/cwt greater net return.

Summary

The results of this analysis suggest that those farms making the transition to IRG have slightly lower cash input costs and comparable net returns with confinement systems. However, there are a number of concerns with the pasture-based system. Fixed costs on pasture farms, which represent 44% of all production costs, increased slightly from 1991 to 1992; hoped-for reductions in labor were offset by higher cow numbers in order to increase gross margins; and total production costs were in the \$11-11.50/cwt range -- leaving marginal returns at best.

Perhaps one of the most difficult management questions facing grazers today is how to reduce investments in fixed assets. While the pasture-based dairies have cut back on mechanically harvested forage and traditional row crop enterprises and acres, investments in machinery increased from \$52,574 in 1991 to \$57,380 per farm in 1992. Fewer acres make it increasingly harder to justify and maintain machinery inventories and investments yet, per acre investments in machinery (excluding pasture acres) were nearly \$200/acre higher for pasture-based dairies. As margins become increasingly tighter, decisions about short-term use of capital resources will play an even more crucial part in the long-term viability of these dairy operations. If trends to reduce row crop acres continue, more farmers may need to reconsider machinery lease, crop share or custom options. Another alternative already being put into place, is the conversion to a seasonal, pasture-based system. Although many challenges face the dairy farmer, additional reductions in capital costs may be possible.

By focusing primarily on reducing input costs, IRG has held out the promise of increased profitability in the face of declining prices and rising input costs. As the economic squeeze continues, many farmers wonder how many more cuts are needed in order to remain profitable. Typically, farmers have offset lower returns by accepting less for their labor. Returns to management, however, are already marginal (in this analysis, the cost of labor at \$5.00/hr was used to calculate returns to management and it is assumed that the average \$22,000/year income would be used to pay for family living and any additional personal debt) and long hours are still required (weekly hours averaged 85).

Although looking for ways to reduce input costs is, and should be, part of a long-range farm strategy, the price farmers receive for their products may play an even larger part in profitability and ultimate survival. With milk prices currently between \$11-\$12/cwt, many farmers are finding it hard to keep pace with increasing input costs and rising family living expenses. IRG has demonstrated that some of these costs can be reduced or eliminated. However, unless more far-reaching change occurs in the organization and pricing structure of the dairy industry, more farmers will leave farming. As long as farmers continue to discount the sale of their labor, tolerate below production cost prices at the farm gate, and support unresponsive cooperatives and other market bottlenecks, the hoped-for benefits of IRG may have limited impact upon the future of Wisconsin dairying.

TABLE 2 *

WRDC/CIAS FARM ANALYSIS PROJECT
PASTURE COMPARISONS 1991/92

| 1 | Farm Name/Numbers | Pasture [8] | Confine [8] |
|--|--------------------------|----------------|----------------|
| COST/COW/YEAR | | | |
| Crop & Purchased Feed Cost: | | | |
| 2 | Pesticide/Fertilizer | 8 | 55 |
| 3 | Fuel/Repairs | 124 | 169 |
| 4 | Seed/Custom/Misc | 57 | 77 |
| 5 | Purchased Feed | 427 | 466 |
| TOTAL FEED COSTS | | | |
| 6 | per cow | 616 | 767 |
| 7 | per cwt | 3.48 | 3.69 |
| Dairy-Related Cash Costs: | | | |
| 8 | Supplies/Utilities | 127 | 145 |
| 9 | Vet/Medicine | 51 | 62 |
| 10 | Repair/Breed/Misc | 131 | 205 |
| 11 | Overhead Cost Crop/Dairy | 196 | 238 |
| TOTAL DAIRY COST | | | |
| 12 | per cow | 505 | 650 |
| 13 | per cwt | 2.85 | 3.13 |
| Fixed Cost - Crop/Dairy: | | | |
| 14 | Capital Recovery Cost | 238 | 276 |
| 15 | Labor Cost | 418 | 503 |
| 16 | Land Cost | 207 | 238 |
| TOTAL FIXED COST | | | |
| 17 | per cow | 863 | 1,017 |
| 18 | per cwt | 4.88 | 4.89 |
| TOTAL CASH COST | | | |
| 19 | per cow | 1,121 | 1,417 |
| 20 | per cwt | 6.33 | 6.82 |
| TOTAL COST | | | |
| 21 | per cow | 1,984 | 2,162 |
| 22 | per cwt | 11.21 | 11.71 |

* Line by line explanation of Table 2 on pages 9-11.

TABLE 2

WRDC/CIAS FARM ANALYSIS PROJECT
PASTURE COMPARISONS 1991/92

| Farm Name/Numbers | | Pasture [8] | Confine [8] |
|-------------------------|-------------------------|----------------|----------------|
| INCOME/COW/YEAR | | | |
| 23 | Production per Cow/cwt | 153 | 186 |
| 24 | Cwt Equivalent per Cow | 177 | 208 |
| Average Product Return | | | |
| 25 | per cow | 2,195 | 2,588 |
| 26 | per cwt | 12.4 | 12.44 |
| ===== | | | |
| NET RETURN | | | |
| 27 | per cow | 211 | 426 |
| 28 | per cwt | 1.19 | 0.83 |
| NET CASH RETURN | | | |
| 29 | per cow | 1,074 | 1,171 |
| 30 | per cwt | 6.07 | 5.62 |
| ===== | | | |
| DAIRY INCOME | | | |
| 31 | Total Gross Revenue | 116,335 | 111,284 |
| 32 | Total Cash Costs | 59,413 | 60,931 |
| 33 | Total Cost – Cash/Fixed | 105,152 | 92,966 |
| ===== | | | |
| 34 | NET RETURN | 11,183 | 18,318 |
| 35 | NET CASH RETURN | 56,922 | 50,353 |
| ===== | | | |
| GENERAL FARM INF | | | |
| 36 | Average Tillable Acres | 194 | 172 |
| 37 | Average Cow Numbers | 53 | 43 |
| 38 | Total Investment | 240,423 | 208,269 |
| 39 | Investment per Cow | 4,725 | 4,843 |
| 40 | Dairy/Crop Labor Hours | 4,400 | 4,264 |

Explanation of Table 2 -- Pasture Comparisons

The following summary describes crop and dairy enterprise costs and returns on 16 western Wisconsin family dairy farms for 1991 and 1992. The analysis focuses on comparisons of two groups of farms using differing dairy and crop production strategies. Confinement represents those farms that use standard production practices and Pasture those farms reporting pasture as a primary crop enterprise. NOTE: All costs and income are represented on a per cow or per hundredweight equivalent basis (cwt equivalent equals the value of all milk, cull cow and calf sales divided by the average cwt price received for milk sold) unless otherwise noted.

1. **Farm Numbers:** [8] means that there are 8 pasture farms and 8 confinement farms used in the comparison sample.

Cost/Cow/Year: Lines 1-22 represent cash and fixed cost per cow on an annual basis.

Crop & Purchased Feed Cost: Represents all cash costs for all crops produced as well as any purchased feed and/or concentrates and minerals. If any crop was sold off the farm, a percentage of crop expense was deducted from these costs.

2. **Pesticides/Fertilizers:** Includes all herbicide, insecticide, synthetic fertilizers and bio-fertilizers (organic or natural) used in crop production.

3. **Fuel/Repairs:** Includes all diesel, gasoline or LP used in crop production plus any repairs made to field machinery or equipment. This does not include any major repairs such as tractor overhauls.

4. **Seed/Custom/Misc:** Includes all seed, custom services, crop insurance, soil testing, etc, related to crop production.

5. **Purchased Feed:** Includes all cash costs for all purchased feeds, concentrates and minerals.

6-7. **Total Feed Costs per cow and per cwt:** All cash crop costs and purchased feed costs divided by cow and hundredweight equivalent (see explanation above).

Dairy-Related Cash Costs: This represents all cash costs which can be directly charged to the dairy enterprise. These costs include dairy replacement expenses but do not include any costs for additional livestock enterprises such as feeder or finished steers, or feeder or finished hogs.

8. **Supplies/Utilities:** The sum of supply costs reported on tax returns (20% of this cost was included in "Overhead Cost") and electricity costs (10% was included in "Overhead Costs").

9. **Vet/Medicine:** The total vet and medicine costs as reported on tax returns.
10. **Repair/Breed/Misc:** This includes all repairs to livestock facilities and equipment (except major cash expenses such as barn roofs or new bulk tanks), all breeding expenses, and all miscellaneous costs such as DHIA, milk hauling, hoof trimming, etc.
11. **Overhead Cost Crop/Dairy:** A total of all cash costs which cannot be charged to a particular crop or livestock enterprise. This includes real estate taxes, insurance, mileage expense, 20% of supply cost and 10% of electricity costs.
- 12-13. **Total Dairy Costs:** The sum of all direct dairy related costs and overhead costs divided by cow and cwt equivalent.
- Fixed Cost - Crop/Dairy:** This includes all non-cash costs charged to both the crop and dairy enterprise.
14. **Capital Recovery Cost:** This includes the fixed ownership cost of machinery (8.5% depreciation plus 5% interest) as well as the fixed ownership cost of storage facilities, equipment and buildings (4.5% depreciation plus 5% interest).
15. **Labor Costs:** The total number of hours which were calculated for all crop field work plus the hours reported milking, cleaning barn and feeding livestock, (at a rate of \$5.00/hour).
16. **Land Costs:** The total cost of tillable acreage based on average rental rates for cropland in participant's county. In some cases, pasture land that could not be considered tillable was given average pasture rental rate values.
- 19-20. **Total Cash Costs:** The total cash cost or a total of "Crop & Purchased Feed Costs" and "Dairy-Related Cash Costs" divided by cow and cwt equivalent.
- 21-22. **Total Costs:** The total of all cash costs plus all fixed costs divided by cow and cwt equivalent.
- Income/Cow/Year:** Lines 23-35 include the sale of all milk, cull cows and calves annually.
23. **Production per Cow/cwt:** The total volume of milk sold during the year divided on a per hundredweight basis.
24. **Cwt Equivalent per Cow:** The value of all milk, cull cow and calf sales divided by the average hundredweight price received for milk sold.

25-26. **Average Product Return:** The total gross revenue earned from milk, cull cow and calf sales during the year, divided by the number of head and the average price received for milk per hundredweight sold.

27-28. **Net Return:** The sum of "Average Product Return" minus "Total Cost".

29-30. **Net Cash Return:** The sum of "Average Product Return" minus "Total Cash Costs".

Total Dairy Income: Total amount of income received from milk, cull cows and calves.

31. **Total Gross Revenue:** Same as "Total Dairy Income".

32. **Total Cash Costs:** The total cash expenses for the dairy enterprise. This does not include expenses for family living or debt retirement.

33. **Total Costs:** The total of all cash and fixed costs.

34. **Net Cash Return:** "Total Gross Revenue" minus "Total Cash Costs".

35. **Net Return:** "Total Gross Revenue" minus "Total Costs".

36. **Average Tillable Acres:** This represents the total crop enterprise acres reported. This includes pasture acres.

37. **Average Cow Numbers:** The average number of cows milked during the year.

38. **Total Investment:** The value of all land, buildings, facilities and machinery owned.

39. **Investment per Cow:** Total investment divided by the number of cows milked.

40. **Dairy/Crop Labor Hours:** (See "Labor Costs", line 15). This includes hours reported for all crop and livestock enterprises.



For more information on this project contact the:



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