From Green Grass to Cash

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Abstract

Interest in management intensive rotational grazing (MIRG) systems has increased. Questions about the profitability of MIRG systems have slowed the adoption of grazing systems. Research conducted at the University of Minnesota West Central Research and Outreach Center attempts to identify key economic and management factors influencing profitability. An on-farm research project showed that raising dairy heifers on high quality pasture was more profitable than raising corn or soybeans. Assessing the financial performance of MIRG dairy systems showed MIRG systems could be a profitable as confinement dairy systems, even with lower milk production per cow in the MIRG system.

A three year trial growing dairy heifers on pasture as compared to feedlot production, found that in two of three years the heifers netted more per acre than alfalfa hay, corn or soybeans. A secondary finding in this trial is that a pasture must be managed just as any other crop would be, by looking at forage health to maximize yields and quality.

Preliminary research of fall and spring calving strategies and the effect on production and culling indicate that a combination of fall and spring calving is the most feasible. With two calving windows the culling rate is reduced.

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I am an agricultural economist located at a research and outreach center, also known as an experiment station, in Morris, Minnesota, located in the west central part of the state. One of the research focuses at Morris is looking at technologies that are available to small and medium sized dairy farms that are going to help make them sustainable and viable into the future. Although I will not discuss it here, another focus is alternative swine production systems - hoop systems, Swedish deep bed systems, and group housing for sows as well as finishing.

The grazing research at Morris has been going on since about 1996. We have looked at such things as differences between confinement and grazing systems. We're looking at production and profitability issues of fall versus spring calving and bunch calving and at issues associated with group rearing of dairy calves. Our latest effort, a cross breeding experiment, is addressing issues related to the low dairy cow reproduction rate as well as some quality issues.

Legitimizing Grazing

- Confinement versus grazing
- Growing dairy heifers on pasture
- Calving strategy in the grazing herd

The perception of grazing systems seems to be that they cannot be economically viable and that real dairy farmers cannot make money with them. That is a prevalent perception even among dairy producers who are considering changes to their system. These are people who don't want to get big but need to upgrade facilities. They are considering systems that will enable them to stay in the small to moderate size and not get into these 800, 1200, or 5000 cow dairies that we are seeing in the Midwestern states. The other clientele group which needs education about the feasibility of grazing systems is agricultural lenders. Access to credit for people wanting to get into grazing dairies is difficult. Part of the issue is that agricultural lenders tend to look at some of the production numbers from grazing systems, see the lower production and say "No. It's not going to be profitable. We aren't going to do it."

I'm going to talk about three areas. We will look at some data on confinement versus grazing. I will discuss some research on growing dairy heifers on pasture that can be applied to beef stocker production as well. A third area relates to calving strategy.

Grazing vs Confinement Dairy

Grazing versus Confinement Dairy Systems. The grazing versus the confinement data comes from a USDA funded project, one of the Integrated Food and Agricultural Farming Systems (IFAFS) grants. It's a multi-state research project with Tom Kriegl from the University of Wisconsin as the principal investigator. We are working with Tom Noyes at Ohio State University, Sherrill Nott, who was here at Michigan State University, and Jim Grace at Cornell University. We often get the question "How profitable are these grazing dairies?" In Minnesota, we had, depending on the year, anywhere from 12 to 17 grazing farms in our financial database that has over 500 total dairy farms. I was a little uncomfortable talking about some of the cost production numbers associated with these grazing farms. Data from only 12 to 15 farms didn't give me a great comfort level. Other states had the same problem of small sample size. The IFAFS grant allowed a number of states to pool farm financial data for grazing dairies. We now have a much larger database of farms with over 100 farms. Now, when I say something about the feasibility of the financial performance of these grazing dairies I am a little bit more comfortable. I have a little bit more confidence in them.

Great Lakes Grazing Network

- Financial summary of grazing dairy farms
  - **MN NY WI MI OH IN**
- 92 farms in 2000
- 126 farms in 2001
- 103 farms in 2002

Comparison of most and least profitable grazing dairies 2002

	Top ½	Bottom ½	Average
Number of herds	50	50	103
Number of cows	75	97	86
Lbs milk per cow	15,587	15,282	15,332
Net Farm Income per Cow	$756 ($451)	$140 (-$255)	$376 ($260)

I am going to highlight some observations from our grazing study for 2002. Farms were sorted by net farm income from operations, and averages for the top third and bottom third of farms were calculated. At the top, the most profitable farms are actually a little bit smaller in terms of cow numbers. This was typical as we looked from 2000, 2001, and 2002. In 2000 and 2001, we found the top half or our most profitable farms actually had lower production than our bottom half. In 2002, the top farms had slightly greater milk production per cow. As an economist I thought, "oh this is kind of cool." It shows you are not necessarily looking to maximize production, you want to be looking to maximize profit.

Net farm income per cow for the top half on the grazing farms was $756, bottom half was $140 and the average over the group was $376. The numbers in parentheses are for non-grazing dairies, or confinement dairies, in Minnesota. In 2002, net income per cow for confinement dairies in Minnesota ran from $450 in our top half to -$255 per cow in the bottom half. One of the things that we have seen is a great deal of variation in net farm income and financial performance in both groups. There are those who do well and there are those who do not do well.

End of Year Balance Sheets

		Assets	Liabilities	Debt/Asset
2000	Top ½	$577,664	$258,482	45%
	Bottom ½	$726,483	$438,075	60%
2001	Top ½	$658,798	$245,567	37%
	Bottom ½	$772,589	$401,310	52%
2002	Top ½	$683,318	$295,925	43%
	Bottom ½	$804,686	$424,524	53%

When we look at how these grazing farms are structured in terms of assets and debt, the more profitable ones tend to have less in asset value, less in debt, and their debt to asset ratio is lower. The conclusion I draw is that the more profitable farms tend to be a little more careful in the type of capital and what they are investing in and how they are paying for that. They are controlling their debt.

Economist's Lesson 1

- Low-capital input systems mean low capital
  - Need to find ways of reducing capital investment

We have learned several lessons from this USDA project. First is low capital input systems mean **low capital**. You need to find ways of reducing the capital investment in low input systems in order for them to be successful. When we say low capital, we mean low capital.

Lesson two is controlling debt. When you look at interest on term debt, interest on machinery loans, on land, on cows, you can see that debt for the most profitable can be 40 cents per cwt less than debt for the least profitable. So you have to do something about controlling that debt. Again it comes back to that low input, low capital: how are you going to do that?

Economist's Lesson 2

- Control Debt (interest on term debt)
  - **TOP 1/2**
  - $0.63/cwt sold (2000)
  - $0.68/cwt sold (2001)
  - $0.71/cwt sold (2002)
  - **BOTTOM ½**
  - $1.07/cwt sold (2000)
  - $1.07/cwt sold (2001)
  - $0.94/cwt sold (2002)

How can farmers put the lessons into practice? How can they control their capital? Here is one example. This is our corn silage harvesting at Morris. We do not own one piece of this equipment. The custom harvesters came in at 6:00 in the morning, and they were done by 2:00 in the afternoon. We had 96 acres of corn silage. Harvesting our corn silage cost us $9200 this year. Over the last 3 years the average cost for harvesting our silage came to $4.50 per ton. We can't afford to own that machinery. Not owning all the equipment is a fundamental shift in thinking. People typically think you have to own the equipment if you are going to go into farming.

Another thing that we do, and we get a lot of strange looks when I bring this one up, is forego the use of barns. Here is our winter housing in Minnesota. This is how we house all of our dairy heifers and all of our cows that are at the tail end or dry part of their lactation in the winter. They are outside 365 days of the year, on a bedding pack. They do have protection from the wind. They are fed a total mixed ration (TMR). You can see the feed bunk in the front.

We have a group of cows that calve in the fall. Those cows are actually in an open faced shed, converted from a beef shed. Last year was the first year we had some trouble with some teat freezing. The fall calving cows in the shed had the problem, which was interesting. We think it had something to do with the distance they had to walk from the shed to the milking parlor. The other thing that was surprising was that we ended up using half the amount of bedding on that outside pack as we did on the inside pack. The difference in bedding requirements was an unexpected finding.

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I have made some observations with respect to grazing dairy systems. Grazing can be a profitable production system just like confinement can be a profitable production system. Grazing can be a very unprofitable production system just as some confinement systems can be unprofitable. It comes down to management. There appears to be as much variability and profitability across grazing dairies as there is across non-grazing dairies. Some dairy farmers do a very good job, some do a very poor job, regardless of the production system. Controlling costs, particularly overhead costs, is critical to the financial success of grazing dairies.

Margot's Observations

- Grazing can be a profitable production system, just like confinement can be a profitable system
- Grazing can be an unprofitable system, just like confinement can be unprofitable
- There appears to be as much variability in profitability across grazing dairies as there is across non-grazing dairies.
- Controlling costs, particularly overhead costs is critical to the financial success of a grazing dairy

Notes to those thinking about going the grazing route

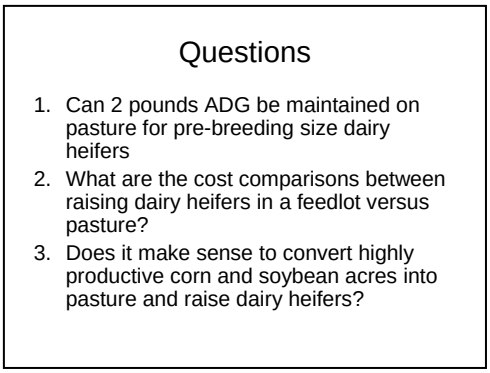
- Know what you need your dairy to earn to support you and your family
  - Work back to figure your needs on a per cow basis
  - Make sure the $ needed/cow is reasonable
- Observation: good managers in confinement systems tend to be good managers in grazing systems

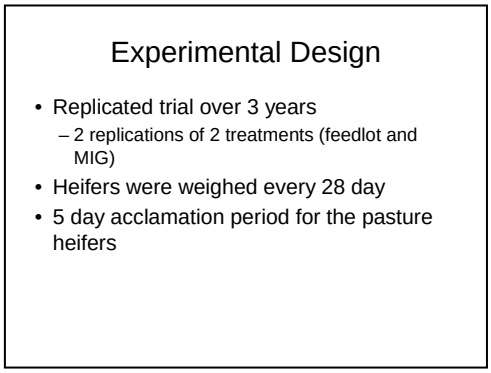
When I talk to people about who are considering transitioning into grazing, I almost encourage them to work backwards. Know what you need your dairy farm to earn to support you and your family. Then go back and figure how many cows do you have or want to have. What is that per cow? Does that make sense? Is it reasonable? If you need $1200 per cow, if you need to net $1,200, this may not be the system for you. I don't know if a confinement system is going to work for you either. But work back and determine if your goal is reasonable and attainable.

Good managers in confinement systems tend to be good managers in the grazing system.

Growing dairy heifers on pasture. Another interesting research project was a collaboration with a professional heifer grower in Minnesota. This project was funded by the Legislative Commission for Minnesota Resources, LCMR.

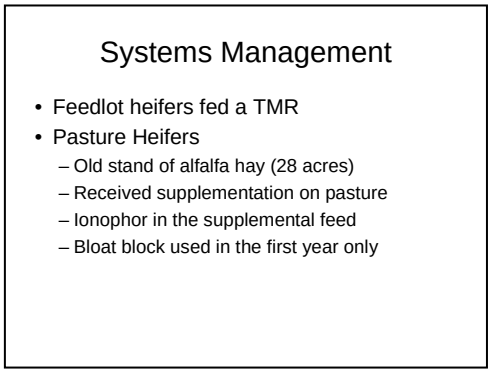
Roger, our professional heifer grower, was interested in learning how to graze. He came to one of our workshops and decided to put what he had learned into practice. He wanted to do a research project because he really had two questions. Roger was interested in what he could get in terms of average daily gains. He needed to hit two pounds per head per day in order to meet his contract obligations. I was interested in the difference between raising his heifers on pasture versus a feedlot, which is what he typically used. Roger's biggest question was, "Does it make sense to convert my highly productive corn and bean land into pasture, and then grow heifers instead of corn and soybeans?" That is ultimately what he was interested in.





We conducted a replicated research trial with Roger over three years. There were two replications of treatment, feedlot and pasture. While these heifers were on trial, they were weighed every 28 days. The heifers that went into pasture actually had a five day acclimation period where they were trained to get used to the fences and learned how to graze, before they went onto the trial.

In terms of systems management, the feedlot heifers were fed a total mixed ration (TMR) that was formulated to allow for an average daily gain of two pounds per head per day. Roger's pasture was 28 acres of established alfalfa hay. He put permanent fencing around the pasture and then used polywire for temporary fencing. The heifers were moved every two to three days so they were given enough forage. They were supplemented while on pasture. I think the heaviest supplementation was three pounds per head per day of mixed feed and some cracked corn. He did have an ionophore in his supplemental feed and in the first year he had a bloat block out in the pasture. He didn't bother using it in the second and third years of the trial.



Stocking and Grazing Season

	2000	2001	2002
Number of Heifers	72	58	72
Days on Trial	145	127	147
Initial Weight (lbs) Feedlot	478	563	532
Initial Weight (lbs) Pasture	480	541	521

Note what happened in 2001. In 2001 we were not able to find as many heifers of similar size. We only had 58 versus 72 head so we had a lower stocking rate on the pastures. We also had a shorter grazing season in 2001. We were late getting on the pasture in 2001 because at the end of 2000 Roger actually hit his pasture pretty hard, overgrazed it and had to do some interseeding. Things were slow coming back in 2001.

In terms of the animal performance in this trial, there were no significant differences in average daily gain in 2000 or 2001 between those two systems. In 2002 we did have a significant difference. The feedlot heifers had higher gains. The term Roger used was "over conditioned". The heifers were fat. It was not that the pasture system didn't meet the target average daily gain of two pounds per head per day. In his feedlot he had a little bit of trouble with his ration and his heifers got fat.

Animal performance

- Feedlot Average Daily Gain
  - 2.00 in 2000
  - 2.03 in 2001
  - 2.10 in 2002
- Pasture Average Daily Gain
  - 2.04 in 2000
  - 1.98 in 2001
  - 1.97 in 2002

Feedlot Costs ($/head/day)

	2000	**2001**	**2002**
Feed	0.73	0.74	0.85
Labor	0.17	0.16	0.20
Machinery	0.15	0.19	0.20
Facilities	0.02	0.02	0.02
Bedding	0.07	0.12	0.11
Health costs	0.03	0.03	0.03
Total	**1.17**	**1.26**	**1.41**

Here is a quick look at the cost comparison, dollars per head per day. In terms of costs the pasture system outperformed the feedlot system. We charged out the pasture at $85 per acre because it was fairly productive corn and bean land, not the typical $12 to $18 per acre for pasture land in Minnesota.

Here are the feedlot costs Feed cost and machinery were the two big ones. If you look at the total cost in 2001, you really see the impact of both stocking rate and the shorter grazing season. In 2000, Roger did lose two heifers while on the pasture system, so there was a death loss. He lost one to bloat and lost one to a lightning strike. He had no losses in the other years.

Pasture Costs ($/head/day)

	2000	**2001**	**2002**
Feed	0.28	0.35	0.20
Labor	0.10	0.15	0.07
Machinery	0.07	0.09	0.08
Fencing	0.08	0.15	0.10
Health costs	0.04	0.03	0.03
Seed & Fert		0.11	0.05
Pasture	0.23	0.32	0.22
Death Loss	0.15		
Total	**0.95**	**1.20**	**0.75**

Returns per Acre

	2000	**2001**	**2002**	Average
Corn	-18	56	30	-15
Soybeans	35	16	39	30
Alfalfa Hay	81	***79***	114	91
Heifers	***125***	16	***200***	***114***

There is a database at the Center for Farm Financial Management at the University of Minnesota that can be queried. I looked at the returns per acre. This includes government payments for corn, soybeans and alfalfa hay for west central Minnesota, where Roger's farm is located. With the exception of 2001, the heifers netted more per acre than corn, soybeans and even alfalfa hay.

A lesson that we learned from Roger's experience is that you have to manage your pasture like you do any other crop. You have to look at the forage health. Manage your pasture like you would any other crop, corn or soybeans, to maximize your yields and your quality. You need to be flexible in these systems.

Lessons Learned

- Manage your pasture like a crop
- Be Flexible
- You have an integrated system—crops and livestock

What does that mean? Who has seen a grazing pasture that looks like this? Whoops! It's early June in Minnesota and it just got ahead of us. In terms of flexibility, you will often see pieces coming out of rotation, the grazing hay made and then brought into rotation later on. You need to maintain flexibility in the system. You will have an integrated system that includes both crops and livestock. There is just no way around it, the two work together.

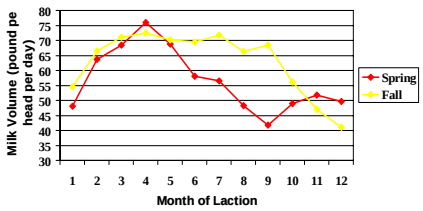
This is a photograph of one of the cross breed heifers that were on trial.

Calving Strategies. With calving strategies, we are trying to look at the economic feasibility of fall versus spring versus some sort of dual bunch calving, where part of the herd is calving in the spring, part of the herd is calving in the fall.

Calving Strategies

AKA Seasonal or Bunch Calving

Average Daily Production



We are trying to minimize the drop in production of the fall calving herd, which is indicated by the yellow line on the graph.

Preliminary findings are that the combination of fall and spring is a lot more feasible. It has to do partly with production patterns and partly with culling. You have lower culling when you have two calving windows in the year as opposed to one. If a cow doesn't settle in her first calving window, you can move her into the second one. So you are reducing your culling rate. That has a big impact on the feasibility.

Preliminary Results

- Spring calving
  - 41% of herd is culled for reproduction
  - P(NPV<0) = 70%
- Fall Calving
  - 18% of herd culled for reproduction
  - P(NPV<0) = 54%
- Spring and Fall
  - 19 % of herd culled for reproduction
  - P(NPV<0) = 6%