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Extension and Outreach

Dairy Profits III

The Grass Milk (GM) Option and Once a Day (OAD) Milking

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A simpler kinda of life never did me no harm, raising me a family on a Grass Milk farm.

Life on the farm is kinda laid back—ain't much about Once-a-day milking, that I can't hack!

Oh, the lure to a more simple life on the farm. Being a big John Denver fan who spirited the riches of a simpler life in nature through music, his lyrics come to mind in discerning goals to try Grass Milk (GM) and/or Once-A-Day (OAD) milking. For most, the decisions are simplicity and quality of life, balanced of course, by profit.

GM dairying and OAD milking can have merit on their own and even together with the labor and other benefits needing to be weighed well with both the costs and milk production losses. Quality of life gains from simplifying the daily feeding system, other chores, not worrying about milking on both ends of the day, limits on family or personal activities, can be worth much more to some than others. Thus, some farms will be much better candidates than others for either system, both profit and quality of life wise, to pursue either of these options.

Farms that can weather the risk of short term failure and possible profit reduction, just in case, are better candidates than those with already tight cash flows. Many producers considering the GM option do it for reasons other than top profit. Thus, they are willing to forego profits for other real or perceived benefits.

To begin with let's define GM and OAD. GM comes from cows that attain the majority of their feed from mostly pasture during the grazing season. In addition to this, the cows may consume minerals and energy supplements, such as molasses. Other forage based feeds that might be fed as supplements during the grazing season or as staples during the winter might include stored silages or baleage of alfalfa, clovers, grasses, small grains (harvested prior to boot stage), and root crops. OAD is simply a practice where dairy producers milk their cows only once per day, instead of the traditional twice per day or three times per day milking routines.

Let's Cut the Grain and Go Grass Milk?

The first consideration when going to GM is "where's the market?" If no market is available, most producers would experience a significant profit loss, unless they are masterminds of getting the necessary energy levels in their cows by other means. But, one might still consider it for possible human health benefits of the milk product, or personal preference as a means of doing business or a philosophy of life. If a GM market is available, the experience of this author shows that some of the best managers might increase price $4-$5 per cwt. of milk sold while increasing costs around $3.50 to $4 per cwt. of milk sold. Sounds good, but the number of cwts. of milk sold might also decrease by 25% or more, necessitating an increase of cows to make up part of the difference to maintain an acceptable level of profitability.

Typically, higher milk production per cow gives a higher margin over maintenance per cow in economic terms. This means that once maintenance costs (body energy, housing, etc.) are already incurred, the additional pounds of milk tend to be a higher percentage of profit on the margin. This concept is a complete reversal of the GM discussion. One needs to ask, can the margin over maintenance (lower milk production per cow) be mitigated by other cost savings and benefits? For some, producer experience has shown it to be profitable, especially in areas where land prices allow producers to own higher levels of acres per cow, if good quality and quantity of pasture forage can be produced.

High growth rates have been proven on all grass diets for dairy heifers and beef stockers. Adequate milk production has also been achieved. If being paid an organic AND GM premium, profits can be competitive.

The reduction in grain fed will need to be offset by similar pounds of dry matter from highly digestible forage PLUS another 33%-50% more due to unequal forage versus grain displacement rates. So, yes, more land may be needed to compensate as often a pound of grain lost from the ration may need 1.25 to 1.5 pounds of forage to compensate. But, it truly cannot compensate in most cases as DMI tends to drop instead, resulting in lost milk production, body condition and reproductive efficiency. If grain was being purchased, this GM option may change soil fertility with less nutrients coming on-to the farm.

Questions for considering GM:

1) Is there a market willing to pay an additional $3.50 to $5.00 per cwt? If not, can profit be forgone and still survive or thrive?

2) Can highly digestible forages (both quality and quantity) be produced on the quality of land owned and/or rented, with goal to maximize energy and other nutrient intake along with "efficient" dry matter intake per cow?

3) Do grazing and hay harvest management (especially 1st crop timeframe) allow quality forage harvest in a timely manner?

4) Do facilities allow for increased herd size to make up for lost milk production per cow?

5) Does acreage allow for increased herd size due to higher forage and forage quality needs, and possibly more stored feeds for the non-grazing season?

6) Do cow genetics fit the GM model? Trial and error is needed as various cows within the major breeds can be successful but the calving interval tends to increase.

7) Can the farm survive an estimated 33% or 6,000-9,000 pound drop in milk production volume per cow or 10-15% of milk solids production?

8) Can the farm benefit by GM production with reduced soil erosion, less tillage and longer term forage/pasture acres?

9) How can one feed minerals and alternative (non-grain) energy sources?

10) Grain feeding provides increased flexibility, can winter forage demands be met with constant, available feed supplies?

11) High quality dry hay in most parts of Midwest and Mideast is difficult to harvest, can quality haylage and baleage be managed and fed?

12) Is reproductive performance above average before beginning GM? GM may compound reproductive issues and higher attention paid to heifer selection based on fertility.

13) Can the mindset handle significant drops in milk production?

14) Can the goal be written down and the pros and cons written side by side and compared with a sharpened pencil and calculator?

15) Can a written action plan and projection with both timeline and protocols in place for feed ration, feed inventory, feed production, and feed consumption be implemented?

Most of these questions are to expand thinking. The first two, of market and efficient DMI are most important for the system to work. The last two, of writing things down, may be the most important for pre-planning. Part of the encouragement with producers considering options of GM is the George Strait song, "Write this Down" as even psychological research points to its benefit for reduced worry and increased good decision-making.

Do not make serious decisions with a gut feeling or because it is working for someone else. Every farm is different and may yield wildly different results. Even cows within the same farm will respond to this management practice differently. And, the transition needs planning upfront and both the cows and the manager will make lots of adjustments through the learning curve that will be experienced. Thus, the results from year one will be quite different from year five as management grows and learns through the transition process.

Let's consider point number two concerning efficient dry matter intake. Many New Zealand and Irish farms feed little to no grain so "if they can do it, why can't we?" First, realize that forages in both Ireland and NZ tend to be higher energy forages, like ryegrass that overwinters there much better than in the USA. They are in a very different climate. Feed tests have shown some of their forages to be .76-.82 Mcal/lb (NEL). Contrast that to many of our forages from .64 to .72 Mcal/lb. This energy difference is significant as the forages samples from New Zealand and Ireland resemble more of a grain energy level, thus increasing success with lower and no grain feeding levels. So, beware in considering comparisons.

Early lactation weight loss due to demand for energy for both milk production and reproduction is paramount to minimize. Having the GM cows go into the dry period with good body condition may be the most important step to minimize weight loss plus increase milk production in early lactation. It is inefficient and not healthy for the cow to put on weight during the dry period, so it is a must during late lactation. If cows go into the dry period less than optimal, or lose body weight less the calf, something will give and it might be the health, milk production and reproduction of the cow.

Human Health Benefits

Organic dairy and GM provide consumers a great alternative for how their food is produced and some consumers are willing to pay for that alternative. The organic movement continues strong and the GM movement has a health improvement, backed by science base, that on the surface, should favor market growth. University of Minnesota Extension, organic dairy scientist, Brad Heins writes:

> Omega-6 and omega-3 fatty acids are essential human nutrients, yet consuming too much omega-6 and too little omega-3 can increase the risk of cardiovascular disease, obesity and diabetes. Research has shown that consuming organic dairy products lowers dietary intakes of omega-6, while increasing intake of omega-3 and conjugated linoleic acid (CLA), a heart-healthy fatty acid.
>
> A recent national study found that cows fed a diet of totally organic grass and legumes produced milk with elevated levels of omega-3 and CLA, which provides a markedly healthier balance of fatty acids. The improved fatty acid profile in grass-fed organic milk and dairy products brings the omega-6/omega-3 ratio to nearly 1 to 1, compared to 5.7 to 1 in conventional whole milk.
>
> In a study over three years, we quantified the fatty acid profile in milk from cows fed a 100 percent forage-based diet and compared it to profiles of milk from cows under conventional and organic management.
>
> Grassmilk provided by far the highest level of omega-3s (0.05 grams per 100 grams of milk), compared to 0.02 g/100 g in conventional milk; a 147 percent increase in omega-3s. Grassmilk also had 52 percent less omega-6 than conventional milk, and 36 percent less omega-6 than organic milk.
>
> We modeled daily fatty acid intakes for a typical 30-year old woman consuming a typical diet in the United States to assess the impact of switching to grassmilk dairy products. Shifting from conventional to grassmilk dairy products may have a positive impact on total omega-3 and CLA intake.
>
> - Three servings of grassmilk provide about 300 milligrams of CLA, which is 75 percent of the target intake for adult men and 100 percent of target levels for adult women.
> - For omega-3s, three servings of grassmilk would provide about 22 percent of daily needs for adult men and 32 percent percent for adult women. Conventional dairy products would supply less than half of these amounts.
> - Three daily servings of grassmilk would supply up to 58 percent of total daily omega-3 intake, making dairy by far the primary source of omega-3 fatty acids across all food groups.
>
> Most of the omega-6 in the American diet today comes from fried foods, vegetable oils and processed foods, with little coming from dairy. For people striving to lower their risk of cardiovascular and other metabolic diseases, for pregnant women, and for infants and children, the greater omega-3 intake from grassmilk may help improve human health.

For those wanting to view a presentation highlighting this information, please refer to this website link: https://vimeo.com/247248247

The Economics of GM dairy

Studies have shown that grazing dairying can be as profitable as conventional dairying and that organic dairying can be as profitable as conventional dairying. Studies of 15 farms in the USA in 2017 have shown that GM dairying can be as profitable as organic dairying. However, many conventional producers can’t believe grazers can make money; many grazers cannot believe conventional producers can make money; and, most organic producers can’t believe either one of them can make any money. And, most others cannot believe the GM organic dairy can make any money either.

Well, the proof is in the following financial comparison from 2017, chosen because it was done slightly before the huge downturn in the dairy industry in 2018 and 2019. The table on the following page depicts two sets of organic dairy farms. The two columns to the left are a study of organic dairy farms across the USA. The two columns to the right are a study of 15 organic GM farms, mostly in the Midwest and Eastern USA. The average herd size for the organic farms was 153, not quite double the GM herd size of 80. The Higher Profit (HP) herds in both the organic and GM groups was less than the average for the group. Bigger is not always better in many of these studies.

Overall, the GM farms tended to be very competitive with the organic farms. The average net return per cwt.eq. of milk sold was $1.62 for the organic herds versus $1.22 for the GM herds. However, for the HP herds, the difference was much greater than the average and between each other.

The HP organic herds had a net return per cwt.eq. of milk sold of $5.42 versus $8.17 for the HP GM herds. Bottom line is that there is profit potential with GM dairying for producers with right resource farms (cheaper, good quality land running more acres per cow) and management ability (efficient, good quality and quantity DMI). These seem pretty key.

Pounds of milk sold per cow per acre operated annually in the HP herds was about double for the organic herds compared to the GM herds with the productive acres per cow very similar. Feed purchased per cow was one-third to one-half on the GM farms compared to the Organic farms. Total cash expense per cow was half or even less on the GM farms relative to the organic farms. Net cash income per cow was $4 higher for the average GM farm but $303 lower for the HP GM farms.

After inventory adjustment, subtracting a 4% equity charge across all assets as interest expense is not included in cash expenses, the average organic farm had a net return to labor per cow of $707 versus $848 for the average GM farm, a difference of $141 per cow. The HP groups reversed the more profitable as the HP organic farm had a net return to labor per cow of $1,533 while the GM farms were $1,497 per cow, only a $36 per difference. Thus, on average there was a significant difference but for the HP group comparison, it was pretty small.

Dairy Comparison	Organic		Grass Milk	
USA Organic Dairies	AVE	HP	AVE	HP
Average Herd Size……………….	153	133	80	70
Average Productive Acres………	443	482	207	205
Pounds of Milk Sold per Cow…..	14,648	15,919	8,295	8,597
Pounds of Milk Sold per Acre	6,329	7,019	4,157	3,372
Productive Crop Acres per Cow	2.98	2.96	2.40	2.86
Fertilizer/Seed Input per Acre	$104	$127	$83	$85
Full Cost of Production Analy	AVE	HP	AVE	HP
Gross Income per Cwt. Eq.	$32.71	$32.93	$38.63	$38.89
Gross Expense per Cwt. Ec	$31.10	$27.51	$37.40	$30.72
Net Income per Cwt.Eq.	$1.62	$5.42	$1.22	$8.17
Cash Expenses per Cow	AVE	HP	AVE	HP
Veterinary, Medicine	$52	$71	$31	$25
Dairy Supplies	$207	$168	$160	$155
Breeding Fees	$40	$49	$15	$13
Feed Purchased	$1,409	$1,323	$616	$402
Repairs	$287	$331	$185	$123
Seed, Chem, Fert	$261	$412	$184	$239
Fuel, Gas, and Oil	$130	$154	$86	$92
Utilities	$107	$105	$72	$63
Interest Paid -- not included due to 4% equity char			due to 4% equity charge	
Labor Hired	$597	$505	$89	$77
Rent, Lease and Hire	$530	$756	$395	$305
Property Taxes	$65	$68	$62	$46
Farm Insurance	$90	$102	$39	$21
Other Cash Expense	$240	$333	$180	$117
Total Cash Expense	**$4,015**	**$4,376**	**$2,114**	**$1,677**
Net Returns per Cow	AVE	HP	AVE	HP
Net Cash Income	$1,423	$2,147	$1,427	$1,844
Inventory Change	-$41	$208	-$8	$287
Net Farm Income	$1,383	$2,355	$1,420	$2,131
Equity @ 4% of Assets	$676	$822	$571	$634
Return to Unpaid Labor	$707	$1,533	$848	$1,497

The GM dairies on average ran 13-14 more cows per full-time equivalent (FTE) laborer but sold considerably less milk per FTE (up to 183,141 for the HP group). Although labor costs per cow were about $350 less for the GM farms, the labor cost per cwt. eq. of milk sold was $1.87 greater for the average dairy and $2.36 per cwt. eq. of milk sold for the HP dairies. All labor as a percent of total costs was approximately 2% higher for the GM farms. So, even though more cows were run per FTE, the GM farms, maybe due to smaller size or desire for more quality of life, had lower labor efficiencies than organic dairies.

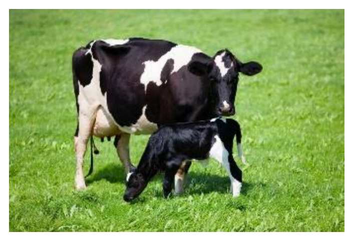
The capital cost per cow was $179 less for the average GM farm and $166 less for the HP GM farm. The total capital cost per cow was $2,328 higher for the average organic farm and $1,026 higher for the HP organic farm. Fixed cost as a percent of total cost was 2-3% higher for the HP GM farms. Rate of return on assets (ROA) were both similar in the 6% range for the average organic and GM farms. The HP GM dairies garnered an 11.56% ROA versus the HP organic dairies at 10.86%.

So, labor efficiency favored the organic dairy farms. Capital efficiency favored the GM farms. Looking at all measures of profitability, it looks like a great truce in comparison for this 2017 data. The milk price difference seemed spot on for paying for the cost differences for GM dairies. Remember, herd sizes were almost double for the organic dairies versus the GM dairies. From experience with other similar studies, it is highly suspected that if similar sized dairies were analyzed, the GM dairies would be more profitable than shown in comparison here, especially again if in more reasonable land priced areas where more acres per cow can be owned or leased. It needs noting that not all dairies remain financially competitive after transitioning to GM. Dairies with split herds where some cows are organic and others are GM, report losses using the GM option. This again emphasizes, the GM option is not for everyone and should be discerned carefully.

Dairy Comparison

	Organic		Grass Milk	
Labor Profit Analysis	**AVE**	**HP**	**AVE**	**HP**
Labor Earnings Per Hour	$21.54	$39.15	$18.62	$32.44
Adj. Gross Return/FTE Labor........	$216,853	$249,736	$193,576	$220,035
Return to All Labor/FTE Labor....	$55,569	$82,144	$51,724	$85,867
Number of Cows per FTE Labor....	40	42	53	56
Lbs. of Milk Sold per FTE Labor..	578,624	646,295	436,093	463,154
All Labor Costs per Cow.................	$1,090	$1,049	$733	$695
All Labor Costs per Cwt. Eq..........	$5.85	$4.54	$7.72	$6.90
All Labor as % of Total Costs........	21.44%	20.63%	23.22%	22.98%
Capital Efficiency and Profit	**AVE**	**HP**	**AVE**	**HP**
Capital Cost per Cow (Dep+Int).....	$945	$920	$766	$754
Fixed Cost per Cow (DIRTI)	$1,364	$1,294	$1,036	$983
Capital Invested per Cow...............	$17,443	$16,939	$15,114	$15,913
Machinery Investment/Crop Acre	$928	$940	$778	$522
Livestock over All Investment %	18.27%	19.71%	20.60%	24.19%
Fixed Cost as % of Total Cost........	26.98%	26.01%	29.72%	29.79%
****Rate of Return on Assets..**	**6.23%**	**10.86%**	**6.06%**	**11.56%**
****Asset Turnover Ratio..........**	**35.51%**	**40.76%**	**30.03%**	**37.16%**
Asset Turnover in Years	**2.82**	**2.45**	**3.33**	**2.69**
****Operating Profit Margin.....**	**18.92%**	**28.53%**	**20.24%**	**36.86%**

Grass Milk Partial Budget



Partial budgets are popular means to determine the income and expense changes that occur with a certain production practice compared to what is currently being done. This author has used this technique with dairy producers wanting to consider robotic milking, low cost parlors, auto-calf feeders, and manure handling systems to name a few. The comparison comes back to what a particular farm is doing now. That's the beauty but also the beast of the partial budget analysis. The beauty is to determine if the new practice is better than the current practice. The beast is that maybe the current practice is very cost or labor inefficient that anything would be better.

So, always ask what the new practice is being compared to as there might be more alternative options that should be looked at. For example, many dairy producers want to look at a robotic milking system compared to a tie stall barn or old, outdated, inefficient parlor. If good levels of milk are achieved, the robot will probably look good, if not great. But, if our comparison would be to a TRANS Iowa Low Cost Parlor, there is a better chance the other systems would by less competitive due to a more efficient system being compared against.

In a partial GM budget, the added milk premium of $4-$5 is pretty crucial. Without that premium, the GM practice tends to be much less profitable in both budget and practice. Two factors of very high grain prices and very low production loss might challenge this thinking if no premiums were available.

In an example 100 cow herd, saving about an hour a day without grain feeding and $1,000 in equipment repair costs, with a 27% milk production loss from a 50 pound tank average per cow, saving $20 per cow per year in vet costs, $10 per cow per year in other costs, a partial budget shows -$816 in net annual financial impact for the total herd. Thus, both on-farm experiences and partial budget analysis show that GM can be competitive with organic milk production, with the possibility of it being significantly more or significantly less profitable depending on the farm and the management ability of the operator.

The GM practice reduces milk production per cow due to limitations in energy intake. Once this takes place, on a pasture based dairy, with possible further incentive and loss of milk on an organic dairy, then the question begins a further thought—how much more milk production would be lost if going to Once-a-Day (OAD) milking, too? Since some of the limitations of the OAD system have already been experienced in the GM system, the losses might not be additive, meaning the marginal loss in milk production would be less than if each practice alone was implemented versus being implemented together.

So, GM, with its current pricing structure of $4-$5 per cwt. increase in milk price premium, is a dairy system to be evaluated as seriously as other systems and other technology or management practices. The size of the GM market is the limiting factor but as the market grows, GM dairy producers have proven that the GM system can be competitive with other dairy production systems, organic or otherwise.

What's Not to Like about Once a Day Milking (OAD)?

In November, 2007, Dairy Today magazine stated: "Research suggests OAD milking can be more profitable than 2x. On average, milk solid (MS) yields (the end-all and be-all production parameter in New Zealand) decreased 5.6% per cow per year with 1x." Fast forward to the USA milk market changes whereby component pricing, especially the value of milkfat, continues to gain in importance in USA milk markets.

New Zealand does some great research and many of the dairy producers there are top notch for their environment. The USA has much different weather and price/cost variables at play in our dairy production system. For instance, New Zealand does not have as cost-effective energy supplementation sources as does the Midwest and Mideast USA where relatively cheaper supplementation can allow walking cows here longer distances or to increase our total dry matter intake for more milk production. On the flip-side, NZ tends to higher energy levels in their pasture grass forages. Energy intake by dairy cows on pasture in NZ seems to be a much bigger issue than here, even though it is still a big issue here. These concepts affect both the GM dairies and the OAD milking dairies to different degrees.

Some great, pencil-pushing USA dairy producers have been making great cases that, all things considered, OAD milking will continue making inroads in the US dairy industry, mostly in grazing, organic and GM operations. With that said, an in-depth analysis of OAD milking is warranted. A partial budget will be used to make a comparison. Part lactation OAD milking can and has been used with seasonal herds, especially in later lactation, just before dry-off.

The following discussion is adapted from an Irish research:

> In terms of part-season OAD, milking OAD in early to mid-lactation has been shown in international studies to improve labor productivity, animal body condition score and reproductive performance. The reduction in immediate milk solids production is approximately 20% post-calving and 15 to 20% in mid-lactation, with the magnitude of the reduction increasing with the duration of OAD milking. In addition, OAD milking in early to mid-lactation can have negative carry-over effects on later 2x production with the magnitude of the carry-over effect increasing as the duration of OAD increases.
>
> The average reduction in milk solids yield when herds are milked OAD varies from 18% to 25% depending on breed and lactation number. Research shows however that individual cows respond differently to OAD. *Some produce close to their previous 2x milk solids yield while others produce less.*

This last sentence gives hope to the OAD system. Will many of the cows produce close to their 2x milk solids yield? How much less will many of them produce? There is much hope for the OAD system, IF and especially IF, the right cows are being milked. There is high suspicion, but not fully necessary, that the right cows may have high levels of

Jersey, Jersey cross, and/or a well-adapted colored breed with Holstein-Fresian blood having a place in the mix.

Other considerations is the transition to OAD milking. For higher producing cows, transitioning to OAD over the course of 1-2 weeks may be warranted with a possible backing off the ration some, though research comparisons maintain constant feed supplement levels. In the Irish research, the narrowing of the difference in net cash flow projected in this analysis is supported by previous OAD farm accounts analysis from New Zealand (Anderle and Dalley, 2007). This means that in the first years of OAD milking the cash flow of changes to the new system is more dramatic but it narrows over subsequent years, though not returning to pre OAD levels.

From a purely net cash flow and profit perspective, the 2x milking seems to remain superior in financial performance. However, the variability among farms in their production drop still seems to warrant a closer look at this system. Reason being, there are some farms that have already taken a sizeable production hit with low grain feeding levels, due to the high cost of grain in their locale. Suspicion is that going to OAD milking in this system makes much more profit sense than a high producing herd with much cheaper energy feed sources at their disposal.

In addition, some farms have cows with genetics that might respond kinder to OAD milking as our Irish research friends report some cows did not lose much production when switched to OAD. Irish research also reports:
The results showed that when cows were milked OAD, daily milk solids (MS) production was reduced by 25% for the first 4-weeks. Where cows continued on OAD milking for weeks 5 and 6 of lactation, MS yield was 50% less than the 2x cows that were producing 1.95 kg (4.29 lbs.) MS/cow/day during those 2-weeks of lactation. Continuing milking OAD for a further 2-weeks i.e. weeks 7 and 8 of lactation, reduced daily MS yield to 70% of the 2x cows (0.76 vs. 2.46 kg MS/cow per day, respectively). When OAD cows returned to 2x milking, production recovered and MS yield was similar for all treatments across the 35-week lactation period (401 kg/cow).

Source: Economics of transitioning to Once A Day milking, George Ramsbottom1, Brian Hilliard2 and Brendan Horan3, 1Teagasc, Oak Park, Carlow; 2Teagasc, Shandon, Dungarvan, Co. Waterford; 3Teagasc Moorepark, Fermoy, Co. Cork.

Like an analysis comparing a present milking system to a robotic milking system, some of the biggest variables are the milk price, milk production changes, labor changes, the cost of labor and amount and cost of feed before and after the change. Based on a 140 cow herd with a 4.5 hour savings in labor going to OAD, at $16 per hour, equals $72 in labor savings per day. Losing even 10% of the value of milk production (116 cows milking x 60 lbs x 10% loss x $0.30/lb) might cost $208 per day for a year-round herd averaging 60 pounds of organic milk per cow per day. About 25% of the production loss could be estimated to be made up with increased milk solids percentage or $52 or $156. Subtracting $72 labor savings from $156 reduced income, leaves $84 per day on the table to determine if it is worth it to go to OAD milking, right? Probably wrong as this very quick and dirty analysis can mislead us into thinking it is not a good deal! What about feed costs changes? What about equipment repair and milk house supplies, electricity, skid loader hours and labor availability, flexibility and management thereof? Point is, there are many quick and dirty analysis done to discern GM, OAD milking, and many other practices that can lead to somewhat or faulty conclusions. On the other hand, sometimes our best guestimates can be far from actual results that can lead to somewhat faulty reality as well.

So, with OAD milking, as with GM, many production and price variables come into play. Other costs that have been identified by dairy producers to be lower with OAD milking:

1) Veterinary costs have been estimated to reduce 10% from health benefits of only bringing cows for milking once per day. Some challenges to SCC may negate this benefit but assumption remains of the decrease.
2) Milk house and parlor supplies and operation should be cut in about half in the way of soaps, sanitizers, equipment repair, teat dip, inflations. This can be a very significant savings in costs.
3) Manure and feed handling, both in labor and equipment usage and repair, has potential for significant savings as well.
4) Slightly lower quality feed usage due to lower energy needs of dairy cows (less milk and less walking) ONLY if not also attempting GM dairying.
5) Labor flexibility in labor demands, the cost of labor and the availability of labor are all major reasons why labor issues combine to be the biggest reason to consider OAD milking.
6) Possible lower priced or lower quality feed needs due to lower energy demand. However, if grain is reduced in the process, higher quality forage feeds may be needed.

OAD Partial Budget Analysis

First question one might ask in consideration of OAD milking is "What is the milk price?" On a 100 cow herd, a simple $1/cwt. drop in milk price changes the net annual financial impact of an OAD milking analysis by a positive $4,000, approximately. Thus, the lower the milk price, the more one can afford to lose the projected 20-30% of milk production. Maybe this OAD milking is more advantageous for non-organic, grazing herds that experience a lower commercial milk price? Maybe the loss of milk income cannot even be overcome by generous reductions in costs or generous thoughts regarding quality of life and not having to be back for the evening milking? Maybe there are more variables at play?

The "Economics of OAD Milking or GM" spreadsheet was designed to assist producers make the decision of adopting OAD milking and/or Grass Milk (GM). The sample analysis that follows considers OAD changes in a 100 cow organic herd with milk priced at $30/cwt.

The herd currently yields 53 pounds per cow daily milk average with an estimated 24% drop in milk yield but only a 19.79% drop in milk solids. Somatic cell count increase of 5% on a herd that was feeding 17.5 pounds of grain supplement as is (with corn silage counted half as grain). After going OAD, it is estimated the grain feeding levels would be 9 pounds per cow per day, or about half. The DMI of the herd was 48.46 lbs. per cow per day, but projected at 45.10 or 3.4 pounds per cow per day less for these 1,380 pound cows. Cull rates reduced a projected 3% but realize culling will be highly variable early on determining which cows fit the OAD system.

Electrical costs decreased by $25 per cow annually, water and chemical costs decreased by $25 per cow annually, teat dip and inflations costs decreased by $35 per cow annually. Change in milking system and other repairs is -$2,500. Labor decreases a projected 2.25 hours per day for milking with set-up and clean-up. Another hour was saved daily handling feed and manure, and one hour per day saved not dealing with labor management issues, the owner's or someone else's. All of these variables can be argued, higher or lower, but used as examples.

Obviously, every farm will experience differences in the OAD milking change. But, with this example, the net annual financial impact was a $20,035 loss. Put a $20,000 value on the "psychological income" or "quality of life" factor for not having to milk a second time daily and the loss is cut to $35, or break-even, when finances and quality of life are tied in. This spreadsheet printout depicts the analysis of the above discussion.

Economics of Once a Day (OAD) Milking and/or Grass Milk (GM) — **Partial Budget Estimator Only!**

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Changes in Incomes			Changes in Other Expenses	
Milk Production	-$106,309	ISU	Milking System and Other Repair Costs	-$2,500
Fat/Protein/Other Solids	$24,873		Feed Costs	-$38,380
Milk SCC Premiums	-$1,490	Extension	Cow Replacement Costs	-$5,400
Premium if Grass Milk (GM)	$0		Utilities and Supplies	-$8,500
Cull Cow Sales	-$1,950	D	Veterinary and Reproduction	-$2,000
Total Changes in Incomes	-$84,876	A	**Total Changes in Other Expenses**	-$56,780
Savings in Labor		I		
Reduced Feeding and Other Labor	$6,388	R	**NET ANNUAL FINANCIAL IMPACT =**	**-$37**
Reduced Milking Labor	$14,372	Y	**Annual Value to Quality of Life =**	$20,000
Reduced Labor Management	$7,300	TEAM	**with Annual Value of Quality of Life =**	**$19,963**
Total Labor Savings	$28,059		**Note: User Inputs are Blue Font Cells Only!!**	

Herd and Financial Assumptions — **Units**

Herd Size -- both milking and dry =		100	cows	**Fat**	**Protein**	**Other Solids**
Estimated Milk Price	**$30.43** cwt. Yours >	$25.25	/cwt $/lb >	$3.35	$2.44	$1.44
Grass Milk Premium with Soil additive/other refund		$0.00	per cwt. %solids>	4.25%	3.30%	5.65%
Milk Production, Herd Health, Reproduction and Milk Quality Changes				**Fat**	**Protein**	**Other Solids**
Average Daily Lbs of Milk per Cow per Day		53.0	current lbs/cow	**2.25**	**1.75**	**2.99**
IF OAD milking, predict **ECM** % loss of OAD		6%	Projected lbs/cow	**1.86**	**1.43**	**2.32**
Projected Milk Production after Change	**-24.07%**	**40.2**	% change lbs/cow	**-17.37%**	**-18.32%**	**-22.46%**
Energy Corrected Milk lbs/cow/day	**58.5**	**Before After**	**47.0**	**Total Solids % Change =**		**-19.79%**
4.63%	Projected Change in Milk Fat %	0.375%	Loss MS lbs/cow/day	**-0.39**	**-0.32**	**-0.67**
3.55%	Projected Change in Milk Protein %	0.250%	SolidsGain/cow/day	**$0.51**	**$0.25**	**$0.00**
5.77%	Projected Change in Other Solids %	0.120%	Milk Value Lost/cow	$1,063.09	Solids Gain/cow	$248.73
Feed Costs and Intake Changes	**Cow Weight**	1380	lbs net/cow =	**-$814.36**	**Grain DM %**	**Grain DM lbs.**
Current Pounds of Grain/Supplement Fed as is		17.5	lbs./cow/day	*Count Corn*	85.00%	**14.875**
Future Pounds of Grain/Supplement Fed as is		9	lbs./cow/day	*Silage at ~1/2*	87.00%	**7.83**
Expected Grain:Forage Displacement Rate		67%	or 1 lb. grain fed displaces =		**0.33**	lbs. of forage
ESTIMATED: Current lbs. DM of Forage/Other Fed		**33.58**	lbs./cow/day	DMI GM Loss :	**2.38**	lbs. DM
ESTIMATED: Total Current DMI	**Before**	**48.46**	lbs./cow/day	DMI on OAD =	**47.43**	lbs. DM
ESTIMATED lbs. DM Grain/Forage/Other Fed	**After**	**45.10**	lbs./cow/day	>>> or >>>	**3.4**	lbs. less DMI
Lbs of Dry Matter (DM) per lb of Milk	**Before**	**0.83**	lb DM/lb Milk	Highly depends on energy density of ration		
Estimated Lbs of DM per lb of Milk	**After**	**0.96**	lb DM/lb Milk	Difference =	**0.13**	lb DM/lb Milk
Cost per lb of Dry Matter	**Before**	$0.145	$ per lb DM	Typical range of $0.8 - $0.15		
Estimated Cost per lb of Dry Matter	**After**	$0.130	$ per lb DM	Difference =	**$0.0150**	$ per lb DM

Labor Changes			
Current Hours of Milking Labor with setup&cleanup	4.75	hours per day	include set-up and clean-up
Anticipated Hours of Milking Labor after Change	2.50	hours per day	include set-up and clean-up
Future Labor Rate for Milking/Feeding, etc	$17.50	$ per hour	Typical rate is $10 - $20 with benefits
Reduced Hours for Feeding and Manure Handling	1.00	hours per day	Include pasture mgt/cattle handling
Reduced Hours for Labor Management	1.00	hours per day	Include hiring, training, overseeing, etc.
Labor Rate for Labor Management	$20.00	$ per hour	Typical rate of $15 - $25
Culling and Herd Replacement Changes			
Cost of Replacement Heifer	$1,800	$ per heifer	Typical range of $1,300 - $2,200
Cull Price per Cow (or sold for milking purposes)	$650	$ per cow	Typcial range of $350 - $1,200
Expected % Increase in Annual Turnover Rate	-3.00%	Variable depending how cows work in GM and/or OAD system	
Utilities, Supply, Repair, Milk Quality, Veterinary, Reproduction and Other Changes			
Anticipated Change in Electricity cost	-$25.00	$/cow/year	
Anticipated Change in Water/Chemical Cost	-$25.00	$/cow/year	
Anticipated Change in Teat Dip/Inflations Cost	-$35.00	$/cow/year	
Annual ***Change*** in Milking System/Other Repairs	-$2,500	~skid steer, manure/feed handling equipment, milk pump, etc.	
SCC Premium per every 1,000 SCC Change	$0.0063	$ per cwt	Typically $0.001 - $0.004/cwt-highly variable
Current Annual Bulk Tank Average SCC	155,000	SCC per ml	Typical range of 100,000 - 400,000 SCC
Estimated Percent Change in SCC	5.0	%	Typically increases 10-20% OAD
Estimated Change in Veterinary/Reproduction/Other	-$20	$/cow/year	Typically decrease 10% OAD milking; 10% GM

The authors have used their best judgement and shall not be liable for any use of this software decision-making aid.

Simply dropping the milk price to $28.00 per cwt. drops the annual financial impact to -$11,615. Dropping the milk price to $25.25 per cwt. drops the annual financial impact to -$37 per cwt., a break-even point just on the financial side, not factoring in the quality of life. Bottom line is that OAD milking discussions need serious discernment as to the projected milk price as one of the main variables in the discussion. Too often, the focus is only on the drop in milk production or the savings in feed which are highly significant, but are missing an important pieces.

Bottom line with OAD milking, in concurrence with Irish research, it tends not the most profitable avenue if that is the main goal, depending on the price of milk and a host of other variables, labor being a big one.

Does OAD Milking Compliment Grass Milk?

If we use the same sample herd and most of the same assumptions, coupling the OAD milking with GM, the production losses are most likely not additive and the components might further increase. But, little to no research is available, especially in the USA, only some producer experiences. Once on GM however, the New Zealand (NZ) experiences become more relative as the grain energy source is taken out of the production equation.

The following discussion, also from the NZ website, has merit here, too, as switching to full season OAD milking will likely impact your whole farm system. Before changing your farm system it is important to assess the potential benefits (if any) and whether it fits with your future aspirations and goals. This tool can be used as a start to the assessment process and by selecting the most relevant answer to the 10 questions below will offer guidance as to whether OAD may offer benefits in your circumstances.

So, this author took the test to see with answers of OAD being beneficial (1^{st} box), not clear (2^{nd} box), or a red flag (3^{rd}box). Here is a sample result:

Question

1. Are you looking for a better work/life balance, or finding milking physically challenging?
Yes, it'd be great to spend more time with the kids or on hobbies.

2. Do you find it difficult to attract/retain suitable staff?
Yes, attracting and retaining staff is difficult

3. How would you use the time saved by milking OAD?
I could employ less staff, without increasing the workload on remaining staff

4. Would milking OAD avoid capital expenditure to expand or replace dairy infrastructure?
Yes, I could increase my herd size without having to build a new dairy if I used OAD milking

5. Is your herd walking more than 2km (1 mile) to the furthest paddock?
Yes, my herd has to do a lot of walking

6. Does your farm have large differences in altitude?
Yes, there are significant differences between the highest and lowest points on the farm

7. Are you meeting industry targets for reproductive performance?
No, I have empty rates higher than 10%

8. Can your business sustain at least one season of reduced milksolids production per cow (e.g. 10-20%)?
Yes, but I can't manage a higher replacement rate while transitioning to OAD

9. Can you afford for your bulk milk SCC to increase by 20-40,000?
No, this increase would mean I am close to receiving milk company penalties

10. What is the genetic make up of your herd?
My herd is predominantly KiwiCross

Breed of cow may play importance to the results but producers are working with both Holsteins to Jerseys and many crossbreds in between. Current NZ herds that have adopted OAD are reported on the NZ dairy website (Dairy NZ website: www.dairynz.co.nz) to have more Jerseys and crossbreeds and fewer Holstein-Friesians, and use more Jersey and crossbred semen. Either NZ producers believe Jerseys are more suited or with the already lower production, the Jersey farmers may have been the early adapters of OAD.

Though the tendency may be away from Holsteins, milk volume is still important and the crossbred cows may have an advantage, in certain ways, with longetivity, health traits, udder conformation and total dollar value of income over costs. Even purebreds within the same herd might be advantageous to keep volume up with components. But, like grass varieties, there is much variation within breeds that can be found across breeds.

Another NZ dataset was published in 2007 that compared the financial performance of 22 farms that has switched from TAD to full season OAD milking. The authors of this paper reported:

- a 25% reduction in farm working expenses upon switching to OAD
- a 6% reduction in total milk solids production FROM GM!!
- farmers switching to OAD milking for lifestyle reasons tended to make lower financial gains than those seeking further farm development.

Other comments skimming conversation from NZ producers and academics share that going to OAD loses about 25% in operating profit margin. These producers are already GM producers! Genetics will play a larger role for production. Udder conformation is especially important under full season OAD, especially for Jersey herds as udder ligaments and breakdowns tend to have more problems with larger volumes of milk to carry from pasture to parlor. Cows with mastitis history or high SCC might be good candidates to cull before OAD milking begins as SCC can spike to double with the first couple days of OAD milking.

It is reasonable expectation that around 8-10% of cows may dry themselves up early, so be mentally and financially prepared to cull on milk production. If cows dry up early once, they will tend to do it again. Later lactation cows going on once a day may just prepare for dry-off so beware.

The heifer milk gap between cows and heifers may be larger than one is accustomed to seeing. And, keep an eye out for losses of milk production late lactation and determine if it's a result of energy partitioning to body condition versus milk production as a result of energy deficient herds not feeding enough high energy forage. Genetics is not a replacement for low quality feed or low level management.

From travels to farms, it is possible to attain 6,000 to 7,500 pounds of milk production per cow annually doubling up the systems but pressure to cut lactations short mounts when cows might give 20 pounds per day or even less toward the end of lactation. Most of the analysis done by this author tends to use 330 days in milk to better correlate with a 13 month calving interval that seems common in the dairy industry. This reproductive efficiency variable needs more research to determine what calving interval is attainable and most profitable.

To make up the difference in milk solids sold, increasing stocking rate can assist as less feed will be eaten, in the 3-5 lbs of DM per cow per day. Many think it should be higher but substitution rates and partitioning to body fat differences can change the equation in both the OAD and GM.

OAD Not Need Be All or Nothing

One of the most profitable dairy farm financial analysis done in the USA was on a seasonal, grass dairy where Once-a-day (OAD)milking was done toward later lactation, like Thanksgiving to dry-off just before Christmas. If this herd was organic, the financial results would have been tremendous in those years. A worthwhile comparison of OAD twice-a-day (TAD) for three months in late lactation is also shared on the NZ website with the following results:

- 10% decrease in milk solids production (while cows were on OAD)
- ¼ body condition score (BCS) unit increase at dry off
- Approximately 3% decrease in intake
- The trial discovered production per cow dropped 10 percent while cows were being milked OAD. In this particular trial, the 10 percent loss in milk solids production occurred when production was past its peak and cows had already delivered about two thirds of their season's total yield. This meant the overall impact on the season's production was approximately four percent.
- Small decline in feed intake
- The trial found the decline in feed intake by the OAD herd was not as great as expected. Cows milked OAD ate about three percent less than cows milked TAD.
- DairyNZ researchers have also dispelled the "mammary memory" myth that implies putting a cow on OAD will negatively impact on future lactations.

Partial Budget Analysis of Combining OAD and GM

Using the same prior herd example for OAD, adding in a $5/cwt. premium for GM and adding a 2.5 point increase point for fat, 1.5 increase for protein and 0.4 increase for other solids percentages, the projected milk production ends up at 32.4 pounds per cow daily over the 330 day lactation. The lactation, however, would probably be shortened up as reproduction would tend to increase, but it is not assumed in this example. Total estimated dry matter for the lactating cows is 42.81 for these 1,380 pound cows.

Predicted pounds of DM per lb of milk changed from .83 to 1.09 in this scenario. The estimated cost of feed per pound of dry matter went from $0.114 to $0.095 cents due to the less grain feeding and higher pasture intakes of cheaper feed. Each pound of grain fed displaced only 0.67 lbs in this example so dropping the grain is not an equal pound for pound proposition. All other variables were held similar to the previous OAD example even though a case could be made for fewer repairs, better reproduction and lower vet bills by combining the OAD with GM.

Bottom line is that the additional net annual financial impact is only -$1,112 by combining these two practices. If the quality of life factor at $ 20,000 is at play, this can be a worthwhile decision if quality of life is balanced with the loss of profit.

With our higher producing cows relative to NZ, this example predicts a loss of milk solids in the 33% range with milk production loss of close to 39%. This is higher than NZ research but again, realize the higher level of production to begin with, the cheaper feed energy sources and often even a higher milk price to boot. All of these factors weigh in on the decision.

If the questions asked to get to a decision is:

1) Will I be better off financially with GM, OAD or both in combination? The tendency would be to answer a strong no to OAD, a good maybe to GM, and if GM is working fine, then OAD may be a decent choice, probably more for quality of life reasons than profit.
2) Can I get by with OAD? Maybe, but the opportunity costs of doing it might be much higher than willing to forgo for most, though not all.
3) Is my herd ready for OAD or GM? There are so many variables at play that this question is difficult to answer or even put a highly educated guess on, even with the spreadsheet tool to use.
4) If I am going to sell my dairy herd if I have to milk twice a day for quality of life reasons, is OAD milking better than an alternative, like a beef herd, cropping the farm or an off-farm job?

Bottom line of the OAD and GM Discussion

Can OAD and/or GM work? Yes, both can work and maybe best in combination. Consider what works for one may not work as well for others and how does one define work? If working is defined as seeking out a living doing it, then probably so for OAD, and moreso for GM. If working is defined as building wealth over time, the organic versions of OAD and GM might tend to better financially allow these systems to work due to probably higher margins thanks to the higher milk prices. However, the organic versions also create a sort of paradox as the higher organic prices create the better margin to allow it but at the same time the higher milk prices make it more difficult to forgo the loss in milk and hiring the labor to do it.

And lastly, even if the net annual financial impact is negative, what is the value of OAD milking and the flexibility and lifestyle it affords? Partial budget scenarios are helpful making decisions on each particular farm, but whole farm annual financial budgets and profit analysis, complete with cash flow implications, need to be part of the decision making process.

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