Lessons Learned from Grazing Dairies

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OBJECTIVE

The intent of this paper is to examine concepts of pasture-based dairy production systems using information and concepts from successful dairy graziers as well as data from research studies. Some principles may be applicable to other dairy production systems.

INTRODUCTION

For a number of years, entertainer Jeff Foxworthy has related to rural folks with his "You might be a redneck if …." and David Letterman has become notorious for his "Top 10" list. In combining those concepts, my interactions with dairy graziers over the years have led to my **"top ten reasons that you might be a seasonal pasture-based dairy farmer if …"**

#10 Seasonal breeding and calving is often used. Seasonal breeding and calving are not required to have a successful pasture-based dairy farm but cows bred to calve in one or possibly two compact seasons can simplify animal management. Use of two calving seasons allows more consistent year-round production of milk if that is of concern for cash flow or is a requirement for marketing milk. Potential advantages for using seasonal breeding and calving in a dairy management system include matching forage availability to nutrient needs resulting in lower feeding costs; having fewer different groups of animals at any one time; being able to concentrate on specific tasks within short periods; and to vary the farm workload across the year.

A particular season of calving may be based on personal preference. One Vermont dairy producer likes for his cows to be dry in late summer so that he can go fishing. He indicated a need to feed cows in the winter anyway so milking in fall, winter, and spring and to take his break in summer suited him better. Certainly, if a high percentage of farms chose to be seasonal in the same season, price incentives would likely occur for calving at other times of the year.

There are also some potential disadvantages to seasonal calving. Matching the forage availability to the calving season may not result in the highest average milk prices and farm net income may not be enhanced even with lower feeding costs. Management of cash flow can be an issue with variable levels of milk income across the year. In seasonal herds, there is much more work from the start of calving through rebreeding which could add to farm family stress levels. Some dairy producers may prefer to have a more consistent workload for themselves and their employees. There is risk involved with needing to breed all the cows in a short period of time. Low conception rates (Washburn et al, 2002a), untimely disease outbreaks, or a nutritional crisis could lead to

failure to get cows bred within a reasonable period, thereby disrupting a seasonal calving strategy.

Typically seasonal dairy graziers try to have 80 to 90 % cows bred to calve in 9 to 12 weeks by using a combination of AI and natural service. See Table 1 for expected pregnancy percentages at various rates of heat detection (submission) and conception for breeding seasons ranging from 3 weeks to 14 weeks. Note that pregnancy rates after 3 weeks of breeding in a seasonal system have to be much higher than 21-day pregnancy rates typically achieved in year-round calving herds.

In New Zealand, 897 cows of which 14% were Jersey and 86% were Holstein-Friesian were evaluated for fertility in 2,594 lactations from 1986 to 2000 (Roche et al., 2007). After only 3 weeks of breeding, 50 to 65% of cows were pregnant with higher proportions pregnant related to less body condition loss postpartum and to more weight gain during the breeding season. Breeding for 6 weeks resulted in 69 to 85% pregnant whereas 12 weeks of breeding resulted in 87 to 97% pregnancy. The high success rate by 21 days and beyond is consistent with a very high percentage of cyclic cows and very high conception rates.

In our own seasonal breeding work in North Carolina, conception rates were higher in Jerseys (60%) than Holsteins (50%) and pregnancy rates after 75 days (~11 weeks) of breeding were 78% and 58%, respectively (Washburn et al., 2002b). Part of the difference was that only 86% of Holstein cows were detected in estrus whereas 96% of Jerseys were detected in estrus. No effect of season of breeding (fall vs. spring) was observed. Although not significant, pasture-fed Holsteins had numerically higher pregnancy rates than Holsteins fed a total mixed ration. More recently, fertility in a fall-calving pasture-based herd of cows with Jerseys, Holsteins, and crossbred cows has been summarized (Williams, 2007). Across the 2005 and 2006 breeding seasons, 90 days (about 13 weeks) of AI breeding resulted in 90% of Jersey cows, 86% of crossbred cows, but only 70% of Holstein cows being confirmed pregnant. Fewer Holsteins were cyclic early after calving and Holsteins also had lower first service conception rates in both years.

In personal communication with several seasonal dairy graziers in the US, success rates are variable with a combination of AI and natural service breeding. Reaching 80 to 90% pregnant after 8 to 12 weeks of breeding is often achieved but is not guaranteed. In many cases, such herds have mostly crossbred cows and/or a significant influence of Jersey or New Zealand Friesian genetics. I am familiar with one dairy grazier who uses 100% AI and calves 90 head of mostly Jersey/JerseyX cows in a 50-day period.

Because of potentially adverse effects of synchronization regimens on conception among cyclic cows, it is more common to use hormonal intervention only on cows that are not cyclic at the planned start of breeding (Rhodes et al., 2003). Also, New Zealand is now selecting bulls for shorter gestation length for use in breeding late in the season so that those cows will calve a few days sooner and have more recovery time in the next lactation. Daughter pregnancy rate (DPR) has been available in the US since 2003 (http://aipl.arsusda.gov/reference/nmcalc.htm) and dairy graziers interested in seasonal

calving can now avoid using bulls whose daughters are less fertile without giving up much on Net Merit$ (Norman et al., 2006).

Table 1. Cumulative pregnancy rates[1] at varied rates of submission, conception, and length of breeding season.

Submission Rate[2]	Conception Rate[3]	Pregnant by 3 wk	Pregnant by 6 wk	Pregnant by 9 wk	Pregnant by 12 wk	Pregnant by 14 wk
90	60	54%	79%	90%	95%	97%
90	48	43%	68%	82%	90%	93%
90	36	32%	54%	69%	79%	83%
80	60	48%	73%	86%	93%	95%
80	48	38%	62%	77%	86%	89%
80	36	29%	49%	64%	74%	79%
70	60	42%	66%	81%	90%	94%
70	48	34%	56%	71%	81%	87%
70	36	25%	44%	58%	69%	74%

[1]Pregnancy rates are the percentage of cows that conceive in a given breeding period. Pregnancy rates of 80% may be acceptable but above 90% is a good target for a total breeding period, usually between 8 and 14 weeks in length.

[2]Submission rate is the proportion of cows that were cyclic and detected in estrus for insemination

[3]Conception rate is the proportion of inseminated cows that conceive.

#9 Pasture is the primary forage with cows and heifers doing most of the harvest. Cows do more of the work and expensive equipment operated by fossil fuel and a driver is not needed as much for harvesting or feeding. This does not mean that stored forages and supplemental concentrates are not used but rather that pasture is managed intensively for high forage quality and yield in order to optimize production. In such a system, milk produced per unit of pasture area and overall profitability is emphasized more than milk yields per cow.

Sufficient pasture land must be available within walking distance (usually within 1 mile) of the milking facilities. A milking “platform” of at least 0.4 acre per cow can be effectively used for a dairy grazing system although having more like 0.7 to 1.0 acre per cow would ensure that most of the forage for lactating cows could come from pasture with moderate supplementation. A pasture-only system would require more land to support the milking herd, the dry cows, and the replacement animals.

Matching the feed resources to the nutrient needs of the animal is an important consideration for many graziers. In environments where cool season perennial pastures are prevalent, late winter or early spring calving is usually implemented so that cows have access to abundant high quality pasture as they reach peak milk production and approach the time of rebreeding. However, in the Southeastern US, breeding cows during June through October poses a physiological problem due to heat stress. Higher ambient temperatures often accompanied with high humidity result in very low conception rates, thereby reducing the proportion of cows that successfully breed within

the desired period. In such areas, compact calving seasons usually are planned within a range of dates starting from the middle of August until late January so that breeding can be done during cooler times of the year. This usually means that a combination of warm season and cool season annual and perennial forages may be needed.

With higher costs of nitrogen fertilizers in recent years, pastures that include mixtures of grasses and legumes may be more desirable than grasses alone. For pastures with higher percentages of legumes that can cause bloat, careful grazing management is needed to ensure that cows do not have problems. Use of a bloat-preventing additive to a feed supplement or water source could be considered but that is usually an expensive alternative compared to adapting animals slowly to legume pastures and especially avoiding wet, lush legume pastures when cows are particularly hungry.

Inconsistent rainfall patterns result in variable amounts of available pasture. Therefore, irrigation or other drought-management strategies need to be considered. Some producers elect to have extra stored forages available while others have used irrigation systems both to grow pastures and to provide a means of cooling cows on pasture.

8. Crossbreeding is generally the rule rather than the exception. With the changes in dairy genetics observed in the past 25 years including detrimental effects on various fitness traits associated with selection for high milk production, the possibility exists that crossbreeding may be even more economically beneficial now. Holstein dairy cattle still maintain a substantial advantage over other breeds and most crosses in fluid milk production. However, crossbreeding in dairy cattle can be economically competitive with pure breeds when multiple traits are evaluated within a production system.

Although selection within breed can address various limitations in dairy genetics across time, the possibility exists that crossbreeding may provide a more immediate solution for some traits under certain production systems and pricing structures. Jersey and Holstein crosses are the most common and are becoming well documented but many other breed combinations are of interest. Continued within-breed selection and use of crossbreeding together will likely be an optimal approach for maintaining genetic diversity and in improving future production efficiencies in various systems.

A simulation study by Lopez-Villalobos et al. (2000) in New Zealand examined economic implications of selection and breeding strategies among Holstein-Friesians (H), Jerseys (J), and Ayrshires (A). The crossbred groups were projected at equilibrium for the various 2-breed (HJ, HA, JA) and 3-breed (HJA) combinations. Relative net income per hectare or acre is the common measurement of economic efficiency for New Zealand dairy farmers and high components are valued more than milk volume. By setting projected net income per hectare at 100% for the Holstein-Friesian (H) herd, then the other breed groups ranked as follows: HJ = 127%, HJA = 124%, JA = 117%, J = 108%, HA = 108%, and A = 85%. Changing values for beef and ratios of fat and protein affected the relative rankings some but in all scenarios, herds with crosses of Holsteins and Jerseys were projected to be most profitable per unit of land area (Lopez-Villalobos et al., 2000).

Under Australian conditions and pricing structures, performance data from cattle in 14 commercial herds were used in an economic model that projected a substantial operating profit advantage for a herd of Jersey x Holstein-Friesian crossbred cattle compared to a comparable herd (5.6% fewer cows because of cow size) of pure Holstein-Friesians (Pyman, 2007).

Using data available in 2000 through USDA, VanRaden and Sanders (2003) examined breed differences, heterosis, and net economic merit of various breeds and crosses. They concluded that Holsteins excelled for Fluid Merit $ based on milk volume (low value on components) over all other breeds or crosses. However, the average F1 crosses of Brown Swiss or Jersey with Holstein had an advantage over average Holsteins in Net Merit $ (62% weighting on yield traits with 57% on fat and protein; 38% on other economic traits including PL) and for Cheese Merit $ (high weighting on protein and fat). Because of the large population of Holsteins, mating of elite animals within Holstein was still an advantage over elite crossbreds in their calculations. However, changes in the weighting of Net Merit $ with the addition of daughter pregnancy rate and calving ability in recent years (http://aipl.arsusda.gov/reference/nmcalc.htm) may favor crossbred cattle in future evaluations.

 # *7. Calves are group fed and started on pasture at an early age.* Seasonal calving facilitates group feeding strategies before weaning. With all the calves coming in a short period, group feeding is more efficient and if that can be done on pasture, then calves get learn to graze well before weaning, not unlike their beef cousins.

Group feeding of dairy calves is opposite typical recommendations on confinement farms where calves are prevented from being in direct contact with each other until after weaning. A key difference in the two systems is that with seasonal calving, there is a break in the cycle such that areas used for calf rearing are not inhabited 365 days a year. This reduces the possibility of a build-up of disease-causing organisms. If two calving seasons are used, more care is needed to ensure that calf-rearing areas are not contaminated from earlier use. Having two distinct calf rearing areas for the different seasons would be one option. Without seasonal calving, starting calves on pasture earlier can be done but group feeding is less of an advantage because of the many smaller groups needed over a year.

Although group feeding calves a high quality milk replacer is probably okay, most all the dairy graziers I know use whole milk (including waste milk) for their calves. I know of no graziers that pasteurize either the colostrum or the milk before feeding but calf health for group feeding seems to range from satisfactory to excellent. Differences likely are in the ability of calf feeders to quickly spot calves that are a bit slow, droopy, or need more attention. Such calves can be pulled from the group they are in and kept with a younger, smaller, and less aggressive group.

What size groups? I have personally observed as many as 100 calves in a pasture chasing two 60-nipple milk feeders being pulled by a small utility tractor. In an adjacent pasture, 100 more calves were waiting their turn at the same milk feeders. At that same farm, calves were handled in small groups with plywood dividers set up on a small

sectioned milk feeder with 9 nipples so that each calf could learn to nurse effectively before being put into successively larger groups.

Many graziers choose to use nipple feeders and feed their calves twice daily and often go to once daily feeding before weaning. Other farms including our research station at the Center for Environmental Farming Systems (CEFS) in Goldsboro, NC train calves to drink milk out of an open pail and then put them in groups and feed milk in a trough. At CEFS, our fall-born calves usually spend between 7 and 14 days in a calf hutch before they are grouped in groups of about 8 to 10 calves and later in groups of about 24 to 30 calves. Calves in groups are fed about a gallon of milk per calf once a day in an open trough while out on an annual ryegrass pasture, along with a calf starter grain mix and a source of fresh water.

We examined cross-sucking behavior in groups of calves fed via a nipple barrel in contrast to being fed using a trough. Calves reared both ways grew similarly but the trough-fed calves did have more cross sucking. Cross sucking was mostly on ears of other calves and just after a meal but that behavior did not persist after weaning (Jackson and Washburn, 2008). In either type of system, an occasional calf may either have to have a nose guard attached to prevent sucking on other calves' mammary areas or be culled from the herd.

Some dairy graziers (particularly among organic producers) choose to let dairy calves nurse their mothers or specific nurse cows through weaning. This usually gets calves off to a very good start but can be tricky to manage to avoid calves using more valuable milk than needed as well as getting too fat and potentially interfering with mammary gland development.

 # 6. You think that cows should be milked in no more than 2.5 hours and labor efficiency is important. Although most dairy farmers are interested in labor efficiency, dairy graziers typically believe in getting milking done quickly and then moving on to something else.

There seem to be two philosophies that have evolved regarding milking systems. One philosophy is that investment in the milking system is very substantial so it is important to keep the system active as much as possible in order to dilute those fixed costs. That philosophy has resulted in many large dairy farms milking cows three times per day with each milking shift at about 7 hours such that the milking parlor is operating nearly around the clock.

In contrast, many dairy graziers generally believe that there are better things to do than milk cows all day, so they typically design systems to milk the herd quickly and only milk twice a day. We actually are now seeing dairy herds in New Zealand and a few in the US going to once-a-day milking as a life-style choice, particularly for those folks involved in both milking and managing the herd. For dairy farms, providing milk to a solids or cheese market, once-a-day milking has some advantages in that the volume of milk is reduced more than the solids production with a less frequent milking regimen.

Because of the efficiencies of cow throughput and relatively lower investment, swing-type milking systems are very common on pasture-based dairy farms up to about 600 cows. Swing systems may have 8 or 10 milking units for smaller herds of 100 cows or fewer but could be as large as 45 milking units for herds of 500 to 600 cows. The swing parlors are at about a 70-degree angle with about 28 inches between units. Large rotary systems with 60 or more stalls are more likely to be used on very large pasture-based herds.

New Zealand investors have set up seasonal pasture-based dairy farms in Missouri, Georgia, and Mississippi in the past few years and are considering other areas within the region. Typically, such dairy farms would include 300 to 500 acres of pasture with or without irrigation, about 500 cows, a swing-40 to a swing- 45 milking system, with plans to operate it using either 3 or 4 people including the herd manager.

 # *5. Your cows take care of 85% of the manure spreading.* Our data show that urine and feces are well distributed on intensively managed paddocks and highly correlated with time spent on pasture. Less manure storage is needed and cows do a good job of recycling manure nutrients if pastures are managed intensively (White et al., 2001). Therefore, it takes about 7 pasture-based cows to equal 1 confinement cow in the amount of manure storage and handling needed. This certainly has implications in working with regulatory agencies and engineers in designing manure handling facilities for pasture-based dairy farms.

Within an intensively managed pasture system, the location of water or shade within a paddock can result in a disproportionate amount of feces and urine being deposited near those areas. Having flexibility to move watering troughs to multiple locations, avoiding use of shade except as necessary, and having designated shade paddocks with plenty of shade can reduce that effect.

With a healthy pasture system, there can be abundant activity of dung beetles, earthworms, and other biological agents that help to breakdown cow pies and redistribute the nutrients. For example, 28 species of dung beetles have been identified in dairy pastures in NC with activity varying by species across the year (Bertone et al., 2005). In summer, when several species of dung beetles are active, it is not unusual for dung beetles to land on a fresh dung pat within seconds after it is dropped and within a few days there is often soil worked up through the dung pat and the original pat is only a dried-up shell on the surface.

 # *4. Investing in things that rust is not your thing.* Although most graziers will have some equipment, often they use custom harvesting and usually emphasize cattle and milking systems more than field work.

I was only a dairy farm recently with about 100 cows and I think that he had 10 tractors as well as many other pieces of farm machinery- a ratio that seemed truly out of balance. A typical family dairy farm in much of the Southeast may have 150 to 300 cows, would grow most of their own forages including corn and small grains for silages, as well as hay crops. Some farms may produce corn for grain but many would purchase

much of their grain supplements. On such farms, there always seems to be intensive planting and harvesting seasons that may nearly overlap.

In addition, such farms will be calving and milking cows year around often in a milking parlor perhaps designed many years ago for a herd half the size it is now. In order to get their crops planted and harvested in a timely manner, they likely own (or have financed) nearly all of the planting and harvesting equipment needed. Family members on such a farm often have informally designated areas of responsibility but often have not strategically examined where they have been and where they are going. If the debt load is low, such a farm may be able to ride through a turbulent economic situation but if debt load is a stressor, such a farm may be vulnerable. The work is hard, the breaks few, and there is little to generate excitement in the next generation.

In contrast, a pasture-based system can function without a full complement of equipment. As indicated earlier, the cows do most of the forage harvesting as well as most of the manure spreading. Cows can reproduce and generate more wealth over time. Tractors, silage choppers, and hay balers tend to depreciate and do not reproduce.

Nearly all dairy graziers do use harvested and stored forages but many depend upon contractual arrangements or purchase forages when needed rather than devoting time and investment in growing and harvesting their own forages. Most dairy graziers would have a tractor or two, likely some mowing equipment, and some would have balers and wrapping options for making haylage.

An interesting recent observation from an organic dairy grazier in North Carolina: he indicated that he had long wanted a large 4-wheel drive diesel-powered tractor. Now that he has one, with diesel prices what they are, he enjoys it most when it is remains parked in the shed.

 # 3. You prefer "tree stalls" to freestalls" for cow comfort and you do not have the veterinarian on speed dial. Investments in housing are typically very low on grazing farms and most new start-ups do not provide housing at all. Grazing cows get more exercise, usually have fewer health problems, and typically live longer.

Capital investment for equipment and housing in pasture-based seasonal dairy herds is expected to be lower than more conventional systems (White et al. 2002). However, investment in land and milking facilities can be substantial.

If housing is used it more often than not would be an open shed with a bedded pack rather than a system with freestalls unless freestalls were carried over from a converted confinement system. Cow comfort in a freestall barn can be excellent with good management but it is not inexpensive. Current recommendations are to use sand bedding, recycle much of the sand, and to provide fresh bedding about twice a week. In addition to the cost of installing comfortable freestalls to start with, there are equipment and operating costs to deal with sand bedding, recycling the sand, and occasionally dredging the accumulated sand out of the first holding pond. All of those factors add

cost along with a necessarily more complex manure handing system to handle 100% of manure produced by the herd.

Cows in a pasture-based system spend a relatively small proportion of their time on concrete and unless large amounts of concentrate are fed, usually consume a ration that is favorable to rumen health. In pasture-based systems, cows rarely need hoof trimming, would rarely ever have a displaced abomasum, and typically have fewer cases of clinical mastitis. However, there may be increased risk for milk fever, grass tetany, and perhaps bloat. Also contagious mastitis such as that caused by *Staphylococcus aureus* can be a problem in pasture-based dairy farms if horn flies are not controlled as a potential vector.

However, even if a grazier does not have the veterinarian's phone number on speed dial, it still is important to have a good working relationship with a veterinarian who understands a pasture-based production system. That can help in designing appropriate vaccination strategies, dealing with an occasional heath concern, and in getting proper guidance if a herd expansion involves bringing purchased animals into the herd.

Dealing with heat stress varies with farms and the potential severity of the problem. For smaller herds, rotational use of 3 or 4 shade paddocks with many trees only when temperatures and humidity are very high is likely adequate. With about 180 cows at CEFS in NC, we usually rotate the herd among 6 shaded paddocks but only on very hot days. We have also adjusted the milking times to reduce the need for moving cows additional times when it is hot. Larger pasture-based herds may use a combination of shade paddocks or spray irrigation to keep cows cool in the summer. Fall calving is also a strategy we use to reduce heat stress because cows will be either in late lactation or dry at the hottest times of the year.

Cold weather is not usually a big issue as long as cows are fed well. Many graziers in northern states out-winter their cows, particularly if they are dry. However, if cows are lactating during cold winter months, some precautions may be needed to avoid chapped and frozen teats.

I have heard a number of graziers indicate that they need to be diligent in keeping the system simple. Any decision to change how the cows are managed, has multiple levels of implications that can result in a much more complicated system.

 # *2. You are routinely in touch with dairy graziers from near and far.* Dairy graziers often participate in discussion groups and are usually willing to share production and financial information. They also provide critical feedback to their peers.

Discussion groups can be facilitated by extension agents, veterinarians, farm consultants, or by the farmers themselves. They seem to function best if there is common interest among the participants and some producer leadership among the group. It has been my observation that a general grazing discussion group that tries to include graziers of beef, sheep, goats, and dairy cattle usually does not have the focus

to be successful over time. Therefore, dairy graziers should try to form like-minded groups.

Discussion groups can be fairly local or they can function with graziers from many states involved. One way for a local dairy grazing group to stimulate new interest is to plan a trip to other regions each year or so in order to stimulate thinking and generate new ideas.

One of the most interesting discussion groups with which I have been involved is the multi state Prograsstinators group (http://www.prograsstinators.com/) who have members from several states in the Northeast, Southeast, and Midwest. They usually meet 3 or 4 times each year with one of the members hosting the meeting and being on the "hot seat" to receive constructive criticism from the others. A subject matter theme is often used at each session and they may bring in an outside speaker to lead the discussion on a specific topic. All of the Prograsstinators process their financial records through the Cornell Farm Business Records Program and their February meeting is usually focused on financial performance of the respective members for the previous year. At least one former member of the group from California has started a Western discussion group that is modeled to some extent after that of the Prograsstinators.

In addition to the formal and informal discussion groups, many dairy graziers also stay in touch with each other regularly via telephone calls and e-mail. Most subscribe to and many also contribute to GRAZE magazine (www.grazeonline.com) which is published in Wisconsin and written "by graziers, for graziers."

And the #1 reason you might be a seasonal, pasture-based dairy farmer is… if you talk more about lifestyle, return on investment, and net farm profit than you do about milk production and milk prices.

Several years ago we conducted three in-service training opportunities for dairy industry professionals including consultants, extension agents, NRCS personnel, and others in South Carolina, North Carolina, and Virginia. As part of the training in each state, we included a host pasture-based farm or two and we always included a multi state panel of successful dairy graziers. Many of the participants in those training sessions commented on the very positive outlook of the participating dairy graziers.

That positive attitude is reflected in that sons and daughters of successful dairy graziers are often interested in either coming back to the home farm or starting a pasture-based farm of their own with the help of their family. A positive and optimistic attitude can also be seen on other types of dairy farms but it seems to be prevalent among dairy graziers.

Because dairy grazing systems require lower capital investment to get started, they provide an easier path to entering dairy production and future farm ownership. Many dairy graziers look for opportunities to assist young people to become involved in the dairy industry.

Because most dairy graziers are very "cost conscious," it is not unusual for many of them to still do well financially even when milk prices are low. There is quite a range in

milk production levels among dairy grazing herds that have been documented as successful. One of the more successful graziers I know has a system in which very few external inputs are used – usually just a few pounds of purchased grain per cow per day. He usually ships less than 10,000 pounds of milk per cow for his mostly Jersey dairy (seasonal calving) in Maryland but was consistently profitable on a conventional milk market and has continued his success as an organic producer. In contrast, we have a couple of very profitable pasture-based Jersey herds (not seasonal) in North Carolina (without housing) that are among the top Jersey herds in the country milk production with over 21,000 pounds of milk per cow. Both of those herds usually have extra heifers to sell as well.

I know of several examples of successful dairy grazing systems which have been able to grow rapidly from within because of more efficient reproduction. In some cases that increased equity is used to start up additional grazing farms for themselves or for family members. In other cases, some have used those resources to make off farm investments or to fund a future retirement accounts such that the farm does not need to be sold away from agriculture in order to fund retirement.

Dairy graziers do have stimulating mental challenges as they learn to manage a "management-intensive" system. It is not a recipe or a cookie-cutter system that can operate long without thoughtful input. However, once past the very intensive period of calving and re-breeding, management of seasonal pasture-based dairy farms becomes more routine.

Seasonal pasture-based dairy production systems do provide changes of pace across a year's time. Consider for a moment that three dairy grazier couples I interact with from New York, Ohio, and Virginia spent most of January, 2009 enjoying the Caribbean attractions in Belize.

CONCLUSIONS

Seasonal breeding and calving as part of a pasture-based dairy system is an attractive option for some dairy producers for reasons of lifestyle as well as for matching nutritional requirements to forage quality and availability in pasture-based systems. This allows for efficient management of animals within similar physiological or age groups. However, having herd fertility high enough to consistently maintain seasonality can be a challenge. Breed differences in fertility are evident but improved fertility within breed can likely be achieved by placing more emphasis on daughter pregnancy rates in selecting sires to use.

As with any dairy production system, differing strategies will likely be optimal for producers with differing resources and goals. Although milk production per cow is usually (but not always) less, advantages in lower facility and equipment costs, lower feed costs, and improved animal health provide the opportunity for well-managed seasonal pasture-based dairy systems to be economically competitive.

I like to describe a well-managed pasture-based dairy farm as:
"elegantly simple but biologically complex."

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