Organic Grass Based Dairy Products for Local Markets

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Abstract

Radiance Dairy is an organic, grass-based dairy with on-farm processing facilities. The milk that is produced is processed into fluid mild, yogurt and cheese, and then sold locally to grocery stores and restaurants. The 236-acre farm is planted with forages and divided into 60 paddocks. The cows are moved to a new section of pasture after each milking. Grazing begins in the spring with pastures being maintained by herd rotation and mechanical harvest. The dairy is designed and managed according to ecological principles as much as possible. The farm is planted with a diversity of perennial grasses and legumes. The forages, along with the manure and compost returned to the land, have helped to restore the soil by building organic matter and fertility. A well designed grazing system capitalizes on the nature of cows, grass and all parts of the farm to make an interconnected whole which functions as efficiently as possible. This contrasts dramatically with the time and energy required to complete the many steps involved in forage and manure hauling and management in an industrial dairy. Chickens are used for fly control by scratching through the manure looking for fly larvae. In the process, they spread the manure so it is not a suitable habitat for flies. They are also effective in killing mice. Our on-farm processing is done in a 1000 square-foot processing plant connected to the milking parlor. The two areas are kept separate by sandwiching the milk house, utility room and office between them. Milk is pasteurized at the lowest temperature allowed by law. All equipment was purchased used from various sources over time. It takes two full time equivalent employees, plus my wife Susan and me, to do all aspects of the processing, marketing and financial management of the dairy. In many ways we have become a community dairy, marketing only in the Fairfield Iowa area, providing tours to school children and visitors, and holding Farm field days. We don't sell our products retail on the farm, they are only available at three local grocery stores and used by about a dozen restaurants. The price of our products is generally about twice the price of conventionally produced counterparts on the grocery store shelf.

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Farm History

Radiance Dairy is an organic, grass-based dairy with on-farm processing facilities. Currently, all of the milk produced is processed on the farm into fluid milk, yogurt and cheese. These products are sold through several local grocery stores and about a dozen restaurants in the nearby town of Fairfield, Iowa.

Radiance Dairy began in 1980 when several families mutually purchased two Jersey cows for their own private raw milk supply. Over the next several years they added a few more cows, included more families and formed a cooperative in which everyone who received milk was a cooperative member. Several years later, the state of Iowa objected to the farm selling raw milk and required that the milk be pasteurized. In 1987 a small processing plant was built on the farm and equipped with used, small-scale pasteurizing and bottling equipment.

When my wife, Susan, and I took over Radiance Dairy in 1992, 22 cows were being milked, and milk and yogurt were being sold in two local grocery stores. We converted the farm to a paddock grazing system and to organic management. In 1996 we moved to a nearby 236 acre farm where we built more efficient milking and processing facilities. Since 1992 we have gradually increased the number of milking cows to 65 as we have added new products and our market have expanded.

Grass-Based System

Our entire 236-acre farm is planted with forages. We have 60 paddocks of two to three acres each, with the balance of the farm in hay fields, which also are grazed when needed. After each milking, twice a day, the milking cows get a new section of pasture. Using portable fencing materials (poly wire and step-in posts) we are able to partition off whatever portion of a paddock is needed for grazing for each half day. For example, after the morning milking we may string a temporary fence to allow the cow's access to only the front half of a paddock. After evening milking, the temporary fence will be removed to allow the cow's access to the remainder of the paddock.

We begin grazing in the spring as soon as the forage begins rapid growth. This past year (2004) we began on March 31. It is important to start early in order to get the forage in the many paddocks around the farm in a sequence of growth stages so we can continue to graze them sequentially at ideal growth stages throughout the grazing season.

In spring and early summer, forage growth in the paddocks is faster than the grazing animals can consume it, so we remove 20 to 30% of the paddocks from the grazing rotation for the first several months. In May, those paddocks are mechanically harvested, and that forage is stored for winter feed. As the summer progresses, forage growth rate slows as it becomes hotter, and usually drier. Starting in June, we bring the paddocks that had been mechanically harvested into the grazing rotation. That enables us to allow a longer rest and growth period between grazing events in each paddock.

Early in the season we rotate back to each paddock in about 20 days. As the season progresses and forage growth slows, we slow the rotation down to 30, then 40, then 50 days of rest between grazing events. We have found that longer rest periods late in the season are very important for maintaining a thick and vigorous stand of forage.

In order to extend the grazing season beyond the forage growing season, we "stockpile" forage in some paddocks for late fall and early winter grazing. We stockpile forage by not grazing selected paddocks from early August until the end of the growing season. During that time, the forage in those paddocks will have had time to grow enough for grazing, but not too much time to grow to the point of over maturity and loss of nutritional value. Also, in the fall and early winter we allow cows to graze hay fields that had been mechanically harvested several times during the summer, but in which the fall hay growth had been left standing to contribute to late-season stockpiles for grazing.

We separate our grazing animals into three groups: 1) lactating cows, 2) dry cows and bred heifers, and 3) yearling heifers. We combine groups 1 and 2 into a "leader/follower" grazing system. In this system, the lactating cows, with the highest nutritional requirements, are rotated through the paddock sequence first. The dry cows and bred heifers follow a day or two behind the milking cows and graze the forage down to the appropriate height before moving on to the next paddock. The yearling heifers rotate through a separate group of paddocks.

Ecological Model

We try to design and manage our dairy according to ecological principles as much as possible. The farm we moved to in 1996 had been in corn and soybean row crops for many years previously. Because the land is quite hilly it had been subject to severe erosion over the years. We repaired the erosion gullies and planted the entire farm to a diversity of perennial grasses and legumes. The perennial forages, along with the manure and compost returned to the land, have helped restore the soil by building organic matter and fertility.

In a natural ecology virtually no wastes leave the system, the wastes of one species serves as food for other species as materials efficiently cycle and recycle through the ecosystem. By contrast, industrial agricultural systems are much more linear. For example, in a confinement dairy system the cows are confined near the milking facilities and the forage they consume is harvested in offsite fields, hauled to the facility, put into storage and then fed to the cows. The manure is collected and put into storage, from where it is eventually hauled to and spread on crop-production fields. This system consumes energy at each step of the process and poses risks of manure spills or misapplications which can cause environmental damage. The ecological irrationality of this kind of system was put into perspective by Allan Nation, editor of the Stockman Grass Farmer, who pointed out that it is the nature of cows to move about and the nature of grass to stand in one place. Modern industrial agriculture has turned it backwards: making cows stand in one place and grass move to them.

A well designed grazing system capitalizes on the nature of cows, grass and all parts of the farm to make an interconnected whole which functions as efficiently as possible. For example, because cows are intrinsically motivated to graze, opening a gate after each milking enables the cows to walk out to a selected paddock, harvest their own forage and spread their manure throughout the paddock as they graze. This precludes the time and energy required to complete the many steps involved in forage and manure hauling and management in an industrial dairy.

The design of a grazing system is key to its efficiency. We provide drinking water to each paddock through a one-inch polyethylene pipe buried about eight inches underground, which feeds a short vertical pipe connected to a float valve in a water tank at each watering site. To provide easy access to each paddock in all weather conditions, we installed a system of lanes, surfaced with a base of two-and-a-half-inch rock and covered on top with fine rock.

We have found that turning cows into a paddock during wet soil conditions is not a problem, and can even be used to advantage. Although a paddock may look muddy and the forage damaged after the cows have spent a day in wet soil conditions, when the cows are moved to a new paddock the next day, the “damaged” paddock quickly begins to grow and recover. By the end of the rest and growth period, when the paddock is again ready to be grazed, evidence of previous damage is gone. As a matter of fact, “damaging” paddocks by grazing them in wet conditions is a good management tool for paddocks in which grass is becoming too predominant, to the point of becoming sod-bound. We intentionally select these sod-bound paddocks for grazing during wet conditions so that the cows’ hoof action will cut up the sod enough to open spaces for legume growth. We try to keep about 40% of the forage stand in legumes (mostly red and white clover) and can influence that balance by management techniques such as grazing during wet conditions and by controlling the length of rest periods, longer rest periods will favor more grass; shorter rest periods will favor more clover.

When we moved to our new farm location in 1996, we built a pole building with an open south side for housing the cows during winter. It worked well but required a lot of bedding to keep the cows clean. By spring, the bedding and manure pack was about three feet deep in the barn and in front of it. We dug the manure loose with a tractor and loader, composted it, and spread it on the land. The compost certainly was beneficial, contributing to soil fertility and ecological diversity. However, the process of making compost and spreading it took a lot of time and energy. In the last several years we have switched to wintering cows out in paddocks. We feed the cows hay bales in a grid pattern in selected paddocks, resulting in their manure being spread throughout the paddocks as the cows eat the hay. This system takes a lot less time and energy and keeps the cows cleaner.

Another ecological connection we found to work on our farm is the use of chickens for fly control. We have about 25 laying hens that free range around the barnyard looking for insects and anything else to forage on. They scratch through manure, deposited by

cows waiting during milking, looking for fly larvae. In the process, they spread the manure out so it is not suitable habitat for hatching flies. We have also observed the chickens attacking and killing mice that they come upon while ranging the cow yard. In addition to their free fly and mouse control, they provide us the bonus of free eggs.

It is interesting to note that several years ago a controversy arose over the National Organic Standards rule that required chickens to have access to the outdoors. Large industrial poultry producers argued that chickens would not survive if allowed to go outdoors, they would get sick and die. That is completely contrary to my experience. Our chickens can't wait to get outdoors; they clamor to be let out at the crack of dawn and spend the whole day outdoors, except for the few minutes it takes for them to go in a nest in the chicken house and lay an egg once a day. Our chickens are strong and healthy. Watching a chicken attack and kill a mouse with a quick peck and a shake, I noticed that a chicken is built like a miniature Tyrannosaurus Rex, and can be about as vicious for its size. The notion that chickens cannot survive outdoors undoubtedly comes from observing chickens that are bred for high production while confined to a small space, in short, a chicken removed from any natural ecology. Our chickens are from traditional breeds, get lots of exercise and are exposed to diverse conditions, all of which probably contribute to their good health.

Our chicken house is mounted on the back of an old pickup truck, making it portable. In the past we have moved the chicken house and chickens through the paddock system, following about three days behind the grazing cows. That allowed the chickens to scratch through the cow paddies, eating fly larvae and spreading out the manure so flies would not hatch. However, we had to discontinue that because of problems with predators killing chickens.

Can nature's ecological processes fill the niche we had allocated to the chickens? Since we converted the farm from row crops to forage, and planted lots of trees, we have noticed a remarkable increase in wildlife, especially bird populations. Some of these birds interact with the grazing cows. I have observed flocks of cowbirds and cow egrets congregating among the cows, swallows continuously flying overhead and wild turkeys visiting areas where cows have grazed. Perhaps nature's ecology can help us balance insect, particularly fly, populations.

On-Farm Processing

We bottle milk in plastic jugs (we are looking into the possibility of converting to glass bottles). We do not homogenize the milk, so the cream rises to the top. The products we currently produce are whole, two percent and skim milk; whipping cream; whole and skim yogurt; Monterey Jack, Ricotta, and Panir cheese; and vanilla soft-serve mix for soft-serve ice cream machines in several local restaurants.

Our 1000 square-foot dairy processing plant is connected to our milking parlor. We designed our buildings to keep the milking and processing areas separate by sandwiching the milk house, utility room and office between them. With that design, we

were able to get a variance from state code that allowed us to connect the milking and processing buildings (regulations normally require milking and processing facilities to be in separate buildings).

We pasteurize our milk at the lowest temperature allowed by law (145 degrees F. for 30 minutes). We batch pasteurize using two vats (200 and 150 gallons) with air-space jackets around their circumference for steam heating. The vats are equipped with strip-chart recorders to permanently record the temperature and timing of each batch of milk pasteurized. Our state inspector examines these records during his periodic inspections of the processing equipment and facilities. He also takes a sample of each of our finished dairy products for quality-control testing every month.

All of our processing equipment was purchased used (most is at least 50-year-old vintage) and was obtained from various sources one piece at a time over the years. This type of used stainless steel dairy processing equipment is becoming increasingly scarce because much of it has been shipped to less industrialized countries. We built our processing plant and assembled our processing equipment on a low budget, for about $100,000. That may be about as low-cost as a functioning on-farm dairy processing facility can be assembled. Other on-farm processing plants I am familiar with have cost in the range of $250,000 to over $1,000,000 to build and equip, depending on the construction of the building and the amount of new equipment purchased.

We have two employees, each about three-quarter time, doing the processing, equipment cleanup, delivery of products, etc. Susan does the invoice and billing paperwork; I do maintenance on the equipment; and we both help out with various aspects of processing. In total, it takes at least the equivalent of two full-time people to process and market our products. Additionally, we have some help with milking the cows.

Marketing

All of our dairy products are sold in the nearby town of Fairfield, Iowa (population 10,000). We have never advertised our products; our market has gradually expanded over the years through word-of-mouth publicity. Two things probably account for the unusual situation of being able to sell organic milk from 65 cows in a town of 10,000:

1) our market has grown incrementally each year over 24 years
2) about 30 years ago Maharishi International University moved to Fairfield, drawing many people who practiced Transcendental Meditation. This atypical population provided much of the customer base for Radiance Dairy, at least initially.

Over the years that I have owned and operated the dairy, however, I have met a lot of people who lived here before the university came to town who also buy our products. Some prefer it because it has a cream line, some because it is rich Jersey milk, some because it is organic.

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In many ways we have become a community dairy. We provide tours for classes from local schools and often our customers will stop by to see how their milk is produced. Farm field days will turn out 300 local customers. We even have become a "tourist stop" for out-of-town guests of our customers (hey, this is Iowa).

We do not sell our products retail on the farm. We deliver our products twice a week to three local grocery stores. Two, Hy-Vee and Econo Foods, are franchise chain stores. The third, Everybody's Whole Foods, is a locally owned store that specializes in whole and organic foods. We also sell our products to about a dozen restaurants in Fairfield.

The price of our organic, grass-based dairy products is generally about twice the price of their conventionally produced counterparts on the grocery-store shelf. People sometimes ask when organic food will become cheaper, more in line with conventional food prices. That raises the question of whether or not, in the larger context, it would be truly desirable to try to bring the price of organic food down to conventional prices. Conventional farmers are struggling to make a living; many are going broke. Much of the net income of conventional farmers, half in the Midwest, comes from government subsidies. Furthermore, conventional agriculture externalizes much of the cost of production. Do we want to put organic farmers in the same mode of depending on government subsidies and externalizing their costs of production in the name of becoming "more efficient"?

I would argue that if we can design and manage a local, organic farming system in an ecologically sound way which enhances rather than degrades the environment, it should not be unreasonable to expect to pay the full cost of producing the food at the point of purchase. I would argue further that conventional food may seem cheap when you buy it, but that is only the first installment. Another installment on that food is taxes to pay the $20-billion-a-year subsidies to farmers who produce it. Other installments on the food go for subsidies for transportation (the average piece of food travels about 1500 miles); subsidies to procure oil for fertilizers, fuel and pesticides; and subsidies to remove residues of these same pesticides and fertilizers from drinking water. We can think of other costs of our "cheap" food system, for example, the hypoxia zone in the Gulf of Mexico and the costs of obesity and poor health due to the predominance of refined, low-nutritional commodities in our food system. In the end, our "cheap" food is not so cheap. We might all be better off if farmers bore the full cost of production when growing our food and consumers paid the full price when purchasing it.