Dairy Success Through Management-Intensive Grazing

This publication was developed by the Maryland Grazing Lands Conservation Initiative Coalition and the Maryland-Delaware Forage Council with support from the Maryland Cooperative Extension (MCE) and the Maryland Natural Resources Conservation Service (NRCS).

For additional copies of this publication or for more information about grazing, contact your local NRCS Field Office/Soil Conservation District Office or Cooperative Extension Office.

To find a local NRCS or Soil Conservation District Office in Maryland go to:
http://www.md.nrcs.usda.gov/contact/directory/

To find a Maryland Cooperative Extension Office go to:
http://extension.umd.edu/local

Published through the Maryland-Delaware Forage Council

Maryland GLCI

Assisted by:

NRCS Natural Resources Conservation Service

MARYLAND COOPERATIVE EXTENSION
UNIVERSITY OF MARYLAND
COLLEGE PARK • EASTERN SHORE

Authors
Dale M. Johnson,
Farm Management Specialist
Stanley W. Fultz,
Extension Agent, Dairy Science
Michael R. Bell,
Extension Agent,
Agriculture and Natural Resources
Maryland Cooperative Extension
University of Maryland

Facilitated by: Elmer M. Dengler
Maryland NRCS State Grazing Specialist

Dairy Success through Management-Intensive Grazing

Development pressures on land values and environmental constraints are making it increasingly difficult to produce milk economically in Maryland. Expanding the farm or replacing depreciated facilities is not an option for most dairy farms. Some dairy farms are transitioning to management-intensive grazing (MIG) to reduce costs and increase profits. Data collected from conventional confinement (CC) and MIG dairy operations provides evidence that intensive grazing may be a profitable alternative to help dairy farms stay in business. The University of Maryland is conducting research and educational programs to analyze and improve intensive grazing methods and to educate farmers in improving production. This publication discusses management-intensive grazing and illustrates five farms that have found success through this production alternative.

Table of Contents

What is Management-Intensive Grazing?

Management-intensive grazing (MIG) is the movement of grazing animals through a series of paddocks for brief periods of time so that the forages are allowed periods of regrowth to restore reserves and in so doing, the animals are provided with high quality feed if returned at the proper time. MIG maximizes the feed potential of pasture and the forage management skills of the operator. The farmer monitors the height, density and maturity of the plants within the pasture and controls the grazing activities of the animals as they harvest the forages of highest nutritional quality. There are no size restrictions to a MIG system. Size ranges from a single tethered animal that is moved daily to several thousand head of cattle herded across rangeland.

Under MIG, the animals themselves are used to perform the tasks of forage harvesting, animal feeding, and manure distribution. This saves the farmer the time, money, and harvest losses associated with these tasks. To make the system work, the total pasture area must be divided into small units called paddocks. This is accomplished with either temporary or permanent fencing. Generally, farms have permanent perimeter fences, but the interior fences are of lighter construction to reduce costs and to allow increased flexibility in sizing of the paddocks throughout the growing season. Flexibility is important since no two growing seasons will be alike, and plant growth rates will vary throughout the season. Electric fences are the norm. They are less expensive to construct than physical barrier fencing since fewer posts of lighter construction are needed to support less wire. Electric fences are psychological barriers that require the animals to be trained, which is most easily accomplished when animals are young. Small paddocks with both physical and psychological fencing should be used to teach the animals that when they touch the electric fence, they can not escape the paddock.

Smaller paddocks allow the forage to be harvested in a shorter period of time reducing the amount of feed wasted by the animals due to manure droppings and trampling. Animals should remain on a given paddock no longer than three days. Depending on growth conditions, after three to five days, the regrowth of the plants becomes sufficient to allow the animals to backgraze. This regrazing puts significant stress on the plants since the energy required to begin regrowth is coming from stored reserves, not from photosynthesis. If animals are allowed to regraze this tender new growth, plants become stressed and will either die or be overtaken by less desirable species of weeds or other plants. On most dairy farms using MIG, cows are given access to a new paddock after each milking. Some will even move the temporary fence mid-day to encourage additional eating, just like larger confinement operations will push feed up to the cows in the barn several times per day.

Water is the most important nutrient for livestock. Fresh water should be available at all times. In a MIG system, water is provided with either permanent or portable water lines and troughs. Water can come from springs, wells, ponds, or can be carried to the site in a tank. It can be pumped using electricity from the power grid or from the sun. Animal-powered pumps are also available. RAM and sling pumps in flowing streams are options as well. Whatever the water system employed, there should be flexibility built into the system to accommodate moving of fences and paddocks. For year-round water, having the pipes below the frost-line will be necessary. For spring-calving seasonal operations, an above-ground system will work for much of the farm since water will not be as critical in the winter months. Technical advice on designing fencing and watering systems is available through local Extension and NRCS Offices.

A frequent question from producers getting into a grazing system is, “Which grass should I plant?” The answer is always, “It depends.” Forage choices for grazing systems are better now than they were just ten years

ago. We now have research results of grass varieties managed under intensive cutting schedules and grazing trials from land grant universities in the Northeast and Mid-Atlantic regions, including Maryland. There are many factors that must be considered when choosing a forage variety or species. These include, but are not limited to: soil pH, drainage, slope, elevation, organic matter, fertility, previous crop, previous herbicide program, planting technique, irrigation and farm goals.

Grazing can benefit the farmer, the animals, and the soil. Farmers who have made the switch to grazing have provided strong testimonials of improved quality of life. They have time to spend with their families, to go on field trips with their children, to go on vacations, to attend continuing education programs, or to simply have leisure time.

The health of the animals tends to improve with MIG as well. Animals on pasture are generally not pushed as hard to produce more milk. They get regular exercise walking back and forth to pasture. Many farmers no longer need to trim hooves on their cows after they've converted to grazing, and heel warts are also reduced. Body condition scores for pastured animals may be slightly lower than for confinement herds. They are like marathon runners who are also thinner than the general public, but still are healthy and productive citizens. The cull rate averages around 25 percent on grazing farms compared to nearly 40 percent on confinement farms. This allows the farmer to expand internally, sell excess heifers, or sell milk cows. Animals sold for dairy purposes will yield higher returns than the sale of animals for the meat market.

Soil aggregates from pastured fields (right) hold together better than soil aggregates from conventionally tilled fields (left).

Soil health can also improve following conversion to grazing. Dr. Bill Murphy, Professor Emeritus of Agronomy at the University of Vermont, has an excellent discussion of the quality of the soil and the life that is within it, in his book *Greener Pastures On Your Side of the Fence.* He points out that pasture soils contain some of the highest root concentrations of all crops, and that there are 20 to 50 times more bacteria and fungi in soil near plant roots than away from the roots. These microorganisms influence plants in many, usually helpful, ways. This includes the uptake of nutrients such as phosphorus, potassium, molybdenum and manganese. Some microorganisms in pasture soils inhibit nitrification (oxidation reaction that forms nitrates from ammonium). This means that pasture plants must depend more on ammonium for their nitrogen needs than on nitrate. This also means that losses of nitrogen through leaching (loss of nitrate) or denitrification (reduction reaction that uses nitric acid from nitrate to form nitrogen gas, which is lost) are minimal under pastures.

Pasture soils contain three to four times more earthworms (about 1,200,000/acre) than tilled soils (400,000/acre). Since each worm takes in an amount of soil equal to its body weight each day, they make an important contribution to aeration and movement of soils. These worms generate about 21 tons/acre of annual excrement on old permanent pastures compared to nine tons/acre on tilled land. Earthworm excrement contains five times more nitrate nitrogen, twice as much calcium, three times more magnesium, seven times more phosphorus and 11 times more potassium than the top six inches of soil. It is also higher in pH than the surrounding soil.

The added soil life contributes to the soil tilth or aggregate. The organisms create a "glue" that helps to hold the soil particles together, which in turn makes the soil less likely to erode. This is clearly illustrated in the photograph above. The soil in the jar on the left is from a conventionally tilled field from a well-managed farm that practices crop rotation and strip cropping. The jar on the right has the same soil type, but is from a pasture that has been rotationally grazed for eight years. When water is added to the samples and they are gently agitated, the pasture soil stays in a tight clump whereas the tilled soil immediately falls apart and goes into solution.

Environmental Impacts of Management-Intensive Grazing

Several studies, with different approaches and results, have been conducted to look at the fate of nutrients in MIG systems. Professor Raymond Weil, agronomist at the University of Maryland is conducting research on the environmental impacts of MIG. The findings of this research are summarized in a fact sheet "Management-Intensive Grazing: Environmental Impacts and Economic Benefits" Ray R. Weil (professor) and Rachel E. Gilker (Ph.D. candidate), Department of Natural Resource Science and Landscape Architecture, University of Maryland, College Park. This fact sheet discusses the results of prior research on this topic as well. The research was supported by USDA/SARE and the University of Maryland.

The conclusions of this research are as follows:

- There is no evidence of excessive nitrogen leaching from the MIG watersheds.
- Phosphorus levels in groundwater seemed related to geologic soil parent materials and were low regardless of farm management system.
- Neither Nitrogen nor Phosphorus concentrations were increased as stream water flowed through well-managed MIG pastures.
- Under appropriate management, grazing appears to engender relatively low risks for nutrient pollution.
- The benefits of grazing may extend beyond the farm itself, as the conversion of cropland to permanent grass may have implications for global warming and soil conservation, as well as quality of life for surrounding communities. As suburban development continues to encroach on farmland, and dairy farming becomes more economically challenging, MIG provides an alternative that can be both environmentally friendly and financially viable.

This document is available at:
http://www.nrsl.umd.edu/faculty/weil/Grazing_factsheet_weil_gilker.pdf

Financial Comparison of Conventional Confinement and Management-Intensive Grazing

Farm Management Specialist Dale Johnson completes a financial analysis for a dairy farmer.

Financial data collected from the Maryland Dairy Business Analysis (MDBA) provides evidence that intensive grazing may be a profitable alternative to help dairy farms stay in business. MDBA helps dairy farmers analyze their financial data to determine the strengths and weaknesses in their operations. This analysis uses tax data to average five years of income, expense, and profitability data. This helps farmers understand their financial strengths and weaknesses over the long-term. Five-year averaging also mitigates price and yield fluctuations, and annual changes in inventories on the farm.

Data from all farms participating in the summary is then averaged so farmers can compare their farms with other farms. Income, expenses, and profit are reported on a per cow, per hundredweight (cwt), and a total farm basis. Using a per cow comparison is most useful since this is independent of farm size. But per cwt and per farm comparisons are also useful. It should be noted that this analysis is not a random sample. Farmers participate in the summary voluntarily and may not reflect the

Maryland dairy industry as a whole. However, the authors feel that the management of both the CC and MIG farms involved in the analysis are comparable and represent average or better-than-average management of dairy farms.

Table 1 summarizes the average income, expenses, and profit for all farms in the MDBA and includes a comparison of CC and MIG farms. The average of years 2001-2005 shows that MIG farms generated a $0.98 per cow or $1.72 per cwt higher profit than CC operations. While the MIG farms annually produced 6000 lbs less milk per cow and averaged 18 fewer cows per farm in comparison to CC operations, the MIG farms generated a $1,167 higher profit per farm.

MIG farms have lower milk sales than CC farms because of the lower production levels. MIG farms have higher cattle sales per cwt than CC farms. This is partly due to the fact that MIG farms have lower culling rates, so instead of selling lower value cull cows for slaughter, they are selling higher-value bred heifers that will go into milk production. Some MIG farms that practice seasonal breeding also sell milk cows that do not make their breeding window. These are still high value cows that are sold into other dairy herds.

The CC farms have higher "Other income" that the MIG farms. This income includes crop sales, custom work, government payments and miscellaneous income. The CC farms have a $924 higher total income per cow than the MIG farms.

Purchased feed costs are the biggest expense on dairy farms. MDBA shows that MIG farms purchased feed costs are $250 per cow lower than CC farms purchased feed costs. All other costs, except for interest paid are also lower on the MIG farms with the most significant cost reductions in seed, fertilizer, chemicals, depreciation, and repairs. Total expenses for the MIG farms are $1,022 less than the CC farms which more than offsets the lower income on MIG farms.

The MDBA has been conducted since 1996. The average income, expenses, and profit change yearly, but the comparison between CC and MIG farms has been similar each year. Most CC farms are profitable, and, in many situations, it might be a mistake to transition to MIG. But this economic analysis indicates that MIG may be a good alternative for increasing profits.

Financial Comparison of Confinement and Grazing Farms 2001-2005 Average Income, Expenses, and Profit per Cow.

Table 1

	Average 30 Farms	*CC 20 Farms*	*MIG 10 Farms*
Average number of cows	102	108	90
CWT of milk sold per cow	178	195	135
FARM INCOME (PER COW)			
Milk sales	$2,729	$2,971	$2,122
Cattle sales	188	180	207
Other income	203	232	131
Total income	3,120	3,383	2,459
FARM EXPENSES (PER COW)			
Feed purchased	814	885	635
Seed, fertilizer, chemicals	200	242	94
Depreciation and repairs	511	550	414
Labor	109	135	43
Medical and breeding	128	156	58
Hauling and transportation	179	196	137
Rent	133	147	99
Interest	102	102	104
Custom hire	88	109	36
Other expenses	393	428	304
TOTAL EXPENSES	2,656	2,947	1,925
Profit per COW	464	436	534
Profit per CWT	2.61	2.24	3.96
Profit per FARM	47,449	47,072	48,239

Green indicates favorable *Red indicates unfavorable*

Five Successful MIG Farms

The following pages portray five successful MIG farms from across Maryland. Each of these case studies describes the farms' background, philosophy, infrastructure, herd nutrition, and financial analysis. Unique and interesting characteristics are also described.

Dave, Pat & Glenn Shirley
Shirley Farms, LLC.
Westminster, Carroll County, Maryland

Since 1963, this 390-acre farm has supported the Shirley family through milk and cattle sales. The transition to grazing, and eventually seasonal dairying, was not driven by economic necessity, but somewhat by time and labor limitations and personal preferences. In 1994, the Shirleys decided to stop growing corn as a forage for the dairy herd and to try to meet their forage needs with a combination of alfalfa and grazing. They experimented with many grasses, and gradually alfalfa became less important in the plan. They are currently milking 85 cows on a "mostly seasonal" basis.

Pat, Dave, and Glenn Shirley in their milking parlor.

Philosophy

"We strive to farm in a way that is less stressful on our cows, our land and ourselves while always keeping a close eye on cost of production and MILK QUALITY. At the same time, it is important to us to avoid letting the operation become more complicated than necessary, and we have always concentrated on the cows as our primary source of income."

Infrastructure

Prior to beginning the transition to grazing, the Shirleys built facilities including a double-six herringbone milking parlor, and a 96-cow freestall barn with a feeding and barnyard area that are better suited to confinement dairying than grazing. They do however, plan to use these facilities for many more years. When they began grazing, they surrounded about 80 acres with two-strand high tensile fence. About half of this acreage is divided into nine permanent pastures radiating out from two central common areas that have shade and water. Some of these "wedge-shaped" pastures also have shade and/or water. These open pastures are used as "day pastures" and the cows spend 1-2 daytime sessions on each in rotation. The other 40 or so acres are the large open fields where they formerly grew corn. These have been seeded in various grasses and mixtures. Temporary fencing is used to determine how much grass the herd is allowed to have each night which varies with the season and the weather and even with the number of cows. Since these pastures are used almost exclusively at night, they have never found it necessary to install shade or water, although the cows do have access to the barn at night. Because of the lack of infrastructure on these "night" pastures, the open fields lend themselves to easy mechanical harvest of excess grass as well as reseeding if they find a new variety that they want to try.

Nutrition

Unlike most farms, milking is not at 12-hour intervals, but more like 10 and 14 hour intervals. This gives the cows more time on the "night" pastures which makes use of the grasses' natural increased sugar content in the evening hours. In very hot weather, the daytime pasture is virtually ignored as a feed source. The cows concentrate on keeping themselves comfortable during the day and the Shirleys try to maximize night-time foraging. In the winter, the mostly-dry herd is fed grass baleage in the barnyard. A computer feeding system compensates cows individually with grain depending on their stage of lactation and other factors.

Cows eagerly go out to pasture after evening milking.

Calves are raised in groups of eight and are weaned and dehorned at about ten weeks of age. They are turned out on grass at about four months into a continuously grazed paddock designed to train them to electric fences. They are fed grass hay beginning at weaning, and continuing until they leave the training paddock. When heifers reach breeding size they are added to the milking herd where they remain until they leave the farm.

Other Production Practices

The Shirleys attempt to breed the herd to calve seasonally using only artificial insemination (AI). This requires particularly careful heat detection and the Shirleys use many Kmars. Their herd has been bred using AI exclusively for over 40 years and, until recently, using almost entirely Holstein genetics. About half the herd is still grade Holstein. The other half are crosses including Dutch Belted, Milking Shorthorn, Normandy, Scandinavian Red, American Lineback, and New Zealand Friesian.

Future Plans

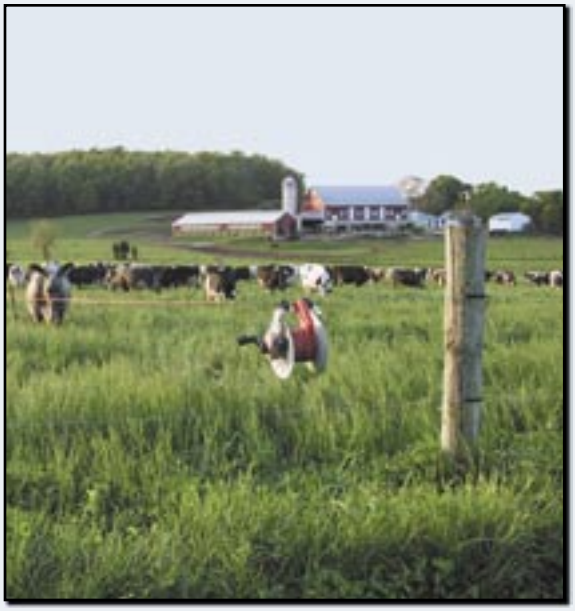
"We are always interested in new technologies or practices that can save time or labor or costs or improve MILK QUALITY. We are interested in improving our replacement heifer program to provide us with larger heifers at 15 months for breeding. Our herd has essentially been 'closed' for 40 years and we are involved in becoming certified 'Johnes-free' to enhance our sale of heifers. There are no plans at this time to increase the size of the milking herd."

Economic Comparison of Shirley Farms, LLC. to Average of Maryland Farms Income, Expenses and Profit per Cow

Table 2

	Average of Maryland Farms	*Shirley Farms, LLC.*
Average number of cows	102	83
CWT of milk sold per cow	178	137
FARM INCOME (PER COW)		
Milk sales	$2,729	$2,190
Cattle sales	188	225
Other income	203	99
Total income	3,120	2,513
FARM EXPENSES (PER COW)		
Feed purchased	814	534
Seed, fertilizer, chemicals	200	84
Depreciation and repairs	511	253
Labor	109	0
Medical and breeding	128	75
Hauling and transportation	179	134
Rent	133	0
Interest	102	4
Custom hire	88	0
Other expenses	393	369
TOTAL EXPENSES	2,656	1,453
Profit per COW	464	1,061
Profit per CWT	2.61	7.74

Green indicates favorable *Red indicates unfavorable*



Polywire is used to divide pastures.

Myron & Janet Martin
Peace Hollow Farm
Brownsville, Washington County, Maryland

Peace Hollow Farm is a second generation farm. Glenn Martin purchased the Brownsville farm in 1967 when he relocated from Hagerstown to minister at Yarrowsburg Mennonite Church. In 1988, Glenn's son, Myron, and his wife, Janet, took over management of the farm, later purchasing it in 1993. Both Glenn and Myron were interested in grazing. Myron tried grazing for two years with native grasses and existing fences, but was disappointed with the results. In retrospect, Myron felt that he was expecting more milk than the pasture could support. At the time, Myron also farmed rented land scattered around the valley. The heifers were located at one of the rented farms. The disappointment in grazing and difficulty in managing scattered farms caused Myron to reevaluate his situation in 1995. In 1996, he built a new free stall barn to consolidate the operation and return to conventional confinement farming. While finishing this construction, Myron explains, "I was in prayer one morning asking for guidance. That same day a flyer came in the mail, advertising Marshall annual ryegrass. I contacted a farmer featured in the advertisement and he strongly encouraged me to try the ryegrass. It worked." From 1996 to the present, Myron has used annual ryegrass extensively for double cropping after corn and seeding into pasture.

Philosophy

"Our goal is to seek ways to make a small family farm profitable while finding time for other religious, family, and recreational activities. Farming can be used as a teaching tool for educating children about life and it works well in supplementing home schooling. It is important to always try to balance the many activities of life."

These Holteins on pasture average about 19,000 pounds of milk per cow per year.

Conventional Confinement versus Management-Intensive Grazing

Peace Hollow Farm is a mix of conventional confinement and management-intensive grazing. The Martins maximize the use of pastures, but when the pastures are not adequate, the cows are housed and fed in the free-stall barn. Myron and Janet characterize their farm as constantly changing. They don't have a grazing "system" to which they adhere. Peace Hollow Farm is set on rolling hills with constantly changing growing conditions for crops. Consequently, Myron maintains a flexible system to cope with the changes. The herd is not seasonal; milking occurs year-round and the herd maintains a much higher yield than most grazing operations with over 19,000 pounds of milk sold per cow per year. However, high milk production is not a goal for the Martins. The focus is on profitability. Cows are Holstein and Jersey/Holstein crosses. Heifers from 16-19 months are bred with a Jersey bull, while cows are bred using artificial insemination. Myron maintains a full line of machinery and equipment for field work.

Excess forage is machine harvested.

Infrastructure

Of the 118 acres, 50 acres of corn are taken off as silage and double-cropped into ryegrass for fall through spring grazing. The remaining 68 acres are in permanent pasture of

which some is harvested for hay depending upon growth and need. There are no permanent paddocks in the pasture, rather, polywire is used to create paddocks depending on need. It is a very flexible system. Water is provided at the barn. Cows are housed in a 90-cow freestall barn with a slotted floor. The milking parlor is a double-eight herringbone. Bunker silos are used for forage storage and commodity sheds hold concentrates for total mixed rations (TMR). The buildings and machinery increase depreciation and repair costs above those found on other grazing operations. However, this is a conscious decision on the part of the Martins.

Nutrition

Lactating cows are fed a TMR once a day. Typical ingredients include the following: corn silage, haylage, citrus pulp, distiller's grain, roasted beans, fine ground corn, soybean meal, and minerals. The TMR is formulated and fed according to quality and quantity of pasture available. Dry cows are fed a TMR ration of dry chopped grass hay, corn silage, minerals and some grain dependent on the quality of forage. Heifers are pastured and fed hay as well as the leftover TMR from the cows. Calves are fed colostrum for the first 24 hours and then milk from fresh cows or from the tank for six weeks in a group feeder. Calves are grouped as newborns, 2-6 weeks, and greater than 6 weeks.

Family Center

Myron and Janet have seven children and are foster parents for the Department of Social Services. As of the date of this publication, over 30 children have lived in their home. Some have stayed as long as two years. They have adopted three of the children. To the Martins, religion, family, and farming are inseparable.

Financial Comparison of Peace Hollow Farm to Average of Maryland Farms Income, Expenses and Profit per Cow

Table 3

	Average of Maryland Farms	*Peace Hollow Farm*
Average number of cows	102	70
CWT of milk sold per cow	178	189
FARM INCOME (PER COW)		
Milk sales	$2,729	$2,842
Cattle sales	188	143
Other income	203	40
Total income	3,120	3,024
FARM EXPENSES (PER COW)		
Feed purchased	814	586
Seed, fertilizer, chemicals	200	209
Depreciation and repairs	511	784
Labor	109	0
Medical and breeding	128	35
Hauling and transportation	179	194
Rent	133	29
Interest	102	50
Custom hire	88	54
Other expenses	393	488
TOTAL EXPENSES	2,656	2,382
Profit per COW	464	596
Profit per CWT	2.61	3.15

Green indicates favorable *Red indicates unfavorable*

Future plans

When asked about future plans, Myron chuckles and looks skyward. With a constantly changing farm, the future is hard to predict. But it is not hard to predict that Myron will always be looking for new production methods and technologies that may improve the bottom line. Currently, Myron and Janet are seriously considering "going organic" and are in the certification process. The higher prices for organic milk are a big attraction. This would likely lead to a higher reliance on management-intensive grazing. One thing Myron is pretty sure of - he will buy a Lely robotic scraper for his barn as soon as Lely imports them into the United States.

Corn harvested for silage is still an important forage in the Peace Hollow Farm grazing system.

Bobby & Pam Prigel
Belleview Farms Inc.
Glen Arm, Baltimore County, Maryland

Bobby and Pam Prigel.

"John Mathias Prigel came to our farm as a share cropper in 1895. In 1906 he bought the farm, 180 acres, for 20,000 dollars at 6 percent interest. By the Grace of God and nothing less, he was able to pay for it." Bobby Prigel

Belleview Farms, Inc. was a conventional dairy farm until 1990 when Bobby and his father, Bob, transitioned to grazing. The cows had been fed all corn silage for over twenty years. Some of the fields had been in corn for over forty years. They started by grazing oats that were planted after corn was taken off for silage. After two years of poor grazing management - trying to adapt grazing with conventional mentality - the Prigels decided that grazing didn't work. After another two years of conventional confinement, the Prigels decided that didn't work either. In 1995, the Prigels went back to grazing with a total commitment to it. This meant they were willing to "color outside the lines." In 1995, they went to total grass; three years later they went seasonal. The Prigels also went from a herd of Holsteins to a herd of mostly Jerseys.

"The difference is that graziers smile." – Bobby Prigel
Left to right: Graziers Dwight Eby, Gilbert Martin, Ron Holter, and Bobby Prigel.

Philosophy

"We must remain profitable and do it within the bounds of Biblical principles. This means being good stewards of both land and cows, treating employees with respect and dignity, and giving proper compensation. We must be mindful of our neighbors and their concerns. While doing these things, we must keep family a priority."

Infrastructure

Cows are milked in a swing-sixteen parlor. They are housed outside year-round. In extremely hot weather, cows have access to sprinklers in the afternoon. Water is accessible in all paddocks. Prigel's cows graze 180 acres of permanent pasture divided into three-acre size paddocks. These paddocks are also subdivided as conditions warrant. Fences are made up of one-wire electric with fiberglass posts. Grain is fed under a breakwire in the paddocks. Parlor waste water and barnyard runoff are collected and irrigated onto the

The mixed breed dairy herd on grass of the Belleview Farm is a sharp contrast to the large conventional confinement operation in the background.

pastures. Solids are composted and spread on paddocks as nutrients are needed. Equipment is kept to a minimum. The Prigels have a rotary mower, a round bale unroller, a bale wrapper, and a feed cart.

Other Production Practices

On May 12th each year, the Prigels start breeding using AI. Forty-two days later, they put a bull in with the cows for clean-up. Cows are bred without the aid of synchronization. On January 4th, they dry the cows off. Calves are fed in groups of eighteen while on milk. After that, they are put in groups of around thirty. Manure/compost is spread once a year with a rented manure spreader.

Future Plans

For the Prigels, the future holds one or more of the following:

- expansion of the current herd
- starting another herd
- value-added products
- multi-species grazing
- possible relocation of farm

"Cattle Egrets appeared when we started grazing."
- Bobby Prigel

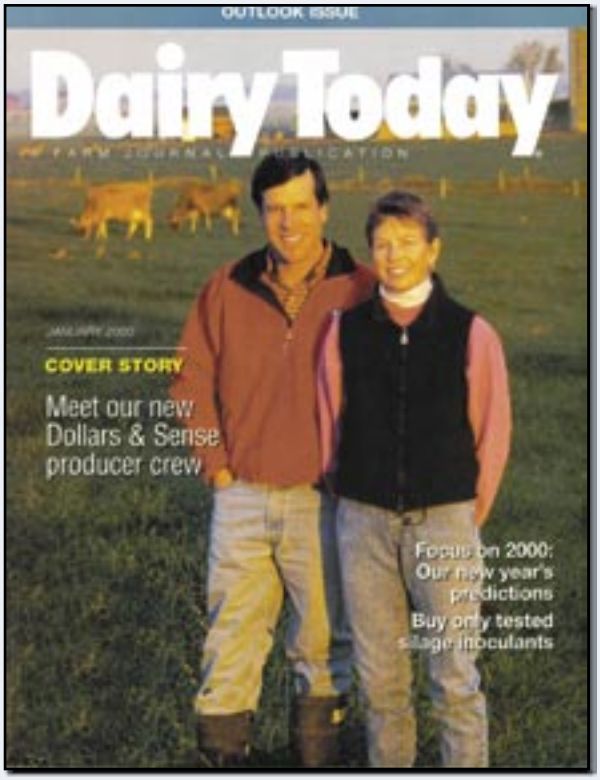
Financial Comparison of Belleview Farms, Inc. to Average of Maryland Farms Income, Expenses and Profit per Cow

Table 4

	Average of Maryland Farms	*Belleview Farms*
Average number of cows	102	143
CWT of milk sold per cow	178	104
FARM INCOME (PER COW)		
Milk sales	$2,729	$1,767
Cattle sales	188	117
Other income	203	96
Total income	3,120	1,980
FARM EXPENSES (PER COW)		
Feed purchased	814	603
Seed, fertilizer, chemicals	200	12
Depreciation and repairs	511	275
Labor	109	91
Medical and breeding	128	23
Hauling and transportation	179	70
Rent	133	10
Interest	102	30
Custom hire	88	0
Other expenses	393	264
TOTAL EXPENSES	2,656	1,378
Profit per COW	464	553
Profit per CWT	2.61	5.33

Green indicates favorable *Red indicates unfavorable*

Robert Fry & Judy Gifford
St. Brigid's Farm
Kennedyville, Kent County, Maryland



Bob and Judy featured in ***Dairy Today Magazine.*** *Reprinted with permission of* ***Farm Journal Media, Inc.***

In 1996, Judy Gifford and Robert Fry purchased land and moved to the beautiful site now known as St. Brigid's Farm. Named after the compassionate patron saint of dairymaids, St. Brigid's Farm is the home to approximately 135 head of registered Jersey cattle. The operation began with the purchase of 58 registered Jersey calves. These heifers grew and increased in value as pastures were planted, perimeter fence constructed, irrigation line buried, and the milking system installed. The first of these heifers calved on January 13, 1998. Twenty-nine heifer calves were born with the SBF prefix that year. The Jerseys have been impressive with their will to milk, their feed efficiency, their calving ease, and their ability to graze.

Genetics

Production, components, type, and outcrossing are the core elements of the breeding program. Using the top 10 percent of sires available, the American Jersey Cattle Association provides a primary and secondary mating recommendation based on kinship values. That list is modified to fit within the budget and to accommodate for any structural or production weaknesses an individual animal may have. In addition, young sires, as a member of Liberty Sires, Inc. and the AJCA Genetic Diversity sampling program, are incorporated into the breeding strategy.

Philosophy

The vision at St. Brigid's Farm is to balance three guiding principles into an economically and environmentally sustainable operation. (See Figure 1.)

Economics

Profit/cow on a dairy farm is highly dependent on three variables – milk price, feed cost, and milk volume. Receiving premiums for low somatic cell count and high fat and protein for Jersey milk maximizes milk price. Feed costs are minimized while striving for maximum milk flow by utilizing high quality grass as 60 percent of the diet. All pasture costs, including the input expenses of seeding, drinking water, fencing, fertilizer, and irrigation are accounted for feed expenses.

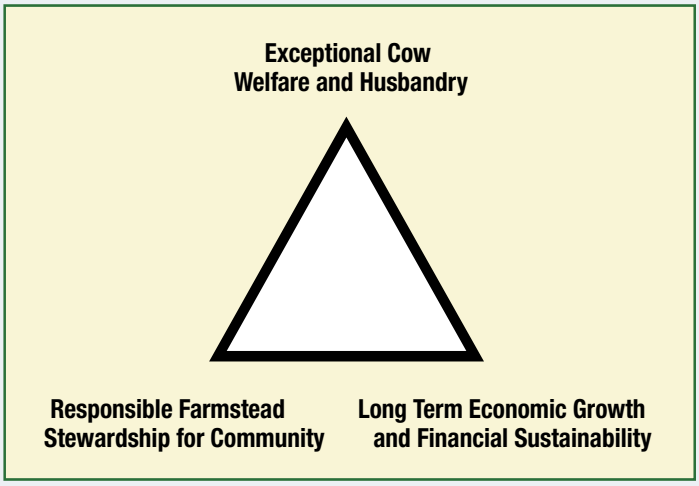


Figure 1.

Nutrition

The philosophy of the feeding program is to feed standing grass to the greatest extent possible. Hay and corn silage are fed only when grass is short due to drought or winter conditions. After forage needs are satisfied, the remaining ration requirements are fulfilled with a custom grain mix fed in the parlor during milking or mixed with fermented silages. The protein content of the grain mix will vary from 9-14 percent depending on grass quality. If grass is plentiful and of premium quality, a target ratio of milk to grain is 4:1. Dry cow nutrition is an important focus area for the success of a milking herd in the following lactation. During January and February, the dry herd will be fed corn silage, grass hay, and a fortified grain supplement. As calving approaches the energy and protein density of their diet will be increased to prepare for calving and the demands of lactation that will follow.

Nutrient Management

Voluntary nutrient management planning is practiced to minimize soil erosion, improve soil tilth, organic matter and area water quality. By monitoring the mass nutrient balance of nitrogen, phosphorus and potassium, it is assured that nutrients are used efficiently to produce grass and milk. Minimizing unnecessary purchases of feed and fertilizer, controlling the rate and timing of fertilizer, exporting stored manure, and implementing best-known soil and water

conservation practices reduce environmental losses of nutrients and sediment from the farm.

Irrigation

Irrigation is an essential risk management tool to ward off the high cost of purchased grains and forages during dry weather. The source of water is a 110-foot well supplied with a 10 horsepower 3-phase submersible pump. Water is pumped at 60 gallons/minute at 100 psi to a hard hose traveler. With this system, one inch of water can be applied to three acres/day. During each of the dry summers of 1999 and 2002, over ten million gallons of water were pumped onto pastures resulting in a continuous grazing season from February until December.

Irrigation is important on this Eastern Shore farm.

Managed Intensive Grazing

Fifty-five acres of cool and warm season perennial grass pastures are utilized as the primary forage source for the milking and replacement herds. From about March 1st until December 1st the milking herd is moved after each milking to a new paddock of fresh grass. Yearling heifers trail behind the milk cow paddocks or are given other less "milky" grass. Paddock dimensions vary and are appropriately sized according to the amount and quality of available pasture. Fresh drinking water is supplied to each paddock by a buried one inch water line and quick coupler hydrants every two acres.

After grazing two or three rotations, 35 pounds of liquid nitrogen fertilizer are applied followed by irrigation during the summer months. With this rotation of grazing, fertilizing, and watering, vegetative growth is usually ready for grazing every 2-3 weeks.

Travel lanes are five feet wide and consist of a bank-run gravel base covered with a 42-inch wide rubber coal mine conveyer belt. The 2000 feet of belting provide excellent cushion for the cows and also protect the laneways from hoof traffic erosion.

Health

The principles followed to maintaining a healthy herd are prevention through strict attention to biosecurity, nutrition, sanitation, and cow comfort. Additionally, biosecurity is bolstered with a vaccination program against common viral and bacterial pathogens. Proper nutrition with adequate vitamin and trace mineral fortification is provided to support the cows' immune systems. Clean and comfortable resting areas are a natural part of a grazing system. However, on severely hot days, the cows come in from pasture to a shaded barn with bedded freestalls and fans until after the PM milking. Intramammary infusion with a dry cow antibiotic treatment is practiced on all of the prefresh heifers and dry cows eight weeks prior to calving.

Financial Comparison of St. Brigid's Farm to Average of Maryland Farms Income, Expenses and Profit per Cow

Table 5

	Average of Maryland Farms	*St. Brigid's Farm*
Average number of cows	102	66
CWT of milk sold per cow	178	180
FARM INCOME (PER COW)		
Milk sales	$2,729	$3,047
Cattle sales	188	318
Other income	203	613
Total income	3,120	3,978
FARM EXPENSES (PER COW)		
Feed purchased	814	406
Seed, fertilizer, chemicals	200	110
Depreciation and repairs	511	723
Labor	109	56
Medical and breeding	128	135
Hauling and transportation	179	NA
Rent	133	0
Interest	102	244
Custom hire	88	171
Other expenses	393	622
TOTAL EXPENSES	2,656	3,119
Profit per COW	464	859
Profit per CWT	2.61	4.76

Green indicates favorable *Red indicates unfavorable*

Seasonal Breeding

The entire milking herd is artificially inseminated as soon as possible after May 15th for a targeted calving date of February 20th. This schedule coordinates peak milk flow and dry matter intake with maximum springtime grass yield and quality. Balanced nutrition, accurate and aggressive heat detection, and proper AI technique are essential in reaching an 85 percent pregnancy rate by 60 days into the breeding season.

Quick coupler hydrants are used on this one inch water line.

Holterholm Farms featured in
Northeast DairyBusiness Magazine
Reprinted with permission from
Northeast DairyBusiness Magazine.

Ron and Kathy Holter
Holterholm Farms
Jefferson, Frederick County, Maryland

Holterholm Farms is a fifth generation dairy farm located in the Middletown Valley of Maryland. Ron and Kathy purchased the 207 acre farm from Ron's parents in 1994. They have two children. It had been a successful, 100-cow registered Holstein CC dairy until 1995. At that time, Ron attended an Extension workshop conducted by Stan Fultz and Dale Johnson at the Frederick County Office. The workshop focused on developing a mission, strategic planning, and goal setting. This was a catalyst for Ron and Kathy's decision to convert from CC to grazing to meet farm, family, financial, environmental, and spiritual goals.

Philosophy

"At Holterholm Farms, we believe that farming should be done within the boundaries that our Creator set when He set the world into motion. We farm knowing that we are just stewards of the land attempting to improve the land for future generations."

This field map illustrates paddock layout of Holterholm Farms.

Infrastructure

In 1995, the transition to grazing began with bred heifers and dry cows being grazed on permanent pasture and hay fields from May to October. Perimeter two-strand electric fence was installed around 154 acres of former annual crop ground. By the spring of 1996, single-strand interior fencing was completed, splitting the 154 acres into six-acre paddocks. An above-ground, 1.25-inch waterline was installed to provide water to every paddock using portable water troughs. All stock was turned out to graze in late April. The other 50 acres were seeded into hay and pasture grasses in the fall when the last of the annual crops were harvested. Geotextile-reinforced laneway construction was completed in 1996 to provide year-round access to pastures. The farm is currently divided into 60 three-acre paddocks, further divided with temporary fencing to allow fresh forage after each milking. A refurbished Waikato swing-20 milking parlor was built in 2002 to allow the milking of 110 cows per hour with a single operator.

Nutrition

Calves are fed colostrum at birth. At two days of age, they go into a pasture lot with a training fence and a mob feeder where whole milk is fed. Calves have calf starter and fresh water available from one week of age. They are weaned at eight weeks and grain supplementation is continued until the calves are six months old. Heifers receive no additional grain until three weeks prior to calving. Dry cows receive hay or baleage and free-choice minerals. Milk cows are fed five pounds of concentrates at milking time. Pasture is the only forage source for all animals except for times of pasture shortage (drought and winter) when they will receive hay or baleage. These bales are unrolled on the paddocks to allow the cattle to be fed outside year-round except when the ground is too

soft and pasture damage may occur. Barn confinement is only a few days per year due to inclement weather and paddock conditions.

Spring Calving

Transition to spring calving began in 1997. Cows and heifers are bred to allow calving in late February through April. Cows not falling into this calving window are sold in December. The entire herd is dried-off in mid-December, which reduces feed requirements during winter and provides a "vacation" period of about 6-8 weeks.

"Why Jerseys?"

The Holters switched to Jerseys since they are smaller than Holsteins and are more efficient converters of forage to milk. They also have exhibited better heat tolerance than Holsteins. Even in the heat of summer, Jerseys will spread out and graze. Jerseys have expressed better fertility than Holsteins which is critical to seasonal calving. The Jerseys will typically have a first service conception rate near 65 percent while the Holsteins average less than 40 percent. Only heifer calves from cows that calve in the first four or five weeks of the season are raised as herd replacements, thereby improving the herd fertility in future generations.

The Switch to Organic

After several years of grazing, the Holters began to realize that pesticides, hormones, and antibiotics are just band-aids for poor management. "They are unnecessary and harmful to the land, cow, and the end user - people," says Ron. "The Lord has given us the wisdom to farm without this 'toxic rescue chemistry' and we have farmed this way since 2000." Another deciding factor in the conversion to organic production was the availability of organic milk buyers in central Maryland. They began shipping organic milk on July 1, 2005.

Financial Comparison of Holterholm Farms to Average of Maryland Farms Income, Expenses and Profit per Cow

Table 6

	Average of Maryland Farms	*Holterholm Farms*
Average number of cows	102	107
CWT of milk sold per cow	178	94
FARM INCOME (PER COW)		
Milk sales	$2,729	$1,749
Cattle sales	188	254
Other income	203	224
Total income	3,120	2,207
FARM EXPENSES (PER COW)		
Feed purchased	814	354
Seed, fertilizer, chemicals	200	0
Depreciation and repairs	511	261
Labor	109	25
Medical and breeding	128	20
Hauling and transportation	179	81
Rent	133	1
Interest	102	271
Custom hire	88	8
Other expenses	393	201
TOTAL EXPENSES	2,656	1,221
Profit per COW	464	962
Profit per CWT	2.61	10.25

Green indicates favorable *Red indicates unfavorable*

Future plans

The Holters plan to keep their herd size around 125 cows. They added a little diversity with a few chickens in 2005. Their son is showing an interest in the farm, so they are waiting for the Lord's leading in their future plans.

Grass Variety Research Plots for Improving Dairy MIG

Studies conducted at the Western Maryland Research and Education Center are determining the characteristics of various grass species for intensive grazing in Maryland. Thirty-eight perennial grass varieties (which include eight species) and 20 annual varieties were harvested under a simulated-grazing cutting frequency. Dry matter yield results of three-year perennial trials have been reported. The nutritional composition of the more than 3,000 samples is still being analyzed as of this printing. Annual varieties were also harvested and the results were released at the end of each season. Annual ryegrass varieties provide alternative forage to be utilized as a quick cover or in a double crop system.

Both perennial and annual trials have been used to assist producers in selecting improved grass varieties as they observe the growth habits, leaf texture, varietal vigor and resistance to weather extremes, and disease. These observations have been made at pasture walks, field days, and numerous visits by producers, grass seed company representatives, Extension agents and NRCS personnel. At the USDA NRCS, National Plant Materials Center in Beltsville, MD, a forage variety trial of traditional mixes, over 40 cool season grass varieties, and over 40 warm season grass varieties have been established to collect detailed growth curve data under a simulated grazing (clipping) system.

Stan Fultz measures dry matter with a rising plate meter.

Educating Dairy Farmers through Pasture Walks

Holterholm Farms hosted the first Dairy Pasture Walk for Frederick County in 1996 and has served as a demonstration farm for Maryland Cooperative Extension since then. In 1997, Peace Hollow Farm of Washington County became the second demonstration farm. Since 1996, over 70 Dairy Pasture Walks have been held on 20 different farms and at the Western Maryland Research and Education Center with a total attendance of over 2,200 producers, industry representatives, Extension Agents and NRCS personnel. These Dairy Pasture Walks provide a farmer-to-farmer discussion of practical alternative methods of dairy production used to increase profitability under an intensive grazing management system.

Objectives of the early walks were to address the basics of how to graze dairy cattle in Maryland. Since there was limited grazing experience to draw from, farmer-learners soon became farmer-teachers under this team's guidance. Some of the first subjects included grazing system design, grass and legume species selection, stand establishment, maintenance and renovation, fencing and watering systems, and laneway construction. Dairy Pasture Walk discussions soon became more involved to include managing forage supplies, grazing nutrition, feeding systems, soil health, cow health, and dairy genetic selection. The learning curve continues for experienced as well as new graziers and technical advisors.

Sign directs farmers to a pasture walk at the Belleview Farm.

Ron Holter explains his production methods at a pasture walk.

What A Difference Grazing Makes!

The soil in the jar on the left is from a conventionally tilled field from a well managed farm that practices crop rotation and strip cropping. The jar on the right has the same soil type but is from a pasture that has been rotationally grazed for eight years.

When water is added to the samples and they are gently agitated, the pasture soil stays in a tight clump whereas the tilled soil immediately falls apart and goes into solution.