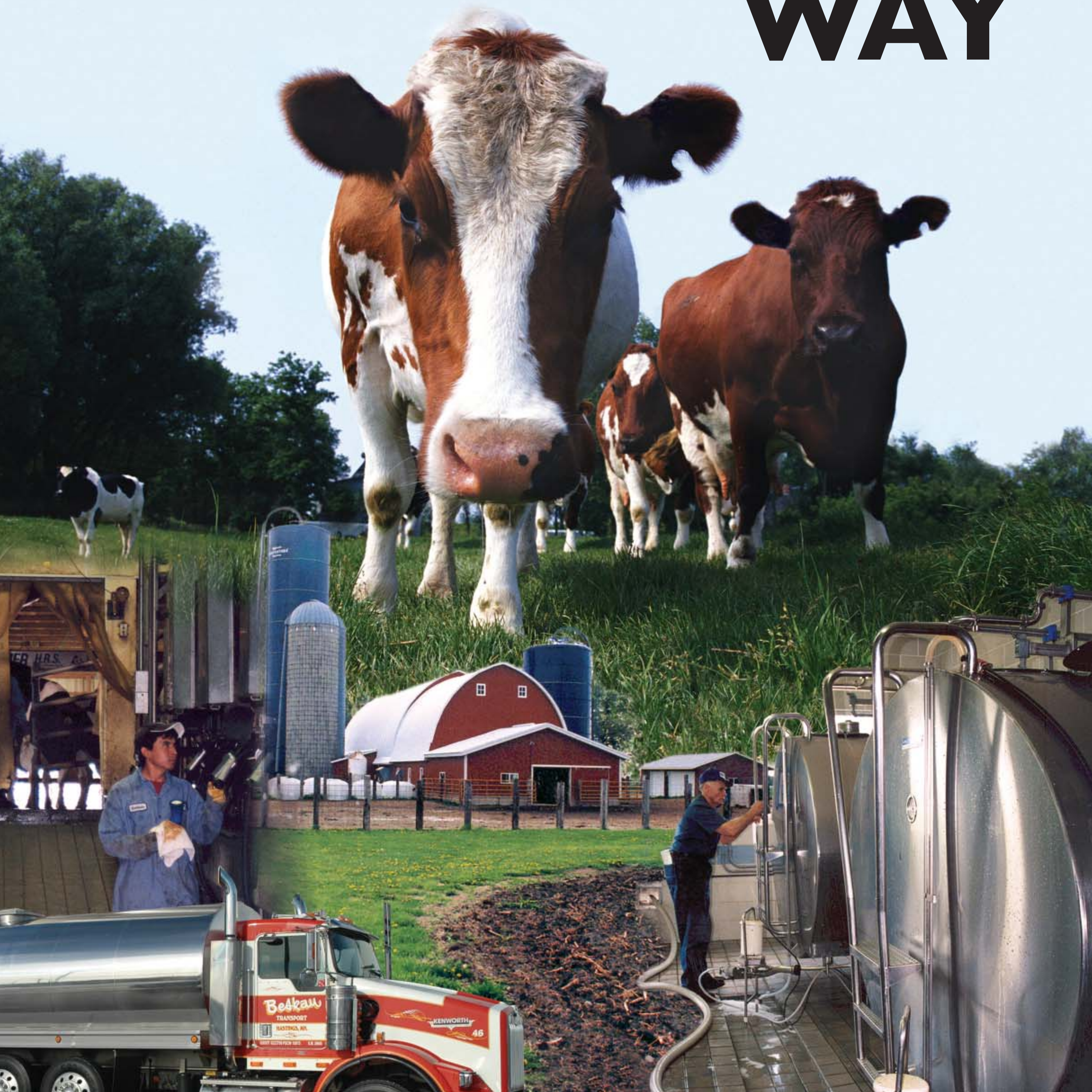
DAIRY *YOUR* WAY

A GUIDE TO MANAGEMENT ALTERNATIVES
FOR THE UPPER MIDWEST



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The 2007 printing of *Dairy Your Way* was made possible with funds from

Minnesota Milk Producers Association

Support for this project was provided by the Cooperative State Research, Education, and Extension Service (Agreement number 2003-38640-13225) through a Research and Education grant from the USDA-Sustainable Agriculture Research and Education Program to the Minnesota Department of Agriculture. Opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the view of the U.S. Department of Agriculture.

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Minnesota Department of Agriculture,
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The Minnesota Department of Agriculture (MDA) works toward a diverse agricultural industry that is profitable and environmentally sound; protects public health and safety regarding food and agricultural products; and ensures orderly commerce in agricultural and food products. Its Sustainable Agriculture and IPM Program demonstrates and promotes alternative agricultural practices that are energy efficient, environmentally sound, and profitable, and that enhance the creativity and self-sufficiency of Minnesota farmers.
www.mda.state.mn.us

Minnesota Institute for Sustainable Agriculture (MISA)

MISA is a partnership between the University of Minnesota's College of Agricultural, Food, and Environmental Science and the Sustainers' Coalition, a group of individuals and community-based nonprofit organizations. MISA's purpose is to bring together the agricultural community and the University community in a cooperative effort to develop and promote sustainable agriculture in Minnesota and beyond. www.misa.umn.edu

Center for Integrated Agricultural Systems (CIAS)

The Center for Integrated Agricultural Systems (CIAS) is a sustainable agriculture research center at the University of Wisconsin's College of Agricultural and Life Sciences. The Center was created to build UW sustainable agriculture research programs that respond to farmer and citizen needs, and involve them in setting research agendas. This means that human relationships are at the core of everything we do. CIAS staff members work with citizen and faculty partners to create flexible, multidisciplinary research in emerging areas. www.cias.wisc.edu

Michigan Food & Farming Systems (MIFFS)

MIFFS is a statewide, non-profit organization whose purpose is to improve Michigan's triple bottom line: our economy, our environment, and the social well-being of our communities through sustainable agriculture initiatives.

Sustainable Farming Association of Minnesota (SFA)

SFA is a nonprofit farmer organization that encourages Minnesota farmers to implement innovative, ecologically sound, and prosperous farming systems that contribute to the good health of people, farms, and communities. SFA supports the development and enhancement of sustainable farming systems through farmer-to-farmer networking, innovation, demonstration, and education. www.sfa-mn.org

CONTENTS

THIS GUIDE WAS DEVELOPED TO:

- HELP farmers compete, prosper, and create successful and fulfilling dairy operations.
- ENCOURAGE producers of different types, sizes, and philosophies to coexist and cooperate, recognizing that there is no single "perfect" production system.
- OFFER options that can provide market access to beginning and specialty dairy producers, regardless of size.
- BUILD upon the expertise and experience of noted authorities, including producers.
- SUPPORT dairy production in the Upper Midwest as a vital contribution to agriculture, communities, and the economy as a whole.
- SERVE as a resource for producers who want to evaluate different dairy options.

WHAT THIS GUIDE WILL HELP YOU DO:

- CLARIFY your dairying goals.
- UNDERSTAND the range of dairy options you have in the Upper Midwest.
- IDENTIFY options that fit your strengths, interests, and resources.
- ENCOURAGE further planning, discussion, and networking.
- PROVIDE contact information to research areas of interest on your own.

WHAT THIS GUIDE WILL <u>NOT</u> DO:

- COVER every system or combinations of these used in the Upper Midwest.
- PROVIDE state-of-the-art technical data.
- REPLACE the expertise and counsel of breeders, nutritionists, veterinarians, engineers, accountants, attorneys, extension agents, contractors, and consultants.
- GUARANTEE success, sustainability, or personal satisfaction.
- MAKE decisions for you.

HOW YOU CAN USE THIS GUIDE:

- SKIM the entire guide (to get an overview).
- START at the beginning and read straight through to the end.
- READ sections of greatest interest (to satisfy an immediate need or curiosity).
- PERSONALIZE your guide— highlight or circle important ideas.
- REFER to additional resources listed for more information that will help you make decisions.

INTRODUCTION

Whether you are a beginning farmer or a current dairy farmer thinking of making some changes to your operation — if you want think more about dairy systems that will best fit your goals and resources — this book is for you. We've talked to many dairy producers and other dairy experts in Minnesota, Wisconsin, and Michigan in order to present complete, unbiased, side-by-side comparisons of many dairying options.

This book is not intended to be a how-to dairy guide or manual. While there is no one-size-fits-all answer for dairy farmers seeking success as milk producers, there are many options that can be profitable and satisfying. This publication was created to provide information that will help producers explore the many choices available for today's dairy farms.

You may want to read the book from beginning to end, or you may want to skip around in it looking for sections that interest you the most. Throughout the book, you'll find profiles of real world dairy farmers in the Upper Midwest who are using the systems described in the book. These will give you an on-the-farm sense of the different production systems and people who use them.

We recommend that you begin by working through the self-assessment questions at the beginning of the book. They will help you evaluate:

- your skills, interests and values
- your current assets in buildings, livestock, and capital
- the kind of farming work you prefer
- your family's interests and goals

Keep your own strengths and interests in mind as you read about the different production systems described in this book. At the end of the book, a second set of questions will help you sort through the information that you've read and determine which systems appeal to you the most and might be good fits with your situation.

At the end of each chapter and at the end of the book, we've listed resources and contacts you can use for further information and research. These will be critical to help you take the next step in planning your dairy enterprise.

Think of this book as an *à la carte* menu. Help yourself to what interests or makes sense to you from any chapter. You hold the keys to a flourishing dairy operation. Reading this book is only the first step.

Photo courtesy of National Dairy Council®

TAKE STOCK OF RESOURCES AND GOALS: PART 1

Your goals for your farm and for your own satisfaction are critical to the success of any production method you choose. Before you begin reading this book, answer the following questions to help stimulate your thoughts and ideas regarding the past and future of your farm and all those involved running it. Keep these questions in mind as you read about the different dairy production and management systems. At the end of this book you'll find another set of questions to help you further clarify what might fit you best.

WHAT DO YOU ENJOY DOING?

	LIKE BEST									LIKE LEAST
Working alone	10	9	8	7	6	5	4	3	2	1
Supervising others	10	9	8	7	6	5	4	3	2	1
Delegating responsibilities	10	9	8	7	6	5	4	3	2	1
Using farming methods I know well	10	9	8	7	6	5	4	3	2	1
Learning about and incorporating new technology	10	9	8	7	6	5	4	3	2	1
Working on a seasonal basis	10	9	8	7	6	5	4	3	2	1
Keeping careful production records	10	9	8	7	6	5	4	3	2	1
Managing farm finances	10	9	8	7	6	5	4	3	2	1
Analyzing records	10	9	8	7	6	5	4	3	2	1
Making changes and improvements to the farm	10	9	8	7	6	5	4	3	2	1
Working with and managing animals	10	9	8	7	6	5	4	3	2	1
Milking dairy cows	10	9	8	7	6	5	4	3	2	1
Growing crops	10	9	8	7	6	5	4	3	2	1
Managing forage/silage/haylage storage	10	9	8	7	6	5	4	3	2	1
Working with machinery	10	9	8	7	6	5	4	3	2	1
Inside work	10	9	8	7	6	5	4	3	2	1
Outside work	10	9	8	7	6	5	4	3	2	1
Seasonal work	10	9	8	7	6	5	4	3	2	1
Steady, year-round work	10	9	8	7	6	5	4	3	2	1
Having time off for social activities and vacations	10	9	8	7	6	5	4	3	2	1

RANK THE ITEMS THAT, FOR YOU, DEFINE SUCCESS.

	MOST IMPORTANT									LEAST IMPORTANT
Paying off debt without falling behind	10	9	8	7	6	5	4	3	2	1
Being debt-free	10	9	8	7	6	5	4	3	2	1
Farming full-time	10	9	8	7	6	5	4	3	2	1
Farming part-time	10	9	8	7	6	5	4	3	2	1
Building a business that can support several families within my family	10	9	8	7	6	5	4	3	2	1
Taking time to rest, vacation and attend social activities	10	9	8	7	6	5	4	3	2	1
Being able to set money aside for down times and retirement	10	9	8	7	6	5	4	3	2	1
Having a surplus to share with others in need	10	9	8	7	6	5	4	3	2	1
Working together as a family on the farm	10	9	8	7	6	5	4	3	2	1
Generating 100% of my income from the farm	10	9	8	7	6	5	4	3	2	1
Continuing to farm on my family's farm	10	9	8	7	6	5	4	3	2	1
Expanding my dairy herd	10	9	8	7	6	5	4	3	2	1
Reducing my dairy herd	10	9	8	7	6	5	4	3	2	1

NOTES:

CHAPTER 1: TIE STALL HOUSING OVERVIEW

In the Midwest, red barns and blue silos are the traditional signs of a dairy farm.

Background

World War II is a historical landmark that provides a reference point for change in the dairy industry. At that time, mechanization became popular in many industries, and dairy was no exception. In the Upper Midwest, dairy farms were historically pasture-based. Winter brought snow cover, wind, and conditions that motivated many farmers to keep their herds in the barn. Most barns had stanchions separating each cow and cows were tied here during the winter.

In the 1950s, farmers began providing cows with a communal resting or "loose housing" area. This management method continued to grow in popularity, but most farms in Minnesota and Wisconsin did not move to this design because frequent bedding additions were necessary in order to keep the cows clean.

After the war, many farms moved to year-round confinement, using pasture only to feed replacement heifers and dry cows. Round-the-barn pipelines became available, moving milk quickly to the milk house. The tie stall barn was easily retrofitted with this technology. The tie stall system predominated in Minnesota and Wisconsin, partly due to tradition. Upright silos and silo unloaders became the mainstream solution to storing and delivering feed to the cows.

Housing and bedding

In a tie stall barn, each cow is housed in her own stall. In front of her, she has a manger for forage, silage, and grain. A water cup is situated between each pair of cows. The stall is designed to be spacious enough to allow the cow room to rise and to lie down. All cow care and milking is done at each cow's station. The building designs and internal layouts may vary, but the general theme is consistent: cows are cared for individually. Everything a cow needs is delivered to her.

Stalls separate cows, yet allow room for the cow to be milked. As the size of the typical Holstein cow has grown, stall sizes have had to increase as well. Many stalls use rubber mattresses blanketed with a layer of chopped organic material, which may be old hay, corn stalks, or newspapers. Others do not use a mattress under the bedding.

Bedding provides the cow a comfortable, warm, and dry place to rest. A cow's comfort is key to her productivity. Producers remove wet and soiled bedding and replace it with clean bedding material several times a day.

For complete information on new and refurbished milking centers, see Chapter 8, *Milking Center Options*.

CHAPTER 1: TIE STALL HOUSING OVERVIEW

A variety of shapes, sizes, and styles of silos can help tell the history of a dairy farm.

Feeding

By the 1960s, many farms had erected upright silos to store forages. Some tie stall producers use carts to deliver feed to the cows. Others have an open lot where cows are released to eat silage conveyed directly from the silo into a feed bunk.

Some tie stall operations have invested in a feed mixer and feed their cows a total mixed ration (TMR). Others prefer to feed forage, grain, and supplements separately. Sometimes cows sort out what they like and leave behind less favored feed, so farmers may remove uneaten materials from previous feedings to encourage cows to eat a balanced diet.

Herd health and biosecurity

Cow comfort is at the forefront of any herd health plan, because dry, comfortable cows are less vulnerable to infection and disease. Because animals are housed indoors, farmers monitor and trim hoofs to maintain cow mobility, comfort, and milk yield. To ensure that the barn is properly ventilated, producers monitor the temperatures and humidity. Some older barns are retrofitted with fans or tunnel ventilation to help cool the herd in the summer heat.

Biosecurity also plays a role in health. Visitors may be required to put on plastic boots or wash their boots before entering a building.

Producers often incorporate a regular veterinarian visit to monitor herd health and reproductive problems. Vets check for pregnancy and health after calving, and administer vaccinations.

One advantage to tie stall production is the individual attention given to each cow. Monitoring each cow's health and comfort is simplified. Farmers report that they can assess body condition and well-being during milking and can individualize diets by feeding grain and supplements according to evaluation of production. If a cow is not consuming all of her feed, it may be an indication of health problems — such as ketosis, a displaced abomasum, or metritis — that need attention.

To prevent disease transmission from cows to calves, heifers and bull calves are typically taken from their mothers soon after calving and kept away from the rest of the herd. Using individual housing facilities for heifers adds to the cost of producing replacement animals, but hutches or pens isolate heifers, preventing contact with manure from other animals and nose-to-nose contact between heifers.

Some farms use self-contained nurseries with individual pens to house the calves (David Kammel, personal communication, 2004). In some cases, convertible housing is possible: dividing walls can be removed to allow for group housing of weaned heifers. Depending on the facility, costs associated with labor and labor efficiency may vary.

Calves are well adapted to grazing, with some supplemental grain, after five or six months. Although animals can be put out on pasture after they are weaned (usually between four to eight weeks of age), when they are this young it is difficult for them to consume enough forage to grow at an acceptable rate. Typically, calves do better with 2 to 5 pounds of supplemental grain until they are 6 to 10 months old. Fenced pasture is the least expensive option for feeding and housing older replacement heifers (Dennis Johnson, personal communication, 2005; David Kammel, personal communication, 2004).

After freshening, a cow's nutrition and health must be carefully monitored to assure high productivity. Her comfort, body condition, and hoof health contribute to her ability to stand, eat, and produce milk. Occasionally, farmers monitor each animal's body temperature as a health indicator. Some farms conduct on-farm milk testing in order to monitor the somatic cell counts of individual cows. To avoid infections, farms incorporate careful sanitation of milking equipment. Tie stall farmers generally treat infections with antibiotics, but some bacterial strains have become resistant to antibiotics. Many tie stall farms keep closed herds and replace cull cows with heifers raised right on the farm. This practice minimizes exposure to foreign bacteria and viruses.

Genetics and breeding

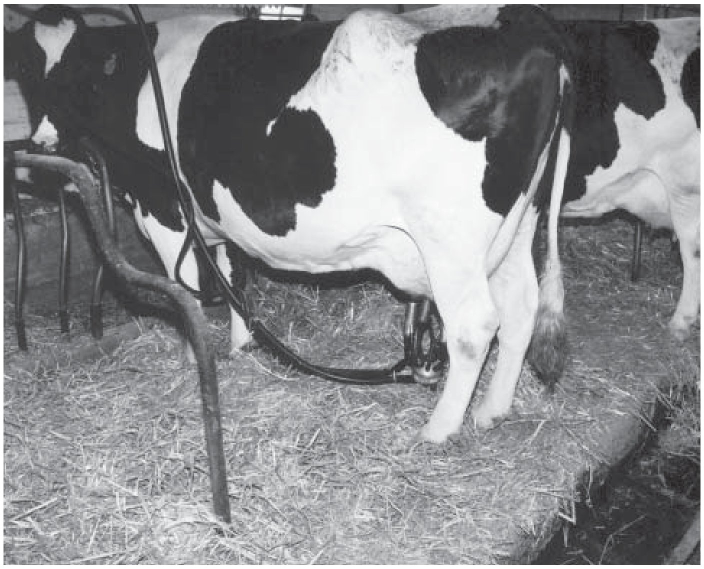
In a tie stall barn, most animals are bred using artificial insemination (AI). Holsteins are the predominant breed, partly because of tradition and partly because they produce the greatest volume of milk per cow. Other breeds include Jersey, Brown Swiss, Ayrshire, Guernsey, and Milking Shorthorn. With the use of a few popular AI sires, U.S. Holstein populations have become closely related and highly specialized. This lack of diversity may account for diminished fertility and increases in reproductive problems in recent years (Hansen, 2000; Dennis Johnson, personal communication, 2005). Estrus (heat) detection is difficult when animals are tied in the barn. Allowing animals to move around in a lot or paddock increases the ease of detecting when a cow comes into heat. Some operators use hormone injections to synchronize heat.

Milking

Operations with tie stall facilities usually do not have a separate milking parlor (see Chapter 8, *Milking Center Options*.) Instead, the barns feature a round-the-barn pipeline. At each milking, the cows are prepped for milking in their stalls. Farmers milk each cow with a milking machine attached to the pipeline that delivers milk to the milk house. On average, twenty to thirty cows can be milked in one hour.

Labor is not used efficiently in a tie stall barn and this milking system is nearly always a physical strain for those milking. The producer must bend repeatedly; first to dip the teats, then to clean the teats, then to attach the milker, again to detach the milker, and finally to post-dip teats. For a 60-cow herd, this means a minimum of 300 bends per milking. Some farms add automatic detachers to improve the milker's comfort and to provide consistency for the cows.

In addition, nothing separates the cow from the dairy producer, and this proximity can create a safety hazard. The cow may step on feet, kick the person milking her, or crush the milker against the stall sides. Most producers say they feel wear on their bodies as a result of the physical demands of this milking system.



In a tie stall setup, milking units come to each cow in her individual stall.

CHAPTER 1: **TIE STALL HOUSING OVERVIEW**

Performance and scale

Tie stall herds can exhibit a wide range in productivity, from 12,000 pounds per cow per year up to 30,000 pounds per cow per year for top producing farms. Management may be very traditional, with few production-boosting enhancements, or very intensive, capitalizing on easy individual access to each cow. In Minnesota, the culling rate is about 33 percent, according to FINBIN records[1] (UMN-CFFM). Herd management plays a role, impacting feed quality, herd health, cow comfort, and any of the numerous factors that can impact milk yields and influence somatic cell counts.

One advantage of the tie stall farm is the ability to retrofit older buildings and feed storage facilities. This strategy can mean lower debt loads, and may help some farms survive fluctuations in milk prices. Herd size varies greatly, from farms with as few as 10 cows to as many as 200, with the most typical size herd size between 60 and 90 cows (Dennis Johnson, personal communication, 2005). The larger herds usually milk in shifts, and are not common.

Manure management

Manure handling contributes to the high labor demands of this barn style. Most tie stall barns have a gutter cleaner consisting of a chain with a set of paddles. This equipment runs through a gutter positioned behind the cow, removing manure by dragging along the gutter. The gutters are positioned between the cows and alleys, and the alleys are scraped or swept by hand. Producers must be present to operate the system and remove the scraped waste from the barn. Some operations have a manure-holding facility, but many others spread the manure daily. Spreading may be possible even in winter, as long as the land is not too steeply sloped or too near sensitive areas where runoff may occur.

Manure testing to determine nutrient content and soil testing to determine nutrient needs are important to maximize the fertilizer value of manure. When spreading near tile inlets, care must be taken prevent nutrient leaching. Many farms that have earthen storage basins hire special haulers to spread manure.

Social and environmental concerns

Generally, since the herd size is relatively small in tie stall systems, odor issues are minimal. However, because daily manure spreading is often required, some neighbors might notice the smell. Earthen basins usually have a crust and only emit noticeable odors during agitation.

If you are considering adding or changing a facility, see the *Resources* section at the end of this book.

[1] FINBIN is a farm financial and production database that summarizes actual farm data from thousands of agricultural producers who use FINPACK, a comprehensive farm financial planning and analysis software system developed and supported by the Center for Farm Financial Management at the University of Minnesota. See www.finbin.umn.edu.

TABLE 1: ***Cost of production for tie stall farms (per cow), Minnesota, 2002-2004***

	BOTTOM 40% OF OPERATIONS (in terms of net return)	TOP 40% OF OPERATIONS (in terms of net return)
Total number of farms reporting	105	106
Feed and bedding	$1,093.76	$1,093.05
Labor and custom hire	$164.96	$142.60
Hauling and marketing	$78.16	$79.81
Health and breeding	$124.79	$130.23
Total direct costs	$1,663.46	$1,625.83
Average number of cows	52.8	67

Detailed reports available at:
http://www.finbin.umn.edu/output/52726.htm and http://www.finbin.umn.edu/output/52729.htm

Source: University of Minnesota Center for Farm Financial Management FINBIN

Note: Costs of production for tie stall, free stall, and grazing systems are compared in a summary table at the end of Chapter 4 (Table 9). Note that these records do not necessarily predict results on any one farm or in all areas for all farmers.

To find current cost of production records for your state, contact:

Michigan
Department of Agricultural Economics
Michigan State University
Christopher Wolf (517) 353-3974 wolfch@msu.edu or
Stephen Harsh (517) 353-4518 harsh@msu.edu

Minnesota
Center for Farm Financial Management
University of Minnesota
(612) 625-1964 or (800) 234-1111
cffm@cffm.agecon.umn.edu

Wisconsin
Center for Dairy Profitability
University of Wisconsin
Bruce Jones (608) 265-8508 bljones1@wisc.edu

TABLE 2: ***Capital start-up investment cost estimates for a tie stall system***

ADDED TIE STALLS	**$2,500 to $3,000 per stall**
HEIFER HOUSING	**$145/calf to $675/calf**

Source: Holmes et al., 2003; David Kammel, personal communication, 2004

Resource people

The following people contributed information for this chapter. You will find complete contact information in the *Resources* section the end of this book.

Ken and Chad Bohn, tie stall dairy, Litchfield, MN

Dave Combs, professor of dairy science nutrition (dairy nutrition, forage utilization, and grazing systems for dairy cattle), University of Wisconsin

Joe Conlin, dairy herd health consultant, Shoreview, MN

John Fetrow, professor of veterinary medicine, University of Minnesota

Paul Fritsche, tie stall dairy, New Ulm, MN

Linus and Vern Goebel, conventional dairy, Albany, MN

Les Hansen, professor of dairy cattle genetics, University of Minnesota

Brian Holmes, professor (biological systems engineering) and extension specialist, University of Wisconsin

Kevin Janni, professor and extension engineer — livestock housing systems, University of Minnesota

Dennis Johnson, professor and dairy specialist, University of Minnesota

David W. Kammel, professor and extension specialist, University of Wisconsin

Jim Linn, professor and extension dairy nutritionist, University of Minnesota

Jim Salfer, dairy extension educator, University of Minnesota Extension Service

Harold Stanislawski, former livestock business advisor, Minnesota Department of Agriculture

Conventional Tie Stall Dairy with Direct Market Business

Bruce and Cheryl Mohn
Lakeville, Minnesota

Bruce and Cheryl Mohn sport their UdderTech "holsters."

Background

Bruce and Cheryl Mohn of Lakeville, Minnesota, operate what seems on the surface to be a conventional dairy farm family enterprise. They enjoy working together and playing together. As they've adapted to the changeable nature of agriculture, they've made some interesting choices for the sake of the farm and family.

Bruce's Norwegian ancestors roamed a bit before finally settling in New Market Township at the present site of the Mohn family farm. Bruce's great grandfather built the first house and horse barn on the original 80 acres. Grandfather Lars bought the farm in 1901 and, in 1921, constructed the dairy barn that is still used today. Bruce's father, Sydney, bought it from Lars in 1951 and milked until the late 1970s. Bruce bought the farm in 1991.

In 1981, Bruce and Cheryl realized Sydney had a nice facility for milking, and wanted to see it put to use. They decided to restart the operation. They moved a mobile home onto the farm, fixed up the barn, and bought a dairy herd of 45 cows.

Bruce rented 160 acres to add to Sydney's 145 acres, 110 of which were tillable. Sydney helped finance the initial investment of cows, which Bruce paid back in bull calves over ten years. Bruce and Cheryl also secured financing from a bank. They began working in their tie stall and stanchion barn, adding some new stanchions and a new barn cleaner in 1993. Just like many farmers of the early '80s, they were highly leveraged.

Reinvesting in the farm

Back in the mid- to late '90s the Mohns hired a high school student to feed their cows. "We were hand feeding with wheelbarrows," Bruce remembered. In 1998, the couple decided to purchase a portable mixer and feeding cart.

Initially, Bruce thought the mixer and cart would make the jobs easier and less time consuming. The benefit hasn't been in saved time, however. "I used to send the feed down an auger into the feed bunk," Bruce said. "In a matter of minutes, the cows were eating." Mixing means that feeding chores take a bit longer, yet the feeding is more organized. Bruce mixes a batch in the morning, and feeds it outside. While the cows are eating, he mixes the next batch for later in the day.

"I couldn't imagine feeding all the cows one mixture," said Bruce. "But the way I have my ration set up, it works." He said he immediately noticed a 6 pound per cow per day boost in milk production, as well as less ketosis.

Bruce feeds a total mixed ration (TMR) and long-stemmed hay in the morning. The daily TMR consists of corn silage, haylage, and alfalfa hay along with grain mix and cottonseed purchased from the local elevator. Bruce sells some of the hay raised on the farm and uses the proceeds to purchase better quality hay for his herd.

He has used long plastic bagging to store silage and oatlage since the early '80s. "The bags are highest quality method, hands down," Bruce said. While the silage, oatlage, and high moisture shelled corn are all stored in bags, the Mohns use two upright silos to store haylage. The silos, 16 ft by 45 ft and 18 ft by 60 ft, make haylage unloading easier. "I find that the haylage is a lot easier to get out of the silo," said Bruce.

FARM PROFILE: TIE STALL OPERATION

Housing and cow comfort

While they still milk in a tie stall barn, the Mohns have made some changes to the building to improve the comfort of the cows and the people in the building. They own 60 Holstein cows (with 50 milking at any one time), plus about 160 young stock. They raise all heifers in groups and raise the bulls for steers.

The cows are housed in a combination of tie stalls and stanchions. They spend roughly six hours outside each day for feeding and exercise. In 1999, the Mohns added stall mats to improve cow comfort. They cover the mats with wheat straw they purchase from a neighbor.

In 2000, the Mohns decided to improve on noisy hanging fans by adding tunnel ventilation. According to Bruce, the new system moves 20,000 cubic feet of air per minute through the barn and has improved ventilation. Even better, it's quieter.

Diversifying

The couple's education eventually helped them find ways for the business to evolve and grow. Both Bruce and Cheryl graduated from Lakeville High School. Bruce then studied sales and marketing at the University of Minnesota–Waseca. After Cheryl attended the University of Wisconsin–Stout, she and Bruce were married in 1980.

The farm is located just fifteen minutes from the suburban ring, and less than a half hour's drive from downtown Minneapolis. Like many farmers, their location limits options for growth. "We're part of the seven-county metro area," noted Cheryl. If they wanted to increase herd size, they would need to sell the farm and buy a new farm in a less populous area.

Because they always aimed to reinvest in their farm, in 1994, Cheryl started a business offering dairy-related tools and clothing by mail order. Cheryl's off-farm income initially went to support this business, called Udder Tech. The business provided an ideal solution to grow. The combined income from the dairy and the Udder Tech business provides the farm with an income equivalent to that of a much larger herd.

Balancing a full-time farm, a full-time business, and raising a family is a big challenge. Cheryl's heart is centered on her family first. "I could work 18-hour days to make this grow faster, but we have kids and I have to live too." To balance this, she subcontracts the sewing to local people who can sew at home.

This year, Udder Tech income is matching their farm income. They expect the Udder Tech business to become the primary breadwinner in the future.

Family mentoring and help

As the new farm business began to mature, the couple found their relationship with Bruce's parents helped the farm pass to the new generation. A separation between Sydney's dairy and their own allowed them the freedom to begin without pressure.

"My dad helped a lot with labor. We did a lot of sharing of equipment," Bruce noted, saying that without this help, he doubts whether he and Cheryl could have gotten started. Sydney helped with planting and tending the crops and taught the fledging farmer management skills.

While growing up, Bruce always preferred to spend time on the tractor doing the tillage. This holds true today. "If my dad had thought I was interested in milking, he would have held on. He would've helped me build a parlor," Bruce said. Yet Bruce never showed an interest in milking cows, and his father did not expand the dairy in hopes that this would change.

Farm management

Currently, Cheryl or their hired help do the milking, which is done twice each day. Bruce isn't interested in the animal husbandry part of dairy farming, and focuses instead on the crop and mechanical aspects of the farm.

The couple doesn't spend much time in recordkeeping, and wishes they did more. They do take the time to figure out what causes stress. Then they address those issues. For instance, they have four different sized stanchions so different sized cows need to be sorted to appropriate locations. Bruce said he would like to put up a free stall system, so they wouldn't have to tie up cows anymore.

FARM PROFILE: TIE STALL OPERATION

Herd health and production
The Mohns' production is about 80 pounds per cow per day with a 25,000 pound rolling herd average — almost 10,000 pounds more milk than when they started 1981. Their somatic cell count (SCC) average is about 125,000.

"For animal health, I've been fairly lucky," Bruce said. He attributes some of his luck to a good facility, bedding, and TMR feeding. He uses Posilac® (a synthetic growth hormone that stimulates milk production) on some of his cows, but not on the majority of them. He breeds solely with artificial insemination.

Family future
Bruce and Cheryl want their children to attend college, so they haven't been encouraging the kids to become partners in the farm or Udder Tech just yet. Bruce said he believes that anytime between the ages of 24 to 30 is an appropriate time to turn a farm over to a son or daughter. So far the farm has been big enough to provide and income for one family, but not big enough for a second.

The Mohns do not presently own enough land to expand their dairy, so enterprise diversification is important. "We're happy with the size dairy we have," Bruce said, noting that he feels his farm is among the better managed in the dairy industry. The farm has found another option available for increasing income. "We're thinking a little more diversified than the generation before us," said Cheryl.

CHAPTER 2: FREE STALL HOUSING OVERVIEW

Background

By the middle of the twentieth century, many publications and most of the information provided to dairy farmers recommended housing herds in barns with a bedded pack, which is a single area of bedding where all animals rest. This "new" housing style meant moving the animals out of the tie stall barns that were then in use and adding a separate milking parlor to a farm's facilities. Farmers who adopted the bedded pack discovered quickly that the method required a great deal of labor and investment in bedding. In some cases, poor management led to dirty, damp, or overcrowded conditions.

Health problems surfaced even in the cleanest of these housing environments. Since bedding was scattered around the barn, cows could easily track manure across the pack. They rested wherever they found a comfortable spot, and often picked up bacteria from manure. Sometimes, bacteria produced infections, including contagious forms of mastitis. Researchers and agricultural engineers responded by searching for another housing design with herd health in mind. Out of this process, the free stall barn was born.

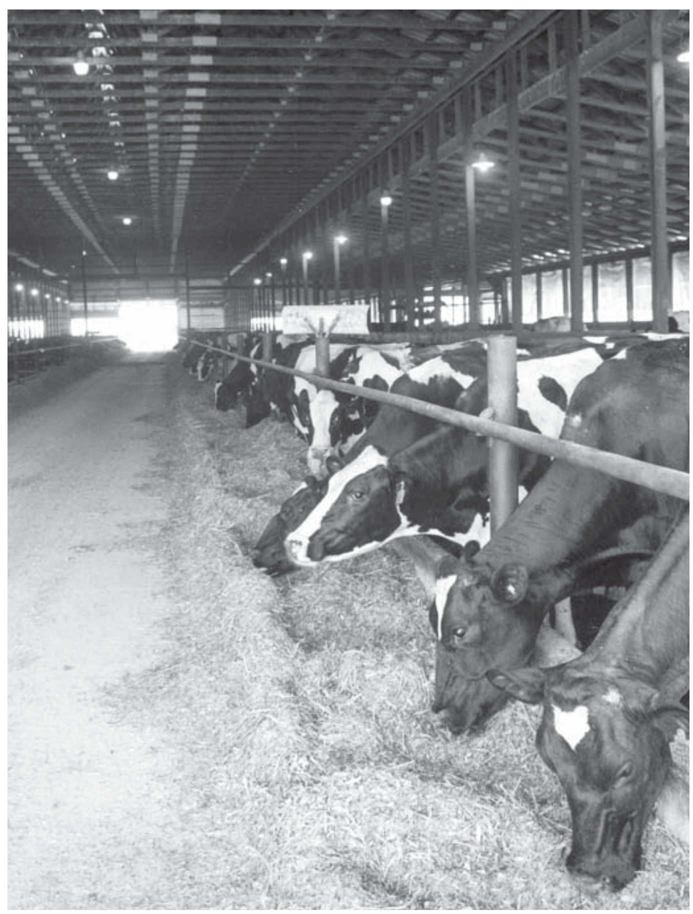
Free stall design

Free stall barns allow cows to enter their rest areas in the same headfirst position every time. The reasoning behind the concept was simple: Keep the manure behind the resting area, where it is least likely to come in contact with the teats and cause infection. Many farms across the country converted their barns to free stall units, although many dairies in Minnesota and Wisconsin stayed with tie stall facilities.

Another factor that encouraged the move to this new free stall system was lack of labor. Until the 1950s, most dairy herds were pastured seasonally and housed in stanchion or tie stall barns during the winter season. Shortages in labor forced a change in the management of dairy herds across the country. The free stall arrangement was less labor intensive and offered important advantages for operators as well as cows.

During the past 60 years, several factors have helped shape the free stall barn and numerous advances in technology have been well suited to the free stall system. The importance of herd comfort and health, the benefits of reducing labor requirements per cow, and larger herd sizes all helped shape the free stall barn. Group handling has allowed ease in delivering feed. Parlors have enabled producers to milk in greater comfort and safety, have shortened milking time, and have helped farms maximize labor efficiency.

The free stall environment also allows dairy producers to control variables related to the animals' health and productivity, to streamline processes, and to become more automated. With good management, cows can achieve consistently high levels of milk output.



Some free stall buildings feature a center alley for delivering feed.

For complete information on new and refurbished milking centers, see Chapter 8, *Milking Center Options*.

Housing and bedding

In a modern free stall barn, there are enough stalls for each cow to have her own resting spot, although the cows may not choose the same stall day after day. Often, farmers choose to group animals in sections. For example: cows that are expected to calve soon; cows at the same stage of lactation; cows at the same level of production; or cows of a similar age. The groupings allow specialized feeding for the animals' specific nutritional requirements. In terms of layout, some buildings feature a wide center alley for delivering feed, either along the alley or to internal bunks. While the layouts and investment levels vary, free stall barns all improve labor efficiency and cow comfort when compared with tie stall facilities (Holmes et al., 2003).

Many freestall operations bed with sand, which is soft for the cows and prevents the buildup of organisms that cause mastitis.

Free stalls are less restrictive than the typical tie stall, and allow the cow a comfortable, warm, and dry place to rest. Soiled bedding is regularly removed and replenished with dry bedding. Floors are usually solid concrete, with the exception of slatted concrete floors that allow waste to fall through to a manure pit beneath the building. For herd health reasons, many free stall facilities use sand as bedding. Others use a rubber mattress that has been covered with organic material such as crop straw, shredded newspapers, or sawdust. Sand is not usually used in barns with slatted floors. Recently, there has been a movement toward roomier stalls that enhance cow comfort.

Buildings usually have retractible curtains along the sides. These are closed for adequate protection from wind in the winter and open for ventilation in the summer. Some buildings have tunnel ventilation, and a growing number use additional fans or sprinklers to keep cows comfortable in the summer.

Long plastic bags like these provide economical storage for silage with minimal spoilage.

Feeding

Cows in free stall operations most often eat a total mixed ration (TMR). A large portion of this ration is a combination of forage, haylage, hay, and corn silage. The rest of the ration is comprised of a protein source and vitamin/mineral supplements. Regardless of whether they are homegrown or purchased, a wide variety of grains and grasses may be successfully included in the ration. Often, feed companies provide a nutritional analysis of a farm's ration(s) and make recommendations for improvement.

Tracking moisture content, dry matter intake, and feed quality is also important in a free stall operation that wants to maximize productivity. Capital investment on many larger operations is significant: therefore, output must be maximized (Jones, 2000).

For silage, rectangular bunkers built of concrete walls or packed piles are the most frequent choice for new farms, because they are less costly than upright silos and allow for more volume as well as rapid filling and feeding without the need for a silo unloader. On many older free stall farms, however, upright silos may still be used. Long, plastic bags can be used to store silage. Sheds may be used for storage of feed ingredients. The ration is generally mixed, hauled to the barn, and fed from bunks or feeding floors. Some barns have center alley feeding, where feed is placed along the edges of a drive-through lane.

Animal health and biosecurity

Herd health management and biosecurity are of critical importance in free stall operations, especially when expanding herd size. High productivity is highly dependent on herd health and combining animals from a variety of sources in a large herd expansion presents higher risks of disease epidemics (Dennis Johnson, personal communication, 2005). Veterinarian visits to check for pregnancy, reproductive, and general health problems are frequent. Heifer health is monitored in these visits, as well.

Because there may be numerous employees on a free stall farm, internal biosecurity measures are followed by employees and family who are routinely in buildings. A second set of guidelines may apply to consultants and visitors. The goal of these measures is to prevent outside infectious agents from entering the herd, and to prevent internal infection from spreading within the herd. New animals added to the herd also present a biosecurity challenge and may be isolated or quarantined for a period of time before being introduced into the herd (Joe Conlin, personal communication, 2004).

Whether the farm raises its own heifers or uses a custom heifer raiser may depend on a number of factors. If a farm has the facilities, labor, and necessary skill to raise healthy replacements, the calves may be raised on-site. Cost effectiveness drives this decision, which may change depending on the prices of milk, grain, and heifers. For more information about heifer production, see Chapter 6, *Custom Heifer Raising*.

Typically, nutrition and health are carefully monitored to maintain a healthy herd. Because each cow must travel to get feed and water, her health and mobility contribute to her ability to consume an adequate amount of her ration and water each day. In addition, producers who own free stall farms may closely monitor condition score, body temperature, somatic cell counts, and rumen condition to ensure high health throughout lactation.

A synthetic hormone called recombinant bovine somatotropin (rBST), is administered to cows in many free stall dairies with the goal of boosting performance. This hormone typically increases productivity from 10 to 12 percent. Injections are usually given to select cows starting nine weeks after calving and continuing until the cow is dried off (John Fetrow, personal communication, 2004; Dennis Johnson, personal communication, 2005).

Breeding and genetics

Reproductive performance must be carefully monitored and managed to maintain milk production. Heat detection aids can be used to monitor the cows' interaction in the barn, helping producers identify animals ready for breeding. Cows are usually inseminated about 55 days after calving, and are milked until roughly two months prior to calving (Joe Conlin, personal communication, 2004). In an effort to synchronize the breeding of cows, some operations use hormone injections to stimulate ovulation. This kind of grouping can streamline feeding, housing, and cow care.

Per cow milk yields have more than doubled in the last 40 years, due largely to genetics. However, these increases are associated with declining ability to reproduce, increasing incidence of health problems, and declining longevity, all indicative of a substantial decline in the adaptability and welfare of modern dairy cows. Calving intervals have increased from 13 to 15 months as fertility has declined, while involuntary cow losses have increased on average. The ability of a cow to produce large amounts of milk has increased more rapidly than has her ability to adapt to very high levels of production (Oltenacu, 2005).

Each cow must maintain good body condition without fattening too much during gestation and without becoming too thin in early lactation. Diet management is key to keeping the cow fit for calving and milk production. Some operations ship heifers to custom heifer raisers who raise the animals until they calve at roughly 24 months of age. The cost of raising these animals offsite tends to vary and trends up and down with milk prices. For more information, see Chapter 6, *Custom Heifer Raising*.

Many of the dairy herds in the upper Midwest are genetically related to one of two Holstein bulls. Sire evaluation systems have been modified recently to address the longevity and reproductive health concerns associated with close relationships and inbreeding (Hansen, 2000; Dennis Johnson, personal communication, 2005). Many producers are introducing genetic variety into their herds.

Performance

A dairy cow in a well-managed free stall barn can be expected to have three to four lactations, although on the average farm the productive life of a cow may be lower. In the best managed herds, a cow may have a much longer productive life. Health issues and reproductive performance are the top reasons for culling, or removing an animal from a herd.

Comfortable, healthy, properly fed cows can yield more than 20,000 pounds of milk each year, with the best farms yielding up to 30,000 pounds. The higher-yielding farms participating in the University of Minnesota's Farm Business Management Education Program averaged almost 22,000 pounds per year. The culling rate for these herds was 27.7 percent. Volume and low overhead may help farm profitability when prices drop (Jones, 2000).

Scale

Free stall operations can range tremendously in size and scale depending on the area and the facility used to house the animals. In Michigan, nearly half of the free stall operations have fewer than 100 cows, and some have fewer than 40 (Wolf et al., 2000). Dairy farms may use remodeled bedded pack barns as free stall barns or may build new facilities. Operations housed in remodeled facilities range in size, from few as 100 cows to as many as 500 head or more. Larger operations may have several thousand cows. It is very important to match milking center design with herd size (see Chapter 8, *Milking Center Options*). Because of the debt typically carried by dairy operations with new facilities, these enterprises must use their buildings at capacity to maximize return (Jones, 2000).

Employees

Depending on scale, many operations require employees who can assist with the tasks of feeding, milking, removing waste from the barn, and tending to the cows' and replacement heifers' needs. On average, a dairy requires one person working full time for every 50 to 60 cows. Crop production is a common component of free stall dairies, and demands more human resources.

Dairy farmers who previously managed only cows will recognize that in a larger free stall system they must now manage people instead (see accompanying farm profile, *What Big Dairy Farms Do Best*, about Webster Ridge Dairy, a 700-cow operation in Michigan). Often, farmers who expand find that although they thought they knew what would be involved with managing employees, the reality of the situation is not what they expected.

Hiring good workers and training them well is crucial. Farms seek to provide a competitive salary and benefits package. In Michigan, in particular, the automotive industry competes with all others for trainable employees, although dairies with reputations as good places to work find plenty of qualified applicants. To help retain employees, owners need to clearly communicate their goals and expectations (Grusenmeyer, 1999).

Manure and wastewater management

In buildings that don't have slatted floors, manure is scraped daily. The materials are pushed from the building to an earthen storage basin designed to hold manure until it can be applied to land. Most basins are clay lined. In areas where a clay-lined basin does not provide adequate protection against seepage, a concrete-lined basin must be built (Holmes et al., 2003).

Some facilities store manure beneath the barn. When producers must eventually empty the storage unit, they can use the manure as a fertilizer and soil amendment for their own farm, or can make arrangements for the waste to be transported to another farm. Manure and soil testing help farmers make the best use of the nutrients. If sand bedding is used, the sand must be removed from the basin using a dragline bucket. Pumping primarily removes the manure and liquids.

In facilities without slatted floors, manure is scraped and hauled daily.

A lined manure storage basin at one Minnesota dairy.

Environmental and social considerations

Producers must be sensitive to their neighbors and to the natural setting of any new or expanded facility. Local and state laws must be considered before building on a site. In addition, there are local and state setback recommendations for the number of cows and the facility to be built (Jacobson et al., 2002). Manure storage facilities must be constructed to provide adequate capacity for the number of animals in the operation. In addition, water from cleaning the milking parlor must be treated (septic system and/or vegetative filter strips) and disposed of if it is not diverted into the manure storage basin. Any farm with 1,000 or more animal units (about 715 cows) must have a National Pollutant Discharge Elimination System Permit and a manure management plan (Matt Drewitz, personal communication, 2005; Sheffield and Paschold, 2003). Each state also has its own requirements which must be considered before construction or expansion.

Neighbors may at times complain about dust, flies, and odor. Agitation of manure holding facilities, in particular, can cause a dramatic increase in odor. When organic materials are used as bedding, the storage facility usually forms a crust, which keeps odors to a minimum. If sand is used, a crust will not form, so some producers blow straw onto the surface in order to form a crust that will help with odor abatement. Setback models based on operation size have been developed, and the potential for odor should be considered as a facility is designed (Jacobson et al., 2002).

Farm neighbors sometimes express concerns about the impact of an enterprise on groundwater or wildlife. State dairy producer associations work with producers to encourage wildlife and natural resource stewardship. These groups also encourage producers to work cooperatively with neighbors, listen to their concerns, and foster good relations within the community itself. This might include talking to neighbors before spreading manure, for example, in order to convey an atmosphere of openness and accommodation.

Most producers view manure as a valuable resource and seek to be environmental stewards. Some dairies compost their manure. A number of dairies that have several hundred cows or more have incorporated methane digesters that generate electricity from the methane gas produced by manure in the basin.

TABLE 3: ***Cost of production for free stall farms (per cow), Minnesota, 2002-2004***

	BOTTOM 40% OF OPERATIONS (in terms of net return)	TOP 40% OF OPERATIONS (in terms of net return)
Total number of farms reporting	117	118
Feed and bedding	$1,153.20	$1,204.88
Labor and custom hire	$444.16	$271.49
Hauling and marketing	$73.82	$73.56
Health and breeding	$141.22	$141.63
Total direct costs	$1,772.20	$1,826.09
Average number of cows	233.4	160.2

Detailed reports available at:
http://www.finbin.umn.edu/output/52756.htm and http://www.finbin.umn.edu/output/52757.htm

Source: University of Minnesota Center for Farm Financial Management FINBIN

Note: Costs of production for tie stall, free stall, and grazing systems are compared in a summary table at the end of Chapter 4 (Table 9). Note that these records do not necessarily predict results on any one farm or in all areas for all farmers.

To find current cost of production records for your state, contact:

Michigan
Department of Agricultural Economics
Michigan State University
Christopher Wolf (517) 353-3974 wolfch@msu.edu or
Stephen Harsh (517) 353-4518 harsh@msu.edu

Minnesota
Center for Farm Financial Management
University of Minnesota
(612) 625-1964 or (800) 234-1111
cffm@cffm.agecon.umn.edu

Wisconsin
Center for Dairy Profitability
University of Wisconsin
Bruce Jones (608) 265-8508 bljones1@wisc.edu

TABLE 4: ***Capital start-up investment estimates for a free stall system***

BUNKER SILO	**$75/linear foot for side walls, $1.32/square foot for pad**
NEW FREE STALL BARN	**$676/cow up to $1,573/cow**
HEIFER HOUSING	**$145/calf to $675/calf**
EARTHEN MANURE STORAGE for 400 cows for 1 year	**$76,400**

Source: Holmes et al., 2003

If you are considering adding or changing a facility, see the *Resources* section at the end of this book.

Resource people

The following people contributed information for this chapter. You will find complete contact information in the *Resources* section the end of this book.

David K. Beede, professor of dairy management and nutrition, Michigan State University

William Bickert, professor (Department of Biosystems and Agricultural Engineering), Michigan State University

Herb Bucholtz, research and extension in dairy cattle nutrition and feeding, Michigan State University

Dave Combs, professor of dairy science nutrition (dairy nutrition, forage utilization, and grazing systems for dairy cattle), University of Wisconsin

Joe Conlin, dairy herd health consultant, Shoreview, MN

Dennis Cooper, professor and extension dairy specialist (dairy nutrition, grazing, dairy farm human resource management), University of Wisconsin – River Falls

John Fetrow, professor of dairy production medicine, University of Minnesota

Les Hansen, professor of dairy cattle genetics, University of Minnesota

Dennis and Marcia Haubenschild, free stall dairy producers, Princeton, MN

Dennis Johnson, professor and dairy specialist, University of Minnesota

Bruce Jones, professor and farm management specialist, University of Wisconsin–Madison

Art Kerfeld, free stall dairy producer, Princeton, MN

Jim Linn, professor and extension dairy nutritionist, University of Minnesota

Ranee May, dairy pilot plant manager, University of Wisconsin–River Falls

Christopher Wolf, associate professor of agricultural economics, Michigan State University

What Big Dairy Farms Do Best

Larry and Cathy Webster
Wayne and Margie Webster
Webster Ridge Dairy
Elsie, Michigan

The growth of large dairy farms is a story of the transformation of chores into paying jobs.

Today, it is still possible to construct a profitable dairy farm as a single-family operation. On this kind of farm, dad, mom, and kids carry out the scores of tasks that need to be done every day to handle the 75 cows a family income requires. There will be some specialization, but most will be jacks-of-all-trades. Exhausting, yes. But it can be done, and it can be rewarding.

Webster Ridge Dairy is located near Elsie, in central Michigan. Larry Webster grew up on the farm. As a boy, he and his dad, Glenn, switch-milked 45 cows in stanchions. Now the Webster family milks 750.

In a series of expansions that began in the 1960s, the Websters added hired labor. Because Glenn's health was poor, Larry began to transform the farm with hired labor after he entered the operation as a partner.

Larry's son Wayne joined the partnership in 1991. By then, the farm had grown to 300 cows and several employees. Yet it was still organized according to the old family model. And it didn't work well anymore.

"We had maxed out the old double-8 parlor and we were terribly labor inefficient," Larry said. The Websters became so frustrated that they considered getting out of the dairy business. Instead, in 1995 they attacked the labor problem by getting bigger still, expanding to 600 cows but not expanding the labor force.

This move converted chores to jobs. "It allowed people to specialize in what they were doing," Larry said.

The next step was finding people who wanted to do the jobs, especially milking. About three years after expanding, they had a terrible labor year that again

Webster Ridge Dairy is located near the town of Elsie, in central Michigan.

drove them to consider quitting the dairy business. "That year, we hired 54 people to milk cows. At the end of the year, none of them were with us," Larry said.

They decided to hire milkers that had moved to the area from Mexico. And, as so many large dairies have found, it worked, despite communications problems that can occur when languages and cultures are not the same. "We've had extremely good luck with them," Larry said.

New work force

Dairy farmers have always had trouble finding willing milkers. It's tedious, repetitive work. As parlors became more expensive, dairies wanted to use them more intensively. Webster Ridge is a good example. The double-16 parlor has a throughput of just over 100 cows an hour. Milking 750 cows three times a day means 7.5 hours of milking and a half-hour for cleanup and shift change.

The milkers the Websters have hired are mostly relatives of each other and come from one small area of Mexico. They moved to the U.S. to make money and support family back home. Usually, "family" means not just immediate family, but extended family as well.

"They are not here with their families," Larry noted. "They send money home. They may be paying to send a brother or sister to school, or build a home for their parents, or saving up to buy land in Mexico. They identify themselves as Mexicans and plan to return to Mexico and a better life their earnings here will create. They plan to work here seven or eight years, and they are saving to go home."

These plans create a work ethic in which the jobs are very important. The milker group is self-disciplining, which helps Larry and Wayne, who speak very little Spanish. "If one of the milkers isn't doing his job, they address the problem," Larry said. The milkers arrange to find a replacement employee. If someone is sick, the employees take up the slack and cover for one another or find a replacement. They also teach each other proper milking techniques. In sum, according to Larry, they are reliable. "Most want to work more hours than we will let them," he said.

In addition they value equality among themselves, so "we try to show each one how his job is part of the whole farm, and that one job is not better or worse than another," Larry said.

Webster Ridge is located about 30 miles north of Michigan's capital city, Lansing, in a concentrated dairy area. "There are about 70 young guys from one small area in Mexico working on dairies in this area," Larry said. They have formed teams and play soccer year-round — indoors in Lansing in the winter, outdoors the rest of the year.

They get raises based on skills and length of employment, notes Larry. In addition, they are provided free housing, including electricity and heat, and free meat and milk.

The nine milkers work in shifts of three. Each has other tasks besides milking, so they each work about 10 hours in a shift. Cows are grouped. When the highest producing cows are milking, throughput is slower and one person does it all. When groups of lower producers come in, two people milk. The others help by pushing cows into the parlor from the holding pen and scraping manure from barns while cows are in the holding pen.

Cows in groups

Having a large herd allows a dairy to manage cows in meaningful groups. "You can sort forever," Wayne said. "We try to keep cows in six even-sized groups. Not only does this work well in the parlor where we can match manpower to production, it works in other ways, too."

Cows are sorted weekly into six groups that each receives a customized ration:

- Two-year-old heifers in their first lactation.
- Highest producers.
- Cows in mid-lactation that are pregnant.
- Mid-lactation group — not pregnant (and intensive efforts are underway to change that.)
- Fresh cows and high-producing two-year-olds.
- Low producers.

The Webster Ridge herd is mostly registered, and some are on the show circuit. Most of the breeding is done artificially, but bulls have a place, too. "We use bulls in some groups," Wayne said. "We keep one in the pen with pregnant cows in case a cow isn't, in fact, pregnant." One bull stays with the late lactation group for the same reason. Another is in the mid-lactation group for cows that are difficult to breed.

Getting cows bred seems to be a major problem in herds that shoot for high production. The Websters' rolling herd average is about 26,300 pounds of milk per cow per year. In high production herds like these, fertility — rated according to first-service conception — runs about 35 percent. The Websters concentrate on getting cows bred, and say that grouping them by stage of lactation and pregnancy status helps.

Webster Ridge uses an estrus synchronization program (Ovsynch) so cows come into heat and are bred in groups, and any cow not breeding is evident. "Usually we breed 10 to 12 cows a day, but with synchronized estrus, it can be more," Wayne said. "One day we bred 61."

"About a quarter of the cows we cull go for infertility reasons," Wayne said. "We have no room for luxury culling." They have had some problems in recent years. First was an outbreak of Leptospirosis, finally solved by a new and effective vaccination program. The second was an "outbreak" of bull calves. "We reached a low of 17 percent heifer calves one year," he said.

Many other jobs

Wayne said the big change in the way they organized their business was learning to delegate. "When you get big, you don't have the hands-on and the opportunity to do things your way. And you have to accept that," he said.

A key person on the farm to whom things are delegated is herdsman Glenn Tucker. "He knows cows," Wayne said. The modern parlor is highly computerized and lots of data flows into the adjacent office where Wayne and Glenn scan computer screens.

Each parlor stall has a computer unit and all cows carry transponders that identify them to the system at milking time. Milk weight is taken as each cow is milked, and the weight is compared to what the cow should give based on her individual lactation curve. A departure could mean she is ill, is off-feed, or is in heat — any one of which warrants closer individual attention from the herdsman or the one primary helper who works with him.

The Websters use rBST, a growth hormone, to stimulate milk production. About one-third of the cows receive injections every two weeks. The Websters see a milk production increase of between 6 and 12 pounds a day, and say that this hormone can extend high production longer. They find this to be a great benefit when cows don't get pregnant easily.

Odd jobs

Employees are assigned to a variety of jobs. For example, Pablo and Pam are the calf feeders and handle all calves up to six months of age. A calf barn has replaced calf hutches. "Calf hutches are great for calves but not great for people," Wayne said. Tending to calves in cold or rainy weather isn't fun.

Another employee, Mark, handles all other feed. He has six rations to prepare and distribute to feed bunks for the cow groups, plus rations for heifers in age group pens in the heifer barn and for dry cows.

Brad and Dennis deal with machinery — driving tractors and trucks, manning the farm shop, and fixing everything from field equipment to broken cattle gates.

One other employee scrapes free stall barn alleys and hauls manure. Webster Ridge uses daily haul as much as weather permits, but also has a large manure pit they empty once or twice a year.

Thirty years ago, the Websters were among the first to use sand as bedding for free stalls. Most Michigan dairies do now because it can minimize mastitis. The downside is that it takes six 30-ton loads of sand each week to bed the six free stall cow barns and all that sand has to be hauled away as part of the manure.

Milkers at Webster Ridge prep cows and attach milking units in the double-16 parlor.

FARM PROFILE: FREE STALL OPERATION

Producing the feed

Larry and Wayne do much of the field work, but some is also contracted. They farm 1,400 acres, all devoted to corn for silage and alfalfa for haylage. They purchase dry hay in large square bales and feed high moisture corn purchased at harvest time. In the past, they hired outside farms to plant and spray their corn but did their own chopping. Recently, they've been doing more of the field operations themselves, finding they can manage their crops more effectively that way.

They have a large self-propelled Claas six-row corn chopper and a 16-foot New Holland haybine rotary disk mower-conditioner for alfalfa. Forage harvest draws in trucks and drivers as the forage is chopped, hauled, dumped, and packed into huge piles on concrete slabs.

The piles are covered with plastic weighted down with used car tires cut into thirds — two sidewalls and a center. They look like large versions of those flying disks kids play with, and they don't hold rainwater where mosquitoes may breed.

Facility layout

The layout of facilities at Webster Ridge is designed for environmental protection. Milk cow housing — three 200-cow free stall barns — and the milking parlor are ringed around three sides of a 4.5-million-gallon concrete manure pit. All the manure from the barns and parlor is scraped to the pit, and all clean water from roofs and unpaved areas flows away from the buildings.

"We have enough manure storage for about seven months," Wayne said. "In years of rainfall, as we've had in 2004, we can pump off liquid and haul it away. But what we prefer to do is clean it out completely in the spring before crops are planted and again in the fall when wheat and corn ground open up after harvest."

Because they bed with sand, which wears equipment and is hard to pump, the pit must be pumped and then cleaned with front-end loaders. A ramp on the open south end of the pit allows easy access for cleanout.

Another complex of buildings includes calf housing for calves being individually fed with milk replacer and several buildings called "transition barns" for heifers designated as future herd replacements. They are housed indoors, in free stalls with sand bedding, and fed outside along fencelines.

In the final barn, the heifers are bred artificially and then moved to barns farther away to await calving and subsequent incorporation into the milking herd.

The heifer barns and lots are scraped about once a week to remove manure, which is pushed over a drop-off into a pit, from which it is hauled away as a solid. This pit is not designed for long-term storage, but as a short-term holding area.

The other barn is the old, pre-expansion milking area. Nearly 200 milking cows are housed there, and must take a quarter-mile walk three times a day to the milking parlor.

The feed storage area is also compactly designed and set up to avoid environmental contamination. A large asphalt-paved area is used for pile storage of corn silage and haylage. A commodity barn with six large stalls holds commodities like soybean oil meal, fuzzy cottonseed, or distillers dried grains, which go into ration formulation.

The person mixing feed has recipes for each group of cows and heifers. Using a front-end load and mixer wagon equipped with a scale, he mixes ingredients by weight, stirring them into a uniform mixture on-the-go during the drive to the feeding alleys and fencelines.

Keeping the books

For many years, Larry managed the farm and his wife, Cathy, did all the bookkeeping. Now their son Wayne, who has a university degree in accounting, is gradually taking over the financial records.

Wayne married Margie Green, a dairy farmer's daughter from nearby Green Meadows Farm. For years, Green Meadows was Michigan's largest dairy farm, milking 2,000 cows when the norm was 50. That farm now milks more than 4,000 and remains one of Michigan's largest. It also maintains a herd of show animals.

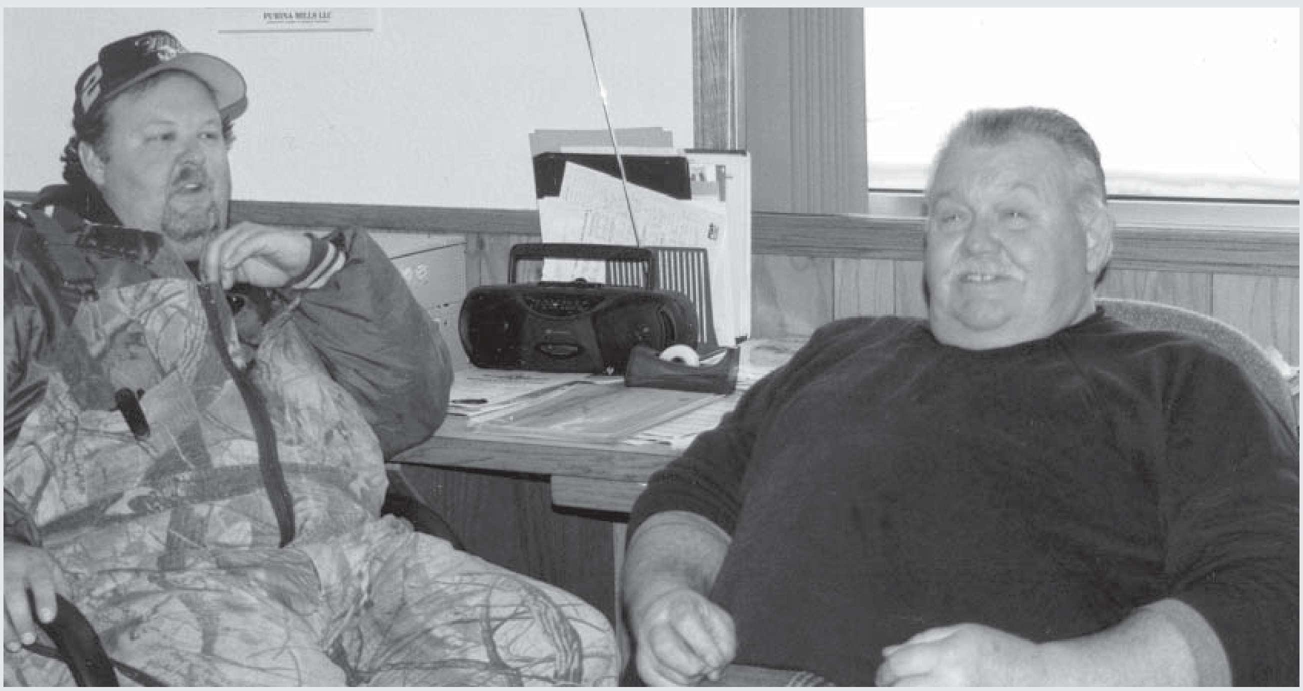
Margie brought her experience with a registered show herd to Webster Ridge, and today she keeps the registration papers, works with calves and heifers, and is guiding their two children along the same path of showing top quality registered animals.

FARM PROFILE: FREE STALL OPERATION

For many years, Webster Ridge expanded by adding on here and there, gradually increasing cows. But the last expansion in 1995 was the big one that dramatically altered the form of the business.

“Debt load is a big factor in cost of production and a huge source of risk when milk prices are low,” Larry said. Before the expansion, they had 80 percent owner equity. After it, they had 20 percent. They’ve rebounded to 68 percent equity now and don’t feel quite as vulnerable.

The farm is now sized right and runs smoothly. They want to take one more step, converting it to a Limited Liability Corporation (LLC). That switch would make the farm like a corporate entity, not responsible for debts of individuals, but having important tax features of a partnership that allow income to flow through to the partners.



Wayne Webster and his dad visit in the farm office.

Since this profile was written, Webster Ridge Dairy entered a sad and difficult time of transition. Wayne Webster was killed on the evening of July 31, 2005 when the pickup truck he was driving was struck by a drunk driver only four miles from home. The family partnership continues, with Larry, Cathy, and Margie all working together to manage the farm and looking toward the future when Wayne and Margie’s boys — Kelvin and Justin — may want to join the family partnership too.

“All Wayne ever wanted to do was farm,” said his mom, Cathy. “He was a really caring individual — the one who made everybody feel good. You can’t replace that spirit.”

CHAPTER 3: ADDITIONAL HOUSING ALTERNATIVES

Modernizing a dairy operation doesn't have to cost your children their inheritance. Many dairy farms in the upper Midwest are housed in facilities that are aging or outdated. Some farms have the option of updating or remodeling their buildings for a lower capital investment than would be required for a new unit. Regardless of the farm type, if the buildings are structurally sound, it may be possible to make any of the following changes, or some combination of them.

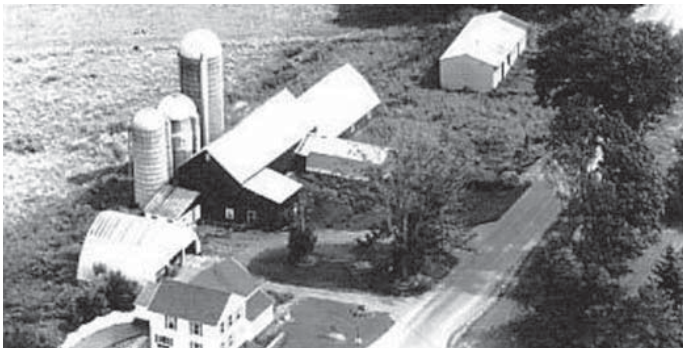


Photo courtesy of Dennis Johnson.

Many old dairy barns have scars and bumps where they were enlarged in order to add a few cows at a time.

Dairy farmers in tie stalls have historically opted for modernizing in steps. Many old dairy barns have scars and bumps where they were enlarged in order to add a few cows at a time. Improvements may have included things like adding a round-the-barn pipeline after years of bucket dumping, motorized feed carts, or bunk feeders. Some farms may have added an earthen basin, lagoon, or minipit so they can avoid daily spreading. Improved and controlled lighting boosts productivity, and mechanical ventilation helps preserve animal health and comfort.

Yet in a tie stall setup, labor efficiency is difficult to improve. Adding additional tie stalls can cost $2,500 to $3,000 per stall and will do nothing to achieve higher labor efficiency (David Kammel, personal communication, 2004). Plus, many new technologies for estrus detection and milking do not work in a tie stall setting. For this reason, many farmers housing their animals in tie stall barns would like to modernize their dairy facilities (Janni, 2002). In doing so, a farmer may make a farm more inviting to children who could someday take over the family dairy.

Feed storage

Wherever upright silos are used, silo unloaders are necessary, and these need frequent maintenance and repairs. Some farms opt for other methods of feed storage, which may include bagging haylage and silage in long plastic tubes. Bagging materials are purchased annually, and an initial investment is needed for bagger attachment (Holmes et al., 2003). Other producers may elect to build bunker silos. Well-packed silage piles are less expensive than bunker silos, and require only flooring. These covered piles provide silage for winter use.

Piles covered by plastic and weighted with old tires provide silage for winter use.

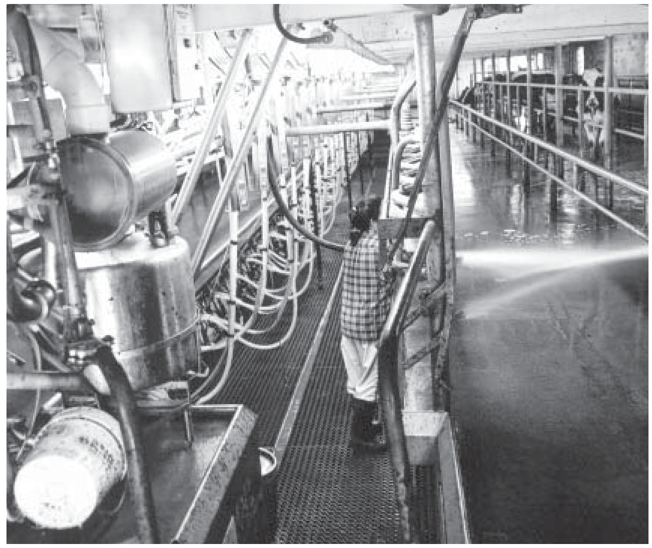
Milking in shifts

Some farmers with cows in tie stalls increase their herd size and use the existing barn without any modifications. To milk animals, the farmers turn out the first set of cows after they've been milked and bring in the second set of animals (kept outdoors on pasture or on bedded packs sheltered from the wind during the winter months). Other farmers add a small free stall barn and switch cows between free stall barn and the tie stall barn, where they are milked. This strategy allows expansion at low cost, but also increases labor demands. It does not improve milking ease or efficiency.

For complete information on new and refurbished milking centers, see Chapter 8, *Milking Center Options*.

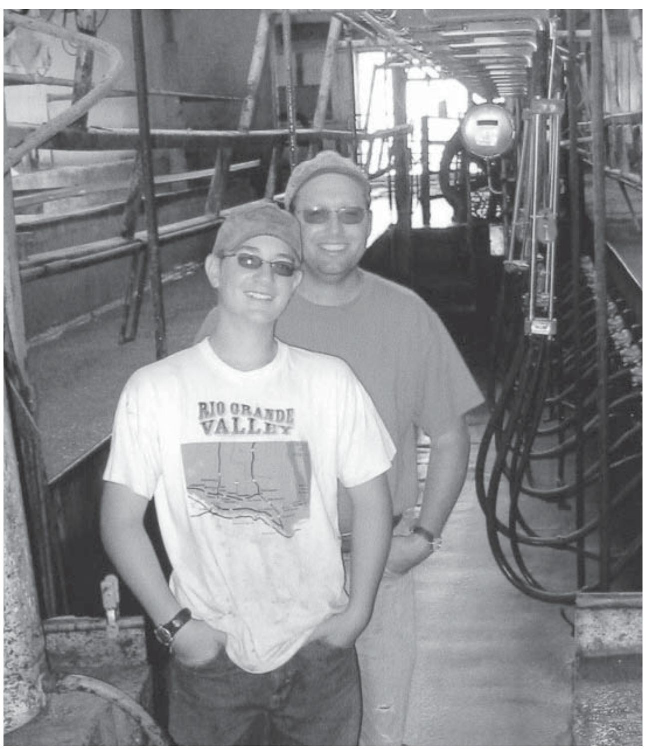
Remodeled parlors

Improved efficiency, safety, and comfort for milking do not require a new milking parlor. Some dairy producers opt for lower-cost modernization and management changes (Haugen, 2001; Haugen, 2005). The cost can be calculated as low capital cost or low annual cost. Farmers on this path may be more comfortable taking smaller steps in modernization. In the process, the owner can prepare the farm future expansion and/or modernization. Often, the tie stall barn is converted into a low-cost remodeled swing parlor that improves the comfort and speed of the milking process (see Chapter 8, *Milking Center Options*). Remodeling can result in quicker completion of milking chores — often twice as fast. The cost of a remodeled parlor can be as low as $25,000 (Holmes et al., 2003). When a farmer can provide part of the labor in remodeling, the cost can be even lower (Haugen, 2001).



This operation modernized by adding a pit parlor, which improved labor efficiency and milker safety.

More costly parlors are also an option. These incorporate varying degrees of technology and generally improve the speed and performance of milking. Regardless of whether or not a producer expands, herd management can be improved by reducing the demands of the tie stall milking method (Holmes et al., 2003). Producers often consider the possibility of adding cows to the herd when choosing a new milking facility. As farms consider modernizing, they generally plan a system that allows for flexibility and change should someone in the family want to join in the dairy business or should the farm add cows. Some older dairy farmers benefit from upgrading facilities as an investment in their own retirement, whether or not a family member is waiting in the wings (Reneau, 2002). An economic evaluation that considers fixed costs per cow is important in planning for a new or revamped milking center.



Dan Vosberg and his son, Derek, retrofitted an old tie stall barn with a New Zealand-style swing parlor. Read more about the Vosbergs in Chapter 4 and more about swing parlors in Chapter 8.

Small-scale free stall

Farmers planning for future expansion may decide to build a new free stall barn, but continue to milk in the tie stall barn. Although the options range in size and scope, profitability is generally enhanced by low-cost investments in modernization (Holmes et al., 2003). Cow comfort, ease of labor and other factors come into play when selecting a design for a new barn. Staged growth allows for the producer to adapt to managing to a new system before jumping into a larger scale system that would require hiring and managing employees. In addition, a smaller-scale expansion reduces the amount of money a producer must borrow. Sometimes, an existing building can be converted into a free stall barn for significantly less money than new construction requires.

Bedded pack and composting bedded pack barns

For farmers considering a bedded pack barn or a composting barn, a number of building design options exist, including hoop structures or greenhouse barns. In a bedded pack barn, bedding is added as needed to keep cows clean and dry. Large amounts of bedding (25 to 30 pounds per animal per day) are required, more if animal density is very high.

Low-cost buildings can work well for bedded pack and composting barns.

In a composting bedded pack barn, by contrast, sawdust or wood shavings are used for bedding (80 ft^2 per cow) and typically stirred with a tined cultivator mounted on a skidsteer twice a day (Janni, 2004; Dennis Johnson, personal communication, 2005; Reneau, 2004). Maintaining a dry, comfortable pack requires proper management, including twice daily stirring, sufficient bedding, and plenty of ventilation (Janni, 2004).

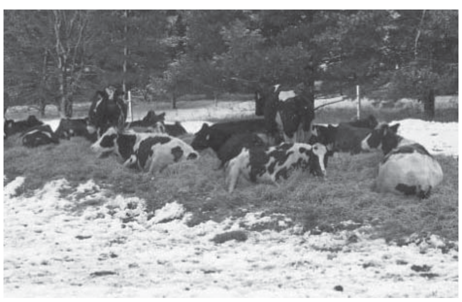


Photo courtesy of Dennis Johnson.

At the West Central Research and Outreach Center in Morris, MN, the herd spends the winter on an outdoor bedded pack in the lea of a windbreak.

Fresh bedding must be added once or twice a week, depending on the moisture content of the bedding and the humidity of the season. In Minnesota, these barns are typically cleaned in the fall, after corn silage harvest, and the composted manure applied to land (Janni, 2004).

These systems may result in cost savings for some operations. The building design is less costly than a free stall type building because no stalls need to be built, but bedding acquistition and labor for stirring are required. Dry pine shavings or sawdust make excellent bedding, but supplies are limited in some areas. Results with finally ground straw crop residue have been inconsistent. Some farmers have been quite satisfied while others have complained that the residue bedding tends to “muddy” as it becomes damp. A composting barn newsletter is posted at www.extension.umn.edu/dairy/. The barn may later be retrofitted to include free stalls if a producer decides the bedded pack or composting system is not working. In addition, no manure holding facility is required for bedded pack or composting systems. On-farm tests indicate that the bedding conserves nitrogen and may be applied directly to cropland as a fertilizer (Fulhage and Pfost, 1993).

Outdoor bedded pack

The lowest cost alternative to a tie stall barn is to house cows outside, providing them with a bedded pack to rest on and a windbreak for shelter in the winter. Some farms opt for an inexpensive shelter for winter protection. Grazing feeds the herd during parts of the year and can reduce feed costs significantly. Outdoor bedded packs can require half as much bedding as indoor packs (Johnson, 2005). This alternative is especially attractive for those with limited access to capital and have a farm with a tie stall barn, that can be converted to a low cost milking center.

Other options

A few farms have decided to focus their labor and capital investments on only feeding, managing, and milking cows. These farms outsource all other needs and usually have only a few acres. Bred heifers, feed, and all other inputs are purchased, while all outputs — including calves, milk, and manure — are sold. Sometimes, the owners are dairy producers who aren't interested in crop farming. Cows are the primary investment, and bankers are likely to lend the money needed to buy bred heifers. These types of operations typically lease their facilities, reducing the need for major capital investment.

Whenever farms consider making physical, production, or management changes, the owners, workers on the farm, and the cows all have to adapt. Some of the cows may not adapt well to the changes — whether it's finding feed in a new place, competing with other animals for access to feed, a new milking routine, or a different type of stall. Increased culling rates are common in herds switching to modernized free stall facilities and can result in a period of reduced milk production (Dennis Johnson, personal communication, 2005; Weigel et al., 2003).

TABLE 5: ***Capital start-up investment cost estimates***

BALE BAGGER ATTACHMENT	**$30,700**
ASPHALT BASE FOR PILED SILAGE	**$1.54/square foot**
BUNKER SILO	**$75/linear foot for side walls, $1.32/square foot for base**
REMODELED MILKING CENTER	**$1,600-$20,000 per milking stall**
NEW FREE STALL BARN	**$676/cow up to $1,573/cow**
HEIFER HOUSING	**$145/calf to $675/calf**
EARTHEN MANURE STORAGE for 100 cows for 1 year	**$39,155**

Source: Holmes et al., 2003; Kammel, 2001

If you are considering adding or changing a facility, see the *Resources* section at the end of this book.

Resource people

The following people contributed information for this chapter. You will find complete contact information in the *Resources* section the end of this book.

William Bickert, professor (Department of Biosystems and Agricultural Engineering), Michigan State University

Vance Haugen, grazier and county agent, University of Wisconsin Extension

Brian Holmes, professor (biological systems engineering) and extension specialist, University of Wisconsin

Kevin Janni, professor and extension engineer — livestock housing systems, University of Minnesota

Dennis Johnson, professor and dairy specialist, University of Minnesota

David W. Kammel, professor and extension specialist, University of Wisconsin

Thomas Portner, free stall dairy (bedded pack), Sleepy Eye, MN

Doug Reinemann, professor (milking machine and rural energy issues), University of Wisconsin

Jeffrey K. Reneau, professor of dairy management, University of Minnesota

Jim Salfer, dairy extension educator, University of Minnesota Extension Service

CHAPTER 4: GRAZING PRODUCTION

These cows, ready for fresh pasture, are eyeing the paddock next door.

Background

Dairy cows scattered across pastureland were once a common sight in the upper Midwest. However, pasturing dairy cows fell out of favor. In part, this was because grazing often meant placing cows on a parcel of fenced land and allowing them to graze for an unlimited period. Overgrazing resulted in the destruction of grasses and plants, and ultimately meant more work and frustrations for dairy producers. In addition, a trend toward more specialized farms, availability of inexpensive grain, and increased emphasis on increasing production drove the adoption of confinement systems.

Eventually, research and information sharing produced greater understanding about grazing management and helped revive the practice. Publications shed light on effective grazing management. One of these was *Grass Productivity*, a book about rotational grazing, written by French author Andre Voisin in 1959 and reprinted in 1989. In the 1980s, prolific authors like Allan Nation, Alan Savory, and Joel Salatin promoted a management-intensive approach to the practice. University bulletins like *Pastures for Profit*, publications like *Stockman Grass Farmer* and *Graze*, meetings and conferences, and grazing groups or clubs are more current resources for graziers and provide new technical information on the management of grazed lands and animals. Now, a growing number of dairies in the Upper Midwest incorporate grazing as a successful method of feeding cows and producing milk.

Most graziers in the Upper Midwest rely on management-intensive rotational grazing (MIRG) to keep pastures productive and control the composition and quality of what their cows are eating. In this system, farmers rotate the animals from one paddock to another within a prescribed period of time, usually after each milking. The practice allows the root systems of the grasses and legumes to regrow, creating a self-sustaining pasture.

Grazing offers a low-cost method of producing milk. Animals harvest a significant percentage of their own feed, reducing machinery, storage, and labor expenses. Facility costs can also be lowered considerably. For some producers, the method offers a change in lifestyle that they find to be a positive one. There are graziers who feel they are growing a healthy food, and point to studies that show higher levels of beneficial fats in milk from grazed cows (Dhiman et al., 1999).

For complete information on new and refurbished milking centers, see Chapter 8, *Milking Center Options*.

Housing and bedding

In grazing operations, keeping overhead costs low is an integral part of making the operation profitable (Nott, 2003). Animals are usually provided with minimal shelter using existing buildings. There are many options for housing. In Minnesota and Wisconsin, farmers may continue to use tie stall buildings for harsh winter weather. In Michigan, an older free stall barn may be used. Others keep animals outside on a bedded pack, providing some sort of windbreak. Pole buildings without an inner stall structure may also serve as protection against the wind and cold. Cold weather is generally well tolerated by dairy animals that have been allowed to acclimate. Wind presents the greatest risk; therefore windbreaks provide protection and comfort to cows housed outside.

Feeding

In the Upper Midwest, grazing can begin in April or May, depending on the farm's location. Many producers continue to graze cows until October or November, depending on summer rainfall and temperatures. Depending on the supplemental feed used and the forage productivity of the pasture, a grazing herd needs approximately one to two acres of pasture per cow milked. Most farms use two acres per cow. Pasture should be within one mile of the milking parlor because productivity depends on the animals getting quickly from the parlor back to the pasture, maximizing their opportunity to eat forage, while minimizing energy expended in walking. (Johnson, 2005;
Nott, 2003) Added grain or supplements may be fed at milking time or delivered to the paddocks for the cows to eat there.

Diet management is important for graziers. Some herds use grazing without any additional feed and are successful. Others experience problems with body condition and reduced milk yield and fat content as a result of the grazing diet. Adding supplementary feed may offer improved performance compared with a grazing-only diet. Well-managed pastures provide more protein and energy than poorly managed pastures, but are generally lower in fiber. If the pasture is not properly supplemented, farmers may observe loose manure, reduced milk fat and milk yield

TABLE 6: ***Characteristics of forage legumes***

Legume	Heat/ drought	Wet	Winter injury	Frequent cutting/ grazing	Soil salinity	Soil acidity	Soil alkalinity	Seedling vigor	Ruminant bloat-inducing?
Alfalfa	E	P	G	F	F	P	F	G	Yes
Alsike clover	P	E	P	P	F	G	G	G	Yes
Birdsfoot trefoil	F	E	F	G	F	G	G	P	No
Cicer milkvetch	G	F	E	F	F	F	E	P	No
Crownvetch	G	P	F	P	F	G	P	P	No
Kura clover	F	G	E	E	F	F	F	P	Yes
Red clover	F	F	F	F	F	G	P	E	Yes
Sweetclover	E	P	E	P	G	P	E	G	Yes
White clover	P	G	F	E	F	G	P	G	Yes

E = EXCELLENT | G = GOOD | F = FAIR | P = POOR

Source: Sheaffer et al., 2003. Used with permission.

Grazing pasture management
Beginning graziers may convert land that is difficult to farm because of uneven terrain, land that is currently productive cropland, or woodland (Loeffler et al., 1996). A number of graziers use frost seeding and winter their cows on pasture to improve soil and develop the pastures. A variety of forage grasses and legumes can be used (see Table 6). Often, paddocks are planted to different species and mixtures because forage species grow and mature at different times during the season. Cool season grasses predominate in the spring, early summer, and fall. Warm season species and annual grasses provide forage during hot summer months. Sometimes, a complement of perennial legumes and annual grasses is planted.

A significant percentage of a grazing dairy producer's time is spent observing and maintaining pasture. Often, MIRG means cattle graze when pasture growth reaches a certain height — for example, 6 to 10 inches tall. Then the farmer moves the animals to a fresh pasture when the cows have reduced the height down to 2½ to 3 inches (Sullivan, et al., 2000). Many producers move the animals to a new paddock after each milking. This means moving animals to two fresh pastures each day.

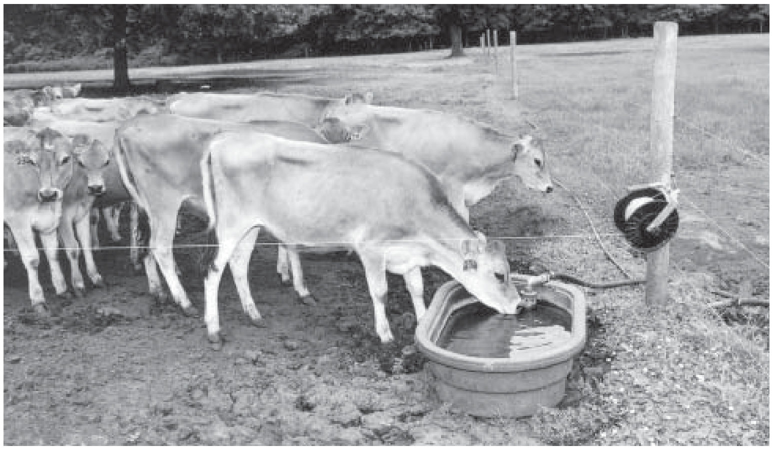
Management changes with the seasons. In the spring, when grass production is flush and highly nutritious, managers may reduce paddock size. Dairy operators mechanically harvest hay on part of the acres during this productive growing period and store it for the dry periods of the summer or for winter when grazing is no longer possible. Sometimes the forage is stored in long plastic bags. High-moisture hay — baled and wrapped — has become more popular in recent years and is an effective, low-cost method of storing quality forage.

Graziers monitor the differing rates of growth between plant species. They also watch for selective grazing which can cause a decline in pasture quality over time. Production is often tracked, to correlate grazing with levels of milk output. Many producers consider the cows' stages of production and give individual attention to diet. Some also cater to the different nutritional requirements of high- and low-producing animals.

Some graziers are satisfied with the production and economic results of using rotational grazing as the sole source of feed for the herd. The result may be milk production that is about one-half that of cows on a conventional dairy diet (Dennis Johnson, personal communication, 2005). Feed choices are made based on the goals and objectives of the farm. Depending on the level of feed supplementation, graziers could see lower feed costs during the grazing season relative to confinement dairies (Margot Rudstrom, personal communication, 2005). In spite of decreased production commonly associated with grazing, reduced production costs can translate into satisfactory profits. Producers should calculate the profitability of additional supplementation, taking into account changing milk and grain prices.

Grain and other supplemental feed may be grown on the farm or purchased. Some farms provide silage for winter months using preexisting silos, bags, or piles. In the interest of keeping overhead costs to a minimum, graziers often opt for the least costly method of providing feed.

Fencing and watering
Fencing and watering options abound and are as individual as the farms themselves. Fencing is an integral part of pasture rotation (Nott, 2003). Well-maintained fencing systems are critical to keeping cows "in" and preserving good relations with neighbors. One option uses high-tensile wire, with posts no more than 60 ft apart. High tensile perimeter fences provide an electrical as well as a physical barrier. The cost of this fence ranges from 15 or 20 cents per foot to $1.25 per foot, including installation, depending on the wire and post configuration (Daniel Hall, personal communication, 2006; Vance Haugen, personal communication, 2004).



Permanent perimeter fence, portable electric fence, and watering systems are important components of most grazing operations.

Most operations include a moveable system that allows pastures to be subdivided into smaller paddocks as needed. The fences that subdivide the pastures into paddocks use one light wire on a portable spool. They are moveable, have step-in posts, and carry electricity. Farmers may be eligible for state or federal grants to defray the cost of adding fences, lanes, and watering stations. State departments of agriculture, the USDA Natural Resources Conservation Service, and Extension offices can all direct farmers to available assistance and can help producers create grazing plans like the one shown in Figure 1. Each state has laws with specifications for fence requirements along property boundaries.

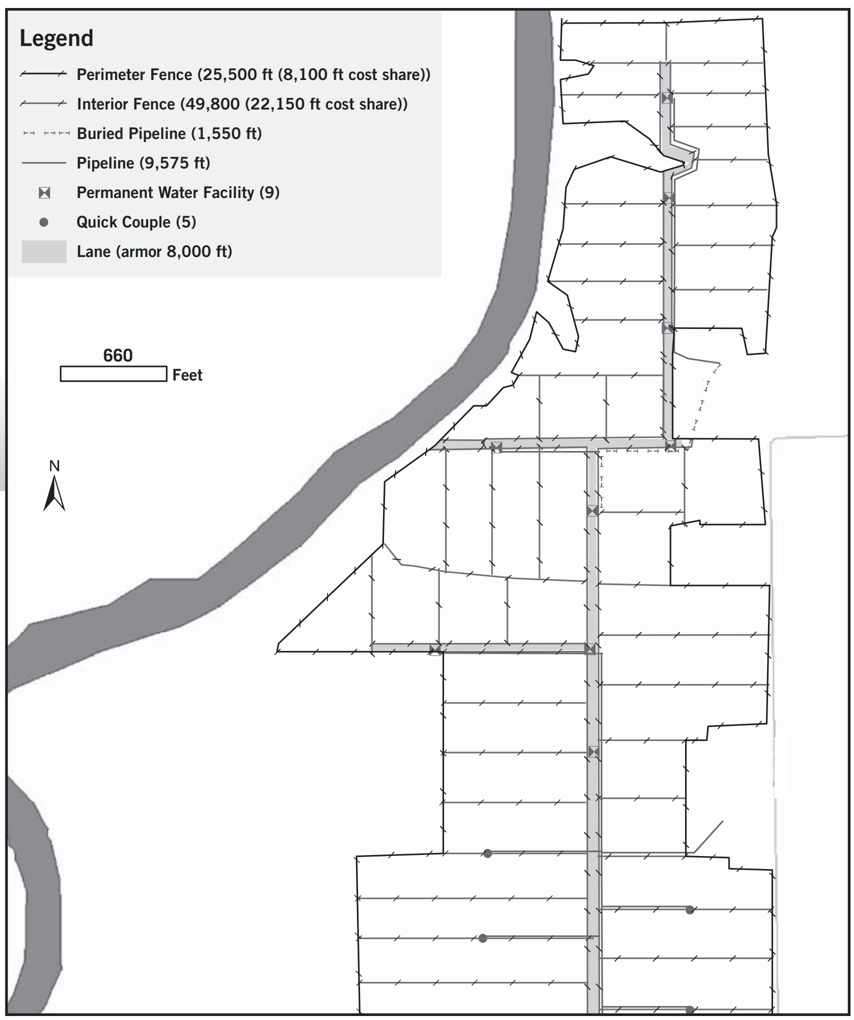
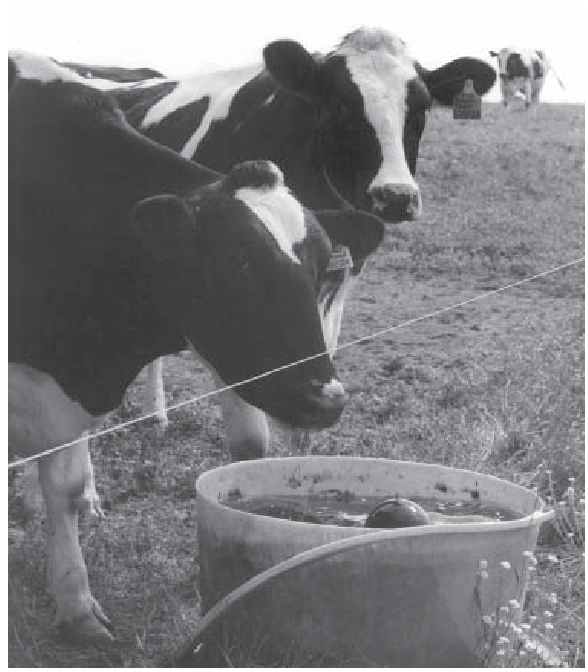


FIGURE 1:
A grazing plan created by staff at the Minnesota Department of Agriculture

Water is the lowest-cost essential component of a cow's diet (Dennis Johnson, personal communication, 2005). Watering systems vary from farm to farm. Some graziers position watering stations between paddocks. This method provides cows water in every paddock. Usually, a valve system allows producers to run water from a main line to the paddock that is in use. A float shuts off water when the tanks are full. Many factors, including the topography and elevation of the land, determine the cost of watering systems. A 50- to 100-cow dairy employing a simple system can cost $2,000–$3,000. The cost includes a ¾ inch to 1 inch line with valves to shut off various parts of the system, movable tanks, and a couple of float valves (Vance Haugen, personal communication, 2004). Other options include mobile water tanks that can be moved from paddock to paddock along with the cows.



Portable watering systems ensure that cows have access to water, the lowest-cost essential component of a cow's diet.

Well-built lanes are important for moving cows from place to place. Appropriate drainage and solid footing for the cows will help keep the herd healthy and simplify the transition from paddock to paddock. A small herd (100-head or fewer) usually uses an 8 ft-wide lane, for which the cost of liner and gravel is between 75 cents to $1.50 per linear foot (Vance Haugen, personal communication, 2004). When choosing materials for lane construction, farmers have many options: Sand, aggregate lime, and paving materials such as concrete may be used. Wider lanes are not necessary, but they allow larger vehicles to use them. As herds grow and corresponding traffic increases, lanes will require more management and attention.

Herd health and biosecurity

Grazed-herd biosecurity often differs from confinement operations. Replacement heifers and bull calves may need more shelter, shade, or water than the cows require, depending on the season.

Health issues also differ for grazing animals. Farmers who have grazing herds report that grazing results in lower stress on the animals, which helps to reduce the cows' vulnerability to disease and infection.

In general, feet and leg problems are significantly less common than in confinement systems. Cows with mobility problems before a transition to grazing are culled from the herd. On sod, the hooves wear normally, and there is often no build-up of manure. Exercise benefits the animals' overall health (Dave Wolfgang, personal communication, 2004).

To prevent the animals from overheating, shade is usually provided to the cows during hot weather. Shade may be provided by moving cows to a shaded area on the hottest days or by providing a moveable shade.

Grazed herds are often closed and provide their own replacement heifers, reducing the opportunity for outside pathogens to enter the system. Good sanitation, dry bedding, and careful management of animals is also a factor in healthy herds with lower somatic cell counts. In addition, pastured animals are less likely to lie in manure, and thus have less exposure to the pathogens that can cause bacterial mastitis.

Bloat, while infrequent, can be devastating in grazed herds. Fresh legumes like clover and alfalfa are most likely to cause bloat. In addition, grazed herds are potentially exposed to more parasites than confined cows. However, a number of graziers say they do not find parasites to be a health issue. Many strategies to reduce parasites can be employed. For example, some producers cut hay to strategically keep the cattle out of pastures for a period, denying a host to the parasite for its life cycle (Dave Wolfgang, personal communication, 2004). Parasite loads should be monitored before implementing a control program.

Seasonal dairies need their cows to calve during a short window of time and so may use hormone injections to synchronize estrus for breeding. However, since one of the primary goals of many graziers is to reduce the cost, most don't use hormone treatments.

Genetics and breeding

Breeding can be accomplished through artificial insemination; however, some graziers use bulls for natural breeding. While some farms still rely on Holsteins to produce milk, many graziers are crossbreeding with breeds like Jersey, Brown Swiss, Ayrshire, Normande, Shorthorn, Dutch Belted, Scandinavian Red, and Montbeliarde in order to boost reproduction, health, and longevity (Hansen, 2005).

Performance and scale

Grazed herds are often small; usually, they have fewer than 200 cows. Many have fewer than 100. However, herds can be considerably larger. Productivity varies widely. Management decisions, including adding water to paddocks and supplements to diet, play a significant role in influencing milk output. A seasonally calving farm dependent on grass alone may yield 11,000 to 14,000 pounds of milk per cow per year. Herds that are fed additional grain supplements have higher yields and can achieve 17,000 pounds per cow per year (Johnson, 2005 and UMN-CFFM). When herds are moved from confinement to pasture, a farm may see changes in milk yield, with a production decrease most common. In a survey of dairy herds using the grazing method, 29 percent reported a decrease in production, while 22.5 percent reported an overall increase in production (Kriegl et al., 1999).

Some grazing operations offer supplemental feed and minerals along fence lines.

Production does not always translate to profit, however. While lower input systems result in lower milk production, many graziers report the system is profitable. The economic performance of a grazing herd is impacted by several factors. Most graziers see lower vet bills than their conventional counterparts. For 354 dairies reporting their expenses to the University of Minnesota Center for Farm Financial Management between 2002 and 2004, the average vet cost was $43 per cow compared to a non-grazing average of $100 per cow (UMN-CFFM). Some dairy graziers report bills as low as $12 per animal per year (Forgey, 1996).

Fertilizer, seeding, fuel, machinery, and equipment costs are also reduced. Overhead costs such as buildings and manure-holding facilities are generally considerably lower for a grazing herd. Small cost savings in numerous areas of production add up to compensate for reduced milk production. Low culling rates allow many graziers to sell their young stock for added income. Because of these savings, rolling herd averages are not the best indication of the profitability of grazed dairy farms.

Manure management

Manure management costs are relatively low for a herd on pasture. Few grazing systems have the overhead cost of a manure-holding unit. Cows deliver most of the manure to the fields as they graze. Depending on the type of housing used and the type of bedding used, there may be straw or some other organic material from winter bedding that may need to be incorporated into crop or pasture fields as fertilizer. Manure management and waste management plans focus on manure and water from milking parlors or other holding areas.

Social and environmental concerns

Many graziers say the kind of outdoor work that grazing requires is healthy and enjoyable. Nutrient management may be simplified on a grazed farm, but bedding and wastewater from the milking parlor must still be applied to land in an environmentally responsible way in accordance with local and state regulations.

Because pastures are most often planted to perennial forages, water quality in local streams can benefit from reduced erosion. Chemical use is minimal on grass-based operations, and the soil and root structure of pasture plants can help trap nutrients and improve groundwater quality as well. In addition, the water holding capacity of the soil usually increases. Some farmers report improved soil health. Research, including water sampling, has demonstrated that grazed land reduces nutrient and chemical runoff and silt erosion dramatically (DiGiacomo et al., 2001). In addition, pastures are attractive to and provide habitat for wildlife. In particular, meadow birds are a common sight on pastureland.

Photo by Robin Martinek

While many people find the sight of cows on pasture picturesque, conflicts with neighbors can still occur.

Neighbors who see cows outside usually find the sight pleasing. Grazing does not ensure that all relations with neighbors will be rosy, however. When the cows get out — as they occasionally do, even with the best maintained fencing system — they can cause destruction to neighbors' property, souring relations. Some neighbors may be intolerant of waiting for cows to cross the road, or may complain about delays in cleaning up manure that is left behind. The neighbor's dogs may find out that it's fun to come onto your property and chase your cattle. Disagreements about fences and fencing can also be a problem (Kevin Stuedemann, personal communication, 2005).

TABLE 7: ***Cost of production for grazing farms (per cow), Minnesota, 2002-2004***

Total number of farms reporting	**34**
Feed and bedding	**$868.25**
Labor and custom hire	**$107.37**
Hauling and marketing	**$76.34**
Health and breeding	**$65.30**
Total direct costs	**$1,277.99**
Average number of cows	**233.4**

Detailed report available at: http://www.finbin.umn.edu/output/52758.htm

Note: Because there are relatively few grazing farms in FINBIN at present, we did not split this report into top and bottom 40% of net return, as has been done in other cost of production tables in this book.

Source: University of Minnesota Center for Farm Financial Management FINBIN

Note: Costs of production for tie stall, free stall, and grazing systems are compared in a summary table at the end of Chapter 4 (Table 9). Note that these records do not necessarily predict results on any one farm or in all areas for all farmers.

To find current cost of production records for your state, contact:

Michigan
Department of Agricultural Economics
Michigan State University
Christopher Wolf (517) 353-3974 wolfch@msu.edu or
Stephen Harsh (517) 353-4518 harsh@msu.edu

Minnesota
Center for Farm Financial Management
University of Minnesota
(612) 625-1964 or (800) 234-1111
cffm@cffm.agecon.umn.edu

Wisconsin
Center for Dairy Profitability
University of Wisconsin
Bruce Jones (608) 265-8508 bljones1@wisc.edu

TABLE 8: ***Capital start-up investment for grazing system***

PADDOCK WATERING	**$2,000-$3,000**
PADDOCK FENCING movable and internal fencing	**15 to 20 cents/linear foot**
BOUNDARY FENCING	**$1.00/linear foot**
EIGHT-FOOT-WIDE GRAVEL LANE	**$.75 to $1.50/linear foot**

Source: Vance Haugen, personal communication, 2004

If you are considering adding or changing a facility, see the *Resources* section at the end of this book.

Resource people

The following people contributed information for this chapter. You will find complete contact information in the *Resources* section the end of this book.

Kathy Arnold, grazing dairy, Truxton, NY

Ben Bartlett, grazing specialist, Michigan State University

Dave Combs, professor of dairy science nutrition (dairy nutrition, forage utilization, and grazing systems for dairy cattle), University of Wisconsin

Darrell Emmick, state grazing land management specialist, USDA – Natural Resources Conservation Service, New York

Dave Engel, organic grazing dairy, Soldiers Grove, WI

Daniel Hall, Southwest Minnesota K-Fence

Les Hansen, professor of dairy cattle genetics, University of Minnesota

Vance Haugen, grazier and extension agriculture agent, University of Wisconsin Extension

Karen Hoffman-Sullivan, animal scientist, Natural Resources Conservation Service, New York

Dennis Johnson, professor and dairy specialist, University of Minnesota

Florence and David Minar, organic grazing dairy with on-farm processing, New Prague, MN

Joe Molitor, grazing dairy, Saint Cloud, MN

Margot Rudstrom, agricultural economist, University of Minnesota

Kevin Stuedemann, organic grazing dairy, Belle Plaine, MN

Art Thicke, grazing dairy, La Crescent, MN

Francis Thicke, organic grazing dairy with value-added processing, Fairfield, IA

Dave Wolfgang, extension veterinarian, The Pennsylvania State University

FARM PROFILE: CONFINEMENT-GRAZING OPERATION

A Hybrid Confinement-Grazing System

The Konkel and Johnson Families
Silver Sky Dairy
Hesperia, Michigan

After debating the merits of grazing compared to confinement feeding for their dairy herd, the partners at Silver Sky Dairy made a decision — and chose both. That was 10 years ago, and today, they say, it works great and they love it.

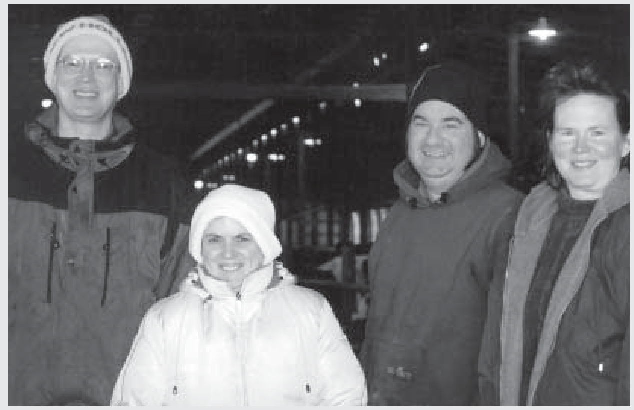
Frank Konkel said it's like having a summer vacation. When the cows go out to pasture in May, there comes a welcome reduction in scraping, manure hauling, and feed handling after the long Michigan winter.

"People thought we were nuts when we started this," Frank said. "But now they see us having more free time for our families." They also have cows to sell because the animals are healthy and they don't cull as many.

Frank's brother-in-law and partner Lance Johnson sees these benefits even more clearly. Lance became a partner with his own father on the Johnson family farm and worked in the labor-intensive 75-tie stall barn. "I didn't want a whole lifetime of that," Lance said.

Lance's life really changed in 1994, when he and his wife Nancy formed a partnership with Lance's sister Shari and Shari's husband, Frank Konkel. They devised a new ownership structure and expanded the herd size to about 150 cows. They also built new facilities—free stall barns and a milking parlor — on a flattened ridge in the middle of 140 acres of rolling ground they intended to devote to grazing.


Silver Sky Dairy is a hybrid confinement-grazing operation that uses both pasture and stored feed.


Lance and Nancy Johnson (l) and Frank and Shari Konkel (r) co-own Silver Sky Dairy.

Right from the start, they wanted to get the best of both worlds. "The New Zealand grazing model doesn't work here," Lance said. "They have lots of grass year-round, and we don't." In Hesperia, Michigan, winter — and sometimes a dry summer — ends pasturing. "Unlike the New Zealanders, we have cheap grain," he noted. Production benefits from grain, so it makes sense to feed it.

What's more, in the northern U.S., few graze all twelve months. Instead, graziers sometimes aim for seasonal dairying — drying off the cows in late winter and feeding a low-powered hay ration as they wait for spring calving and fresh grass. This approach to grazing takes top skills in both forage and breeding management.

Few dairy farms try to get the best of both grazing and confinement. At Silver Sky, production in early 2004 was rolling along at 23,700 pounds per cow. The operation now milks about 280 cows, double where they were when the partnership started.

To protect the farm as a business, the families formed a limited liability company (LLC) in 2002. An LLC structure allows owners the tax advantages of a partnership, but provides corporation-like protection from the private actions of individuals.

Lance and Frank use a cart to monitor parture, check fences, and bring in cows.

Benefits of grazing

"The cows are definitely healthier," said Frank. "It shows up in lower culling rates and greater longevity. The cows have better feet and legs with fewer calving difficulties."

"Getting cows off concrete, even just part of the year, really helps," said Shari. She is a frequent morning milker in the double-10 milking parlor, relieving herd manager Mark Sumner, who does most of the milking.

"Fresh air and sunlight will turn cows around, and green grass will right a lot of wrongs," Frank said. "A cow that's not feeling well will lay depressed in a free stall, but she'll get up and walk around on pasture."

"Our cows breed back and we don't cull many for fertility reasons," Frank said. "We think grazing is partly responsible for that." The Johnsons and Konkels agree keeping bulls is dangerous and impedes genetic progress. The farm has relied on AI for more than 30 years.

Isn't it costly to maintain two forage systems?

"We spent about $11,000 for the fences and water system," Lance said. "A part of that, $3,600, was cost-shared under a government program." Silver Sky's equipment is used less and lasts longer. Plus, they invest less in manure spreaders, scrapers, and loaders, and they don't have to use mowers, rakes, and balers on the pasture.

Pasture is made up of a mixture of orchardgrass, native grasses, and clovers. "The sod seems to get thicker every year," Lance said. Efforts to improve pasture by planting more palatable grasses, such as ryegrass, were frustrating since the grasses didn't persist as well.

Their pastures are productive in terms of tons of feed produced. When cows do the harvesting, the farm doesn't have the same harvest losses and weather damage as with machine harvesting. Making dry hay results in leaf loss during raking and baling, leaving the highest quality portion of the forage crop in the field.

FARM PROFILE: CONFINEMENT-GRAZING OPERATION

Cows in groups

Cows are divided into five groups, two of which are pastured. One 80-acre pasture is divided into 12 paddocks for the 60 to 90 dry cows and bred heifers. These are moved from paddock to paddock every day or two, and watched for impending calving. "We don't let them calve in the pastures," Frank said.

These cows get some supplemental feed, fed along a fence line, but no shelter. They stay in the pasture and get some corn silage mostly as the mineral carrier, according to Frank. "Self-feeding from mineral tubs hasn't worked well for us," he explained.

All pastures are served with aboveground plastic water lines. Quick-attach couplers take water to lightweight tanks that are easily moved from paddock to paddock using a golf cart. Float valves control water flow.

A garden hose carries water from main lines to tanks in individual paddocks. Lance appreciates quick-attach couple technology.

Five strands of electrified high-tensile wire surround the pasture. Inside the perimeter, paddocks are divided by single hot wires.

The second cow group is composed of those that have been milking 180 days or more. These cows move daily through 10 paddocks. They are fenced in and get access to additional feed inside the barn when they are brought up for the twice-daily milkings.

Stored feed is flexible. If the summer is hot and dry and the pasture dries up, the cows eat more feed inside. "For two winters, we kept our dry cows outside, but that was too much trouble," Lance said. Typically, cows go out in May and come back in November.

Other groups are made up of cows that are in the most productive part of their lactation. They are kept in free stalls and fed a total mixed ration (TMR) composed of haylage, corn silage, dry hay, ground shelled corn, soybean meal, and other commodities like wheat middlings or soybean hulls. The content of the TMR is different for different groups.

Heifers are not pastured until after they are about 20 months old and within four months of calving. Earlier in life, they move in groups from pen to pen in the calf and heifer barns as they grow.

"We bid for a year's supply of feed at a time," Lance said. That includes corn grain. Silver Sky plants 250 acres of corn each year for silage but the rest of the farm's 880 acres is hay or pasture. Additional corn is purchased.

They went to the bidding system when they discovered, as Frank put it, "If you're not complaining, you're paying more." He found there is not one price for anything from a supplier — big farms are able to beat down supplier prices and "the suppliers then charge us more."

The old tie stall farm buildings are no longer used, except as a feed center. The concentrates are stored in seven bins capable of handling truckload lots. Corn silage and haylage are stored in the eight upright silos there.

FARM PROFILE: CONFINEMENT-GRAZING OPERATION

Quality milk

The system has worked well at Silver Sky. The land is rolling and the soil erosive, so keeping it in sod helps. They use strip cropping, alternating 120-foot-wide hay-corn strips. Every three or four years, land in alfalfa goes to corn, and corn land rotates back to alfalfa.

Silver Sky was the co-op's top milk quality award winner in 1999 — producing the best milk among more than 2,000 co-op member farms. The quality measure is an indication of herd health, including low levels of bacteria and a low level of somatic cells. While grazing contributes to cow cleanliness and udder health, Silver Sky's quest for quality began when they brought their cows to the new facility in 1994.

Quality lifestyle

"Sometimes as herds get larger the owners lose contact with the cows, but we won't let that happen here," Frank said.

Each person relates to the cows in different ways. Lance is oriented to crops and feed. Mark Sumner is herd manager and milker. Shari milks some mornings as well as coordinating Dairy Herd Improvement Association technician visits, veterinary checks, and weekly dry cow sorting and vaccinations. She works with the computer and cow records.

Silver Sky Dairy supports two Michigan farm families.

Shari described Frank as "the unlicensed vet of our operation" who treats sick cows, delivers calves in difficult births, reads ultrasounds to diagnose pregnancies, and infuses hard breeders.

A herd of 280 cows isn't huge by today's dairy standards, but Silver Sky supports two families and one full-time hired employee, and keeps the family atmosphere. The pastoral approach contributes to that flavor.

"We love living on the farm and think it is a great place to raise children," she said. Lance and Nancy have two and Frank and Shari have five. Several of the kids work on the farm and are paid wages for their work.

Seasonal Calving

Dan and Ruth Vosberg
South Wayne, Wisconsin

In 1991, when Dan and Ruth Vosberg moved to their newly purchased, 158-acre southwestern Wisconsin farm and started milking 18 cows, the popular view of dairy grazing was laid-back, low-input, and "graze what grows." The Vosbergs saw managed grazing and seasonal milk production as the ticket to reaching their dream of making a full-time living milking cows. They felt they could manage a relatively small dairy herd, and not deal with such worries as planting crops, or maintaining a fleet of machinery. "Starting out, we thought grazing was simpler than conventional," Dan relates.

Grazing and breeding all cows and heifers to calve during the spring weeks have indeed proven to be the means for fulfilling the Vosbergs' goals. The cost and labor savings offered by managed grazing has allowed them to make facilities improvements, purchase additional land, and build a new house.

Yet reaching that dream has taken quite a different path from the original vision. The herd is not small: In 2003 they milked 170 cows and produced 2.5 million pounds of milk while running the farm with slightly more than two full-time labor equivalents. The Vosbergs have done far more pasture tilling and re-seeding than originally planned, and have experimented with a large number of grass and legume varieties. They found that profits increased markedly along with per-cow production when they provided more supplemental feed to their cows. And their equipment inventory has grown far beyond what they had anticipated.

Dan Vosberg feels that grazing is the best way to manage a relatively large herd on his hilly farm.

Pasture

The Vosbergs originally planted "salad bar" mixes of various grasses and legumes to their hilly pastures. Dan said they made the mistake of grazing pasture stands too frequently, which encouraged many of the seeding mixes to evolve into nearly pure orchardgrass. A large share of this grass suffered leaf diseases, and cows often refused to graze these stands properly. Dan has since experimented with a wide variety of legumes and both annual and perennial grass species, including some newer orchardgrass varieties. The mix has evolved to include Kentucky bluegrass, reed canarygrass, tall fescue, bromegrass, quackgrass, and perennial ryegrass. The Vosbergs have also planted red and kura clover. "I believe in diversifying the farm rather than the paddock because it's too hard to manage a wide variety of grasses with a wide variety of growth characteristics," Dan said. In this way, some paddock is always ready for grazing.

Dan often applies up to 150 pounds of nitrogen per acre each summer and early fall to boost grass growth. In order to allow pastures to rest and stockpile additional dry matter that the cows can graze for several weeks after the growing season ends, he increases supplemental feeding in late summer, reduces grazing allocations, and limits haying of surplus grass. "To achieve the full benefits of grazing, I feel it's very important to have cattle out grazing as many days as possible each year," Dan said. The fall rest period also allows plants to accumulate the root energy reserves that help them survive the winter and produce well the following year.

He is experimenting with feeding cattle on specific pasture paddocks each winter, and then resting those paddocks through the middle of the following growing season. Dan is seeing signs that the combination of hoof pressure, manure, and rest is improving both the production and quality of the grass stands on his steep, thin-soiled farm.

FARM PROFILE: SEASONAL CALVING OPERATION

The Vosbergs constructed two canvas hoop sheds to provide shelter on bedded packs during the worst winter weather.

During the design of the pasture and fencing, Dan planned paddock size and shape to fit topography. To avoid erosion, he didn't want to put lanes on steep hills. In the spring, he follows a two-week rotation among his 25 paddocks, sometimes subdividing them with polywire. In the fall, he extends the rotation to 40 days and feeds supplemental hay if needed.

Facilities

In 1997, the Vosbergs built a pit parlor within a single-story tie stall building. A row of 12 milking units hangs over the center of the milking pit. The units are moved from one row of cows to the next, with units placed between the hind legs of each cow. During milking, cows consume a grain ration from a concrete manger filled by a lightweight auger controlled from the parlor pit. The parlor was built to allow expansion to 16 milking units. The rear portion of the building was converted into a covered holding area for cows waiting to be milked. In 2003 the Vosbergs used federal cost-share funds to build a concrete manure lagoon that holds run-off from the milking facility and a nearby barnyard. Also in 2003, they installed new milking equipment that makes it easier for one person to do all of the milking.

Not counting the manure lagoon and the new milking equipment, the Vosbergs spent about $65,000 to retrofit the old barn into a milking facility that allows one person to milk 150 cows in an hour and a half.

"We wanted a milking facility that would not be hard on us physically, and wouldn't be a bottleneck to expansion," Dan explains.

The original farm plans did not include housing, but it became obvious that the farm's lack of natural shelter could lead to serious problems during severe weather spells and harshest winter months. The Vosbergs built two canvas hoop buildings, one 38 ft by100 ft, the other 50 ft by 120 ft, that house cattle on bedded packs. The larger one includes a feeding area. The hoop houses are also used in the early spring to house cows and heifers that are approaching calving.

In their early years, the Vosbergs fed groups of heifer calves milk replacer and whole milk from barrels equipped with nipples. But after suffering a serious outbreak of Johne's disease, they switched to raising calves individually in pens within large hutches. After weaning, calves are fed in a small lot with access to a shed. Yearling heifers graze as a group, often following the milking herd into a paddock to clean up excess forage.

Rather than add water lines and tanks to paddocks, or invest in portable tanks, the cows are given access to water during milking and at mid-day during summer. This choice reduced the overhead costs associated with developing the grazing system.

FARM PROFILE: SEASONAL CALVING OPERATION

Seasonal milk production

Because seasonal milk production means that all cows calve in the spring and dry off by January, the Vosbergs felt it would be best to match the production cycles of grass and cows, along with allowing a few weeks' time off from milking each year. "Eventually, we also realized that seasonal calving matched the way our farm is set up," Dan explains.

The Vosbergs have been successful in attaining their seasonal goal. Out of 184 cows and heifers that calved in 2003, 159 did so between early March and mid-April. In 2004, 140 out of 156 calved over a four-week period beginning in early March. Between 1996 and 2003, the milking herd grew from 91 to 184 head without buying a single animal, even though the Vosbergs culled Johne's-infected animals, and sold cows that did not calve between March 1 and June 15 each year.

Years ago, the Vosbergs tried various drugs and hormones in an effort to get their cows to breed for freshening in a short spring time frame. "What we ended up finding was that with our herd, less is best," said Ruth. The Vosbergs attained better success through concentrating on cattle nutrition, dry cow care, and heat detection.

They favor Jerseys, but have crossed a substantial portion of the herd with Dutch Belted, Milking Shorthorn, Ayrshire, Normande, New Zealand Friesian, Norwegian Red, and German Red Angler genetics. "When we choose a bull, we look at what he has to offer to our breeding program more than what breed he is," Dan explained. The Vosbergs' goal is to work with small- to mid-size cows with broad muzzles, sound feet and legs, and bodies that can hold large volumes of forage. Cows that produce high levels of milk fat and protein are also preferred since the Vosbergs sell their milk to a cheese plant that pays premiums for milk solids.

Cows are bred artificially for at least three weeks while bulls breed heifers and any cows that do not settle with artificial insemination. Dan said a 60 percent first-service conception rate is required to meet their goal of having the great majority of the herd freshen within six weeks. In recent years the Vosbergs consistently achieve that mark, which is well above the industry average.

Dan said that his farm's emphasis on strictly seasonal milk production won't work for people who cannot deal with intense periods of work and stress, such as during calving season. "It takes a certain mindset," he said.

The Vosbergs have crossed a large number of breeds into their Jersey herd with the goal of improving grazing efficiency.

FARM PROFILE: SEASONAL CALVING OPERATION

"We like the lifestyle, but someone else might not." Seasonal producers must be willing to work to avoid cash flow problems, he said. Overall, Dan believes that seasonal production reduces his costs compared to year-round production.

Feeding

The Vosbergs' original feeding plan was definitely "low input": pasture, supplemented primarily with only a small amount of grain. The strategy worked, but the Vosbergs were disappointed in per-cow milk production, cow body condition scores, and overall profits.

In the mid-1990s they began adding some feed inputs. They started feeding wilted, wrapped baleage, which increased feed intakes compared to dry hay. They added more byproducts to the grain ration, such as cottonseed and distillers grains. Then they started feeding corn silage at a rate of about 15 pounds per day. Most early afternoons on summer days, the milking herd is brought in to the farmstead feed bunk for corn silage and water. Dan estimates that pasture provides no more than half the cows' total daily dry matter intake even during the prime growing season. Yet his informal trials have shown that cows will consume more total dry matter if given more feed choices. "It's better to err on the side of spending more for feed than to let the cows go hungry," Dan asserts.

The cows have responded. Milk shipped per cow rose from 11,500 pounds in 1998, to 15,500 pounds in 2003. Total milk shipped increased from 1.1 million pounds to 2.5 million pounds over the same period. Breeding performance improved, as did the farm's financial performance.

He said the additional supplemental feeding adds to his total costs and machinery needs, even though the silage is planted and harvested by custom operators. After starting with one tractor, a manure spreader and a skidsteer, the Vosbergs now own a substantial line of tractors and haymaking and manure handling equipment. However, Dan said that compared to most confinement dairies, his equipment costs are much lower.

Financial performance

While profit margins have varied based on milk prices, "We've always been profitable," Dan said. The farm's rate of return on assets has been above 10 percent each year since 1995. Net operating income has averaged in the $800 to $1,400 per cow range in recent years, while total net farm income has been above $100,000 in five of the past six years. In 1998 the Vosbergs were able to purchase a neighboring 130 acres to provide forage for more cows. In 2002 they built a new house. Ruth and Dan say the combination of managed grazing to control costs, feeding cows well to produce more milk, and an efficient milking system has been key to that success.

Labor

Dan said they needed to work hard to establish their farm during uncertain times in the dairy industry. "We always had a sense of urgency, so we pushed hard," he explains. It has been difficult to raise small children while also dealing with the demands of a growing dairy enterprise. As they reach middle age, the Vosbergs want to take some steps to reduce labor requirements while still maintaining profitability. In late 2003 and early 2004 they sold 82 cows and heifers. Rather than hauling feed, they now rent neighboring acreage for grazing and nearby feed sources. Dan and Ruth want to show their three children that the dairy farm can be a worthwhile place to make a living, both from financial and lifestyle standpoints.

Words of advice

The Vosbergs say that dairy farmers who use managed grazing must be willing to explore ideas and make well-informed decisions about what will or won't work on their particular farms. Dan admits that he and Ruth were naïve in their early days of farming, and bought into some grazing ideas that cost them money. "When you're gathering information, you must be careful not to assume anything," Dan said. Financial planning and goal setting are important to this process. "You're not just a cow man. You're not just a grass farmer. You're not just a businessman. You have to be good at all three," he adds. "If you're not, you have to be working with someone who's strong in the area where you're weak."

SUMMARY TABLE

TABLE 9: *Cost of production summary for three dairy systems (per cow), Minnesota, 2002-2004*

	TIE STALL	FREE STALL	GRAZING
Total number of farms reporting	106	118	34
Feed and bedding	$1,093.05	$1,204.88	$868.25
Labor and custom hire	$142.60	$271.49	$107.37
Hauling and marketing	$79.81	$73.56	$76.34
Health and breeding	$130.23	$141.63	$65.30
Total direct costs	$1,625.83	$1,826.09	$1,227.99
Average number of cows	67	160.2	55.8

Note: Figures for tie stall and free stall systems reflect top 40% of operations in terms of net return. Figures for grazing system reflect all operations reporting.

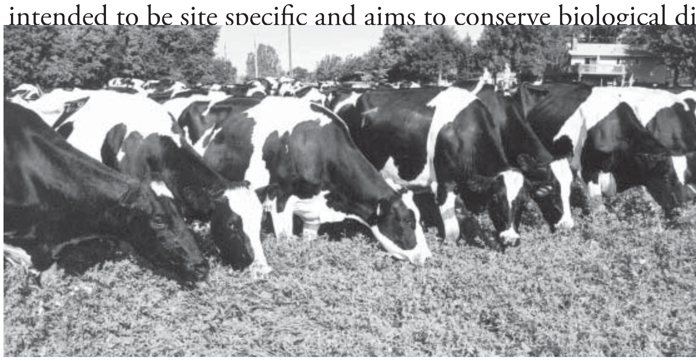
CHAPTER 5: ORGANIC PRODUCTION

Background

Organic agriculture is based on a holistic approach that starts with soil health. Healthy soil yields healthy feed, which in turn produces healthy animals and healthy food for people. While the methods have been used for many years, today's organic dairy farm incorporates a vast wealth of technology, knowledge, and science in managing animal health, productivity, and soil fertility. The consumer marketplace has embraced organic dairy products including milk, yogurt, cheese, and ice cream. Dairy processors have had trouble finding enough organic milk to satisfy consumer demand.

State organic laws in a number of states around the country paved the way for uniform federal organic certification standards. Congress passed the Organic Food Production Act in 1990. A federal organic rule went into effect in October 2002. This rule created a National Organic Program with a single set of standards for organic production, processing, labeling, and accreditation for certification organizations that oversee organic operations.

The National Organic Standards Board defined organic agriculture as "an ecological production management system that promotes and enhances biodiversity, biological cycles, and soil biological activity." The definition further specifies minimal use of off-farm inputs, and emphasizes on-farm ecological harmony. The practice is intended to be site specific and aims to conserve biological diversity within the farm as a whole (NCAT, 2004).



Federal organic rules require that ruminants have access to pasture.

The USDA accredits agencies that certify farmers as organic; farmers can retain any agency accredited by the USDA. Transitioning an entire dairy herd typically takes one year. After the herd is converted, new animals must be organic from the last third of gestation. The organic rule requires that cows have access to pasture, so at least a portion of the farm will ultimately need to be certified organic. The federal organic standards permit land to be certified organic 36 months after the last application of a prohibited material.

Organic dairy operations must make efforts, like posting their land, to prevent contamination by prohibited substances.

The farm must have an organic system plan (OSP) that describes the overall management of the operation and must keep careful management and production records. The OSP is kept on file by the farm's certifying agency and must be updated annually. Organic farms are inspected by a representative of the certifying agency at least once a year and these inspections include review of records. During transition, the farm must manage their cows organically, which affects feeding, housing, and health care practices. Any dairy farm in transition to organic should work closely with a certifying agency to develop a practical and comprehensive OSP.

In some cases, farmers may be eligible for state or federal assistance as they begin the transition to organic production. State Departments of Agriculture, USDA county service centers, and extension offices can all direct farmers to assistance programs.

There are a variety of reasons that producers choose to become organic producers. In many cases, the decision to farm organically matches the stewardship and animal husbandry values of the farm. Many producers are also attracted by the price stability of organic milk and by price premiums (see Figure 2).

For complete information on new and refurbished milking centers, see Chapter 8, *Milking Center Options*.

Records and audit trail

Organic certification requires that farms document livestock management (including animal origin, feed, reproduction, and health care), production, inputs, and sales.

An organic dairy must provide a complete audit trail and records must be maintained for five years. While many dairy producers already keep careful records, the records for organic production are more elaborate than those kept on a typical farm. While some complain about mountains of paperwork, others say the more detailed recordkeeping has helped them become better managers.

Housing

Organic regulations require that all livestock have access to the outdoors. Ruminants must have access to pasture. The animals must also be provided with shade in the summer and shelter in inclement weather (NCAT, 2004). The options for housing vary: some organic dairies use free stall barns with free choice access to pasture. Some incorporate outdoor bedding and windbreaks. Housing must allow for the natural behaviors of the animals (Taylor and Zenz, 1996). Bedding materials, if edible, must be organic. Most farms opt to house animals in groups to make group feeding easier.

Feed

Organic cows must eat organic feed. Pasture and any supplemental feedstuffs or rations must be organic. Organic farms often, but not always, use management intensive rotational grazing (MIRG); while the rule requires access to pasture, it does not prescribe what kind of grazing system must be used. Whether grown or purchased, organic corn, soybeans, and small grains can add to the cost of production because they must be raised organically and can cost twice the price of their conventionally raised counterparts. This requirement can create an economic stress on a farm during the transition period, when the farmer must feed a more expensive organic ration but is not yet eligible for an organic price premium. After achieving certification, farmers who are able to market organic milk receive a significant price premium for their milk, enjoy price stability, and say the cost of organic feed is reasonable in proportion to the increased profit from sales.

There are limits to inputs that may be applied to pasture. Seed must be organic or, if a producer can document that the necessary seed is not available in organic form, conventionally grown but untreated. Genetically modified seed and inoculum are prohibited. Because nitrogen is one of the most difficult soil amendments for an organic farm to obtain, there is tremendous value in the cattle's manure. Generally, this is deposited right in the grazed pastures. Legumes are often planted along with grasses to boost the nitrogen in the soil and provide a balance of forages for the cattle to graze.

Herd health and biosecurity

Organic management stresses promoting health, rather than intervening to cure disease. The National Organic Program Final Rule is very clear, however, that "the producer may not…withhold medical treatment from a sick animal in order to preserve its organic status" §205.238(c)(7) (USDA–AMS, 2000). Organic dairies follow three general principles keep their animals healthy. These are: optimum nutrition, low-stress living conditions, and reasonable biosecurity practices. As with other dairy systems profiled in this book, biosecurity is an important part of organic production. Animals are typically kept away from situations where they might encounter other cattle.

The holistic approach of an organic dairy usually starts from the ground up — with healthy soil on the farm. Low-stress living conditions are key to preventing animal health problems. Spending time on pasture promotes the exercise, fresh air, and hoof-wear that improve health. Organic rules permit the use of a limited number of synthetic substances and medications. These appear on the Rule's National List of Allowed and Prohibited Substances, Subpart G of the National Organic Program Final Rule.

Some organic herds have very low somatic cell counts, while those of other herds are elevated (Dennis Johnson, personal communication, 2005). Organic dairy cows are treated differently than conventionally farmed animals when they have mastitis. Prevention in the form of sanitation is essential to reduce the incidence of disease. Replacement heifers are usually raised on the farm, reducing the chance for outside pathogens to enter the dairy. Newly introduced animals are usually quarantined to reduce the risk of disease transmission. When mastitis does occur, a common practice is to frequently strip the infected quarter. Some farms use no treatment, allowing the animals to recover from the infection on their own. Others incorporate probiotics, herbal supplements, and acupressure. If antibiotics are used, the animal is permanently disqualified for production of organic milk.

Managing the incidence of infection and other health issues begins with prevention as well. The farm's focus is often on a system-wide goal of good health. Enzymes, vitamins, probiotics, herbal remedies, and a number of nontraditional remedies are permitted (NCAT, 2004). Organic dairy farmers assert that the general practices of the farm dramatically reduce the number of sick animals, and that the cattle have a tremendous ability to heal themselves with some extra care and support from the farmers.

Vaccines are permitted in organic production, and are incorporated in the health regimen. Hormones, including bovine growth hormone, or recombinant bovine somatropin (rBST) are not allowed. In addition, physical alterations must be done only as a protection against illness or injury to the animals. Castration and dehorning are permitted; tail docking is not.

Because the animals spend time outside, hoof health and leg health problems are diminished. When health problems do surface, a number of treatments are permissible. Parasite control can be achieved with sound pasture management. In addition, a number of methods can reduce fly populations in the milking parlor, including fans and sticky strips placed near the entrance.

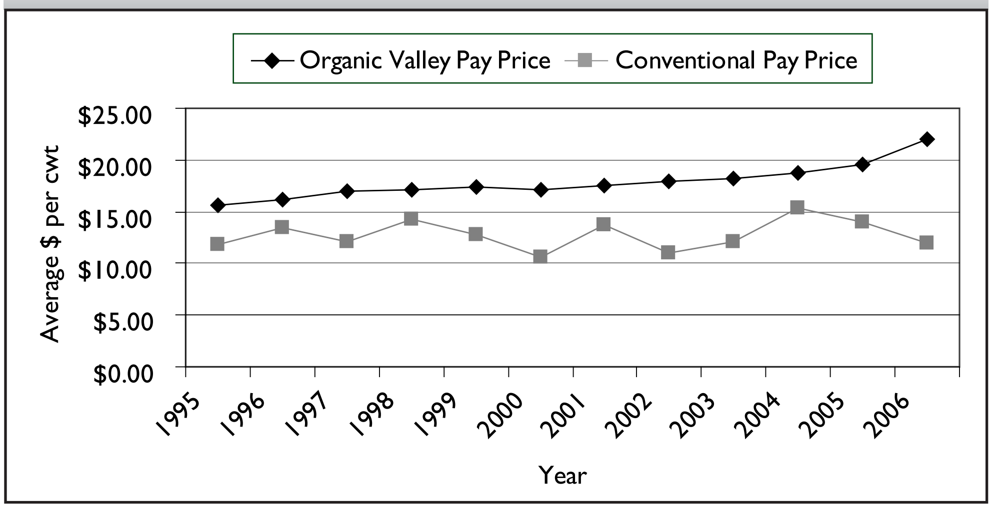
Since stress reduction is an important aspect of organic production, guidelines suggest calves stay with their mother for the first two days after birth, then calves are separated from the cows in the herd (Taylor and Zenz, 1996). Typically, the animals are given whole milk. Milk replacers are only allowed in emergency situations and must be organic. Producers who have herds with Johne's disease should remove animals that are infected.

In the winter, older animals may be housed indoors in a tie stall or free stall setup, or may be housed outdoors with a bedded pack in a sheltered area. Heifers are usually pastured during warmer weather. Animals are often grouped in pens, then moved to pasture when they are old enough to withstand cooler weather, or as the weather becomes more temperate.

Marketing and performance

Certified organic milk commands a premium price. Selling organic milk is not without challenges. In order to add a farmer to a milk route, the truck typically needs to be able pick up 40,000 pounds of milk along its route every other day. This amount usually requires a pool of organic herds located near each other. Some organic producers process and direct market their own milk as a way to add value on top of their organic certification.

FIGURE 2: ***Dairy Prices 1995-2006***



Source: Organic Valley® Family of Farms and USDA-AMS Upper Midwest Milk Marketing Area, Minneapolis
Organic Valley pay price is Midwest base price without butterfat or quality premiums
Conventional pay price is Upper Midwest Class III price (3.5% butterfat)

Genetics and breeding

Breeding practices vary within the organic production system. While many dairies use artificial insemination, some use bulls. Some herds use Holsteins. Many organic producers who use managed grazing have adopted grazing genetics, trending toward Jerseys, Normande, Scandinavian Red, Ayrshires, Brown Swiss, and a number of crossbreeds recognized as efficient grazers. These breeds also produce milk with a high fat and protein content, and contribute characteristics like longevity and fertility to their offspring.

Many organic producers favor colored breeds.

Social and environmental concerns

Environmental stewardship is a tenet of organic production. To meet this goal, many organically certified dairies encourage biodiversity on their farms. Pasture-based systems are particularly helpful in this regard.

Some of the farms with large herds may have a manure holding facility. If the farm's acreage is inadequate, they must seek an outlet for the manure. Most farms in the Upper Midwest need to transport at least some manure during winter. Nutrients must also be cleaned out of the milking parlor and must be applied and managed in ways that do not contribute to polluting ground- or surface water. Organic rules prohibit manure application to frozen ground (NCAT, 2004). Some farms opt to compost manure from the parlor and winter bedding. Consult the appropriate state agency for rules regarding storage and disposal of manure and milkhouse waste.

No cost of production table is included in this section, in part because of lack of adequate economic data. The cost of production can vary considerably from farm to farm. During transition, in particular, production costs may be high because organic feed is more expensive than conventional feed. Farms that can graze land that is already certifiable and feed little or no grain typically have lower transition costs. To calculate cost of production, see the worksheet at the end of this book, or order *The Organic Decision: Transitioning to organic dairy production*, a workbook published by Cornell University.

If you are considering adding or changing a facility, see the *Resources* section at the end of this book

Resource people

The following people contributed information for this chapter. You will find complete contact information in the *Resources* section the end of this book.

David Engel, organic grazing dairy, Soldiers Grove, WI

Tim Griffin, national milk procurement manager, CROPP/Organic Valley® Family of Farms, LaFarge, WI

Alan Haff, procurement assistant, Organic Valley® Family of Farms, LaFarge, WI (888) 444-6455

Dennis Johnson, professor and dairy specialist, University of Minnesota

Florence and David Minar, organic grazing dairy with on-farm processing, New Prague, MN

Meg Moynihan, organic and diversification specialist, Minnesota Department of Agriculture

Joe Pedretti, membership coordinator, CROPP/Organic Valley® Family of Farms, LaFarge, WI

Jim Riddle, organic consultant, Winona, MN

Francis Thicke, organic grazing dairy with value-added processing, Fairfield, IA

From Grazing to Organic Production

Bob and Theresa Mueller
Melrose, Minnesota


Theresa and Bob Mueller with their three daughters.

Background

In central Minnesota, dairy farms dot the countryside. Seen from afar, so many dairy farms dot the countryside that their silos glinting in the sunlight resemble a herd of Holsteins grazing on the landscape. Amidst this seemingly endless march of silos, a few dairy farms set themselves apart from the herd.

One of these is Bob Mueller's organic dairy farm, located near Melrose. Garrison Keillor's Lake Wobegon stories were born in this region, based on experiences Keillor had while living here decades ago. The Mueller farm is only a few miles north of the Lake Wobegon bike trail. Included among those folks in Keillor's stories are some who, like Bob, have taken a different path.

Back in 1979, Bob moved back to the family farm and worked for his father. At that time they had 48 cows. In 1985, he purchased the farm and continued farming conventionally for six years. Then Bob made two major transitions: first to grazing, and then to certified organic. His farm is certified by the Midwest Organic Services Association (MOSA).

"I made a decision around 1991 to expand to support two families," he reflected. Bob started reading about grazing. He nearly built another silo, but decided it might be better to move the cows to pasture to feed themselves instead of harvesting crops, storing them in a silo, then delivering feed to the animals.

"I read about grazing in winter and I asked my feed rep about it. He said they'd lose so much body condition and get skinny," Mueller noted. His research nourished some skepticism about this advice. The very next day he bought fence wire.

The farm has 400 total acres on clay-loam and sandy-loam soils, and the family milks about 100 head. The dairy supports his immediate family and two part-time employees. Now, Bob feels he can handle more than twice the number of cows with the same labor as when he was milking 48 cows. "I'm not pushing a wheelbarrow through the barn anymore," he noted.

Certified organic

Bob learned farming from his father, a man whose generation used chemicals freely, but Bob had concerns about them. "I always cut the application rates in half. I wouldn't spray unless I absolutely had to," Bob said. He also experimented with cultivating for weed control. Sometimes, he noted, the farm had unsprayed fields that were cleaner than the sprayed ones.

By 1998, Bob felt ready to begin converting to organic field crops. He had some acreage that had not been sprayed with chemicals for many years. This acreage qualified for organic certification right away. Other land required 36 months of transition.

"I didn't know what I was doing. I thought I'd grow the soybeans and certify them later if they turned out," Bob recalled. "I ended up chopping them because there were so many weeds." Despite his concerns, the bean harvest was much better than he'd expected.

FARM PROFILE: FROM GRAZING TO ORGANIC

"In '99, I went ahead and sent the [organic certification] paperwork in on 10 acres." This soybean crop ended up yielding 20 bushels per acre and he received $16 per bushel. The fields were extremely weedy, he noted, but his dad was impressed with the results nonetheless.

"The money was part of it," Bob admitted, "but I like the challenge, too. I heard that year they were looking for organic milk. I went home and told my wife we were transitioning the whole farm to organic. My wife asked, 'How are we going to make a living?'"

Bob wanted to ensure the farm would turn a profit. Unwilling to ignore any details, he hired an independent consultant. Here, he found help with soil testing and assessing all of his inputs to determine if they were approved for organic production. He had all of his fields tested at this time.

Marketing

He initially sold his milk to Pride of Main Street, a creamery in Sauk Centre, MN. In August 2003, he began selling to Horizon Organic of Colorado. In February 2004, he switched to CROPP, a producer-owned co-op that sells milk and other dairy products under the brand name *Organic Valley® Family of Farms*.

Housing and pasture management

After he started grazing, Bob undertook a series of remodeling projects. In 1991, he remodeled his tie stall barn, expanding it from 48 to 66 cows. He subsequently converted a pole shed into a 130-stall free stall barn with slatted-floor manure pits while he continued to milk in the tie stall barn. In 1997, he converted the tie stalls to a swing parlor.

Presently, Bob is producing milk with about 100 cows. He adds, "I've milked over 100 cows, but I've backed off since I transitioned to organic."

For grazing and cropland, Bob owns 200 acres and rents another 200. He has converted some fields to pasture to facilitate rotational grazing for the milk cows. He separates the high- and low-producing groups. Cows get a new paddock after each milking. "If it's hot out, I'll open a gate and allow them access to trees for shade," he said.

Herd health

After Bob started rotational grazing, he noticed a change in the health of the cows. The method boosted the general condition of cows' feet and legs. Plus, it increased their longevity.

Prior to grazing, Bob fed a higher protein diet than a typical forage diet. As Bob pushed the cows harder with this diet, he started having animals with twisted stomachs. The problem was new: the farm hadn't had a single surgery for as long as he could remember. "After I started increasing milk poundage, I had three surgeries for twisted stomachs within a five-month period," he said. "I started having the veterinarian out more and more," Bob recalled.

Now, Bob only has the vet out for pregnancy checks before they go out to pasture. He relies on preventive measures to keep his herd in good health. For example, he uses several routes to and from the barn to keep them out of the mud, thus reducing hoof problems. "I did have some hairy heel wart one time, but I haven't had the problem lately."

In addition, Bob uses sand bedding in the free stall barn because he believes it helps decrease the somatic cell count (SCC). Vitamin C and ointment rubs are used proactively to keep SCC low. His SCC averages 150,000, well below what it was during his conventional production days.

Yet Bob still faces some herd health challenges. He just fought a battle with *E. coli*, which killed 10 out of 15 calves. "I believe the warmer early part of the winter of 2003–2004 was the problem with the increased baby calf mortality," he explained. As soon as the cold of winter hit, everything returned to normal. "I plan to watch things very closely and probably vaccinate the cows next fall," he adds.

Feed and performance

Bob waited until all of his acreage was certified organic before he began selling certified organic milk in 2002. He purchases some feed to augment what he grows. Pasture comprises about 50 percent of the cows' feed and total mixed ration (TMR) makes up the rest. Bob adds mineral and vitamin supplements that are allowed under the federal organic standards. The cows get their TMR when they come in to milk, then they return to grazing.

Before he started grazing, Bob's rolling herd average was in the neighborhood of 20,000 pounds. After he started grazing, it slipped 20 to 30 percent. In recent years, the herd average has crept back up again. But many farms can have great production numbers yet fail financially, according to Bob. Farms tend to look at the income increase when more pounds of milk are filling the bulk tank, but the farmers don't realize they're not making more profit because other expenses have increased. "I watch the checkbook more than those numbers," he said. Since transitioning to organic, his rolling herd average is about 18,000 pounds. "I'm working back from the cows, to the feed, to the soils. I actually should have started with soils," he said.

The herd's genetics are composed of a cross between Holstein and Normande. "I'm a little disappointed with the thriftiness of the calves. I thought being crossbred they should be stronger." The crossbred cows account for about 20 percent of his herd and will freshen in fall of 2004. The farm's cull rate has been below 25 percent. In the late 1980s, Bob purchased a few replacements, but had problems with them, so he has maintained a closed herd for the past 15 years and has been able to sell springing heifers each year.

Bob says he is quite pleased with his cash flow. "Most organic farms you talk to are selling their excess [heifers]. They do not have to buy replacements," he noted. And with time, his cows have become acclimated to the weather better than they used to be.

Family and labor

Many dairy farms are a family effort. But Bob handles the chores himself and hires two others to help him keep the process running: one full-time hired man and one part-time. Bob's father helps drive a tractor occasionally. Bob's wife Theresa teaches art part-time at an elementary school and the couple has three daughters.

Conclusion

"Since I've gotten into organic, I feel I can identify with it better than anything else I've done," Bob said. He likes the challenge of learning to farm organically, believes it's a more sustainable method of farming, and would like to see organic farming viewed positively. He's interested in promoting organic practices to other farmers and is a founding member of the Midwest Organic Dairy Producers' Alliance (MODPA).

Bob has suggestions for farmers looking into grazing or organic practices. "When I decided to go organic, I went to every meeting I could find." Several times each year, there are workshops, seminars, and farm tours for those interested in trying grazing and/or organic production on their dairy farm.

CHAPTER 6: CUSTOM HEIFER RAISING

The number of dairy operations in the Upper Midwest has been shrinking for many years. But while dairy farm numbers dwindle, the number of cows in the area has remained relatively steady (USDA – NASS, 2004), which indicates that the number of larger operations is increasing.

On larger operations, labor focuses on milking and cow care for optimum performance. Owners may choose to outsource heifer production in order to free up building space, labor, and feed for the animals producing milk. In many cases, the decision to outsource coincides with a herd expansion (Wolf, 2002).

Heifer growers do not, as a rule, fit one definition. There are large-scale feedlot-style growers and there are also smaller part-time heifer growers. Larger scale growers tend to have at least 200 head at any one time; generally these animals come from more than one dairy.

People who focus on raising heifers are not always former dairy producers. Some are children of dairy farmers; some have opted to grow heifers because the option allows them to continue to work with animals. Heifer growing allows for more flexibility and is less labor intensive than milking dairy cows. Most heifer growers also raise crops on their land and feel that feeding the heifers with their own crops is a good way to add value. Many also have some other livestock on the farm (Wolf, 2002).

Contract agreements

The first obstacle new custom raisers face is finding clients who will trust their ability to raise healthy, productive springing heifers at a low cost. Management requirements differ, and in many cases, the farm has no track record of producing healthy, vigorous springing heifers. Once a reputation is established, growers will usually find clients more readily.

Calves are usually weaned when they are between four and eight weeks old.

There are a number of arrangements that heifer growers make with dairies. Usually, an annual written contract specifies a daily fee per day per heifer raised on the farm. These fees are usually paid on a monthly basis. Other contracts allow the grower to buy the heifer, then the original dairy farm repurchases her when she is roughly sixty days from calving. The price is often determined by how much the heifer weighs at that time (Wolf, 2002).

Many contract growers provide their own transportation, picking up and delivering heifers as needed. Growers sometimes specialize in a specific phase of heifer production and may work with other contract growers as a network. For example, a custom grower may take heifers from day three after birth to six months of age. Others keep them from six months through breeding. Still others may specialize in the period from breeding until return to the dairy where the cow will eventually be milked.

The rates for these stages vary, as do clients' expectations for care and performance. In a 2001 survey of U.S. dairy heifer growers, respondents reported that the fee for wet calves averaged $1.88 per day. From weaning to six months, the fee averaged $1.49; from six months to breeding the fee was $1.50/day. After breeding, the fee rose to $1.59/day. Fees vary and tend to rise and fall with milk prices (Wolf, 2002).

Facilities

Before a producer begins custom heifer production, he or she must first consider what the operation's maximum capacity is. Growers often take into account available pasture land and housing space. Crowding has a negative impact on heifer growth and comfort. Many dairies expect "wet" calves to be isolated. Buildings are usually the biggest expense new growers incur, and housing for wet calves may vary from hutches to individual pens to group housing (Dennis Johnson, personal communication, 2005; Kammel, 2004a,b).

Group pens may be created by removing partitions between individual pens after the heifers are weaned.

Greenhouse and hoop house shelters are commonly built to provide additional shelter and may contain several hutches or pens. Group pens may be created by removing partitions between individual pens after the heifers are weaned. Group housing reduces the time needed to clean pens and feed the animals, improves labor efficiency, and enhances animal socialization (Dennis Johnson, personal communication, 2005). Costs associated with labor and labor efficiency in group housing setups vary depending on the facility. Chores include feeding the calves, cleaning and rebedding the hutches or pens, medical examinations, and vaccinations. Both start-up cost and labor costs must be considered (Karszes, 1996).

It may be cost effective to use a remodeled tie stall barn to house calf pens or groups, provided that the buildings have adequate ventilation and the structure is sound. A free stall or bedded pack barn may also be used. Usually the group size is increased after six months of age and up to forty animals may be placed together (Kammel, 2004a,b).

Some larger dairies want the animals from their herds to spend at least part of their time out on pasture before they return to the farm. Pastured animals are perceived to be healthier because they get more exercise and develop a larger rumen. The end benefit of pasturing is higher milk production (Fanatico, 2000). When the heifers return and move into a free stall facility, they're better able to produce milk. If pasture is used, permanent and temporary fencing and water will be needed.

In this calf barn, the animals move from pen to pen as they grow.

Breeding
Most heifer growers are responsible for breeding. Heifers are typically bred between 13 and 15 months of age. The grower follows contract specifications for genetics, and contracts may also specify the number of attempts at artificial insemination. Many growers use a clean-up bull to ensure that all heifers become pregnant. The springing heifers are returned to the dairy three to four weeks before calving to allow them to get accustomed to their new setting and feeds. This time also permits the dairy to boost protein and energy in the ration to prepare the animal for milking and calving.

On many custom heifer raising operations, like this one in Minnesota, heifers spend a good deal of time on pasture.

Performance
Historically, heifer prices have tended to rise and fall with milk prices. The price has ranged from just over $1,000 in early 1996 to more than $1,700 (see Figure 3). Many contracts are very specific, requiring certain levels of daily gain, size and weight at breeding and at springing.

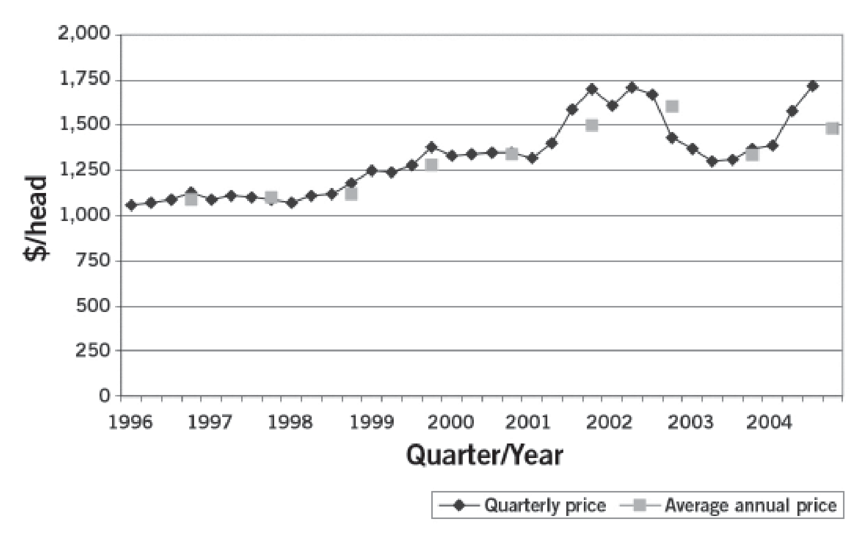
Contracts are usually revisited on an annual basis, and good communication between growers and clients will help keep the contracts satisfactory to both parties.

Raising heifers on pasture can significantly reduce feed, labor, machinery, building, and overhead costs. In a two-year Minnesota study, pasture-raised heifers had roughly 30 percent lower costs compared to animals raised in a feedlot setting, while average daily gains of grazed and feedlot-raised heifers were comparable. The same study determined that costs for the pasture system were lower than for the feedlot system and that stocking rate strongly impacts per-unit costs (Rudstrom, 2002).

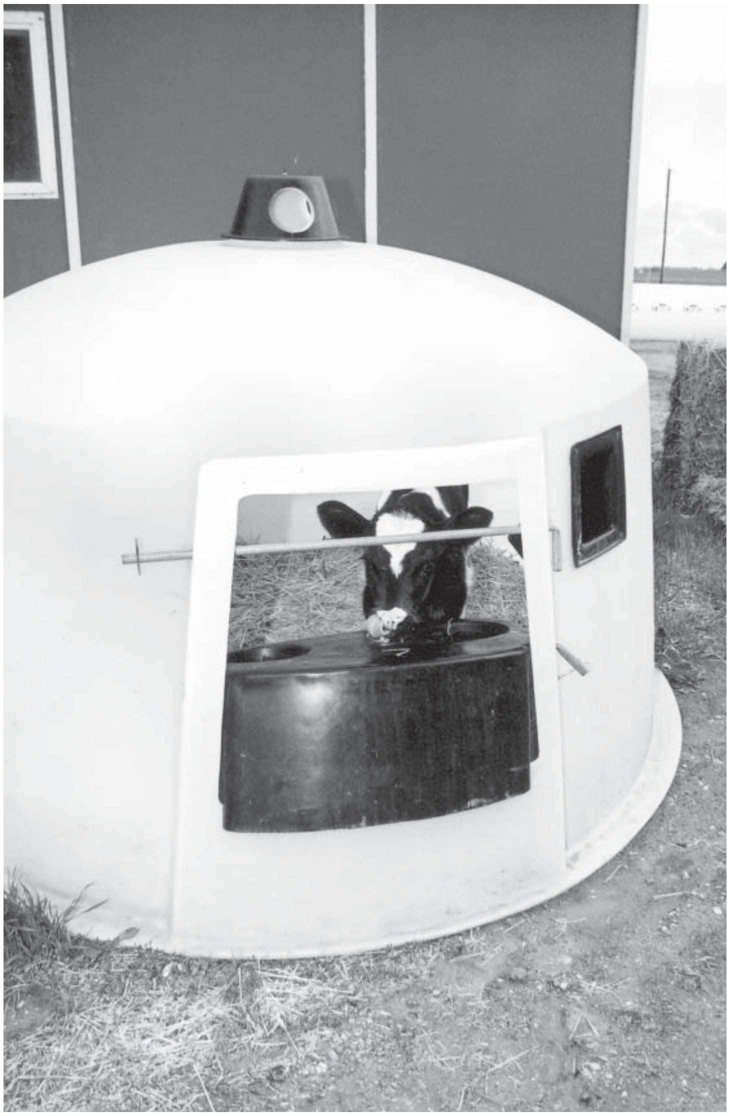
Performance and financial records are important because profit margins are very narrow. Heifer performance is monitored by growers. Heifers are weighed and body condition scored. Rations are tested for adequacy. Feed costs are tracked carefully and building and pastures are kept fully stocked. Crowding can lead to decreased weight gains and health problems.

The demand for heifers raised by custom growers is expected to outstrip the supply of growers in the future (Cropp, 2003). However, during down markets, some larger dairy operations

FIGURE 3: ***Average Dairy Heifer Replacement Cost***



Source: www.aae.wisc.edu/future/ (Dairy Market Data/Dairy Prices/Costs of Inputs) that are carrying heavy debt loads do go out of business; others sometimes choose to stop outsourcing heifer production until the milk market improves. When these things happen, custom growers can lose a significant portion of their business.



Some operations segregate calves in hutches like these.

Biosecurity and health

Contracts between growers and dairies usually stipulate that health care, including vaccination, is the responsibility of the grower. Sanitation is crucial. Calves must be transported in clean trailers and are typically separated from each other in a hutch or pen arrangement. Some heifer raisers quarantine calves when they first enter the herd. Adequate ventilation, clean, dry bedding, and clean food and water help keep animals comfortable and healthy. Some operations make sure that one skidsteer is dedicated to removing bedding and manure and never used for any other purpose, reducing the chance that manure will contaminate feed.

Often, visitors to the farm are informed that the area is biosecure. Farms may post signs to alert feed delivery personnel and visitors. Some farms require people to put on plastic boots before entering an area where the animals are housed.

Growers monitor the animals, taking extra care throughout the early weeks to remove sick animals from groups and checking temperatures to ensure that the calves are staying healthy. Contracts determine who bears the burden when there is a death loss. In some cases the cost is shared. If the animal is healthy when the grower receives the animal, then the grower will bear the burden of death costs, but there are times when the cost of growing the animal is refunded. If something happens to an animal that was purchased from a dairy, the grower alone shoulders the cost.

TABLE 10: ***Average cost of production to raise a replacement heifer to the point of calving, Minnesota, 2002-2004***

Total number of farms reporting	**53**
Feed	**$480.48**
Labor	**$28.65**
Custom hire	**$11.77**
Health	**$36.06**
Breeding	**$7.62**
Total direct costs	**$643.57**
Average number of heifers sold or transferred	**125**
Detailed report available at: http://www.finbin.umn.edu/output/52759.htm	

Source: University of Minnesota Center for Farm Financial Management FINBIN

Note: These records do not necessarily predict results on any one farm or in all areas for all farmers.

To find current cost of production records for your state, contact:

Michigan
Department of Agricultural Economics
Michigan State University
Christopher Wolf (517) 353-3974 wolfch@msu.edu or
Stephen Harsh (517) 353-4518 harsh@msu.edu

Minnesota
Center for Farm Financial Management
University of Minnesota
(612) 625-1964 or (800) 234-1111
cffm@cffm.agecon.umn.edu

Wisconsin
Center for Dairy Profitability
University of Wisconsin
Bruce Jones (608) 265-8508 bljones1@wisc.edu

TABLE 11: ***Capital start-up investment for heifer raising***

HOUSING	**$135 to $675/calf**
FENCED PASTURE	**$75/calf**

Source: Kammel, 2004a

If you are considering adding or changing a facility, see the *Resources* section at the end of this book.

Resource people

The following people contributed information for this chapter. You will find complete contact information in the *Resources* section the end of this book.

Hugh Chester-Jones, associate professor, dairy and beef production systems, University of Minnesota Southern Research and Outreach Center, Waseca, MN

Roger Imdieke, heifer raiser (grazing and confinement), New London, MN

Kevin Janni, professor and extension engineer – livestock housing systems, University of Minnesota

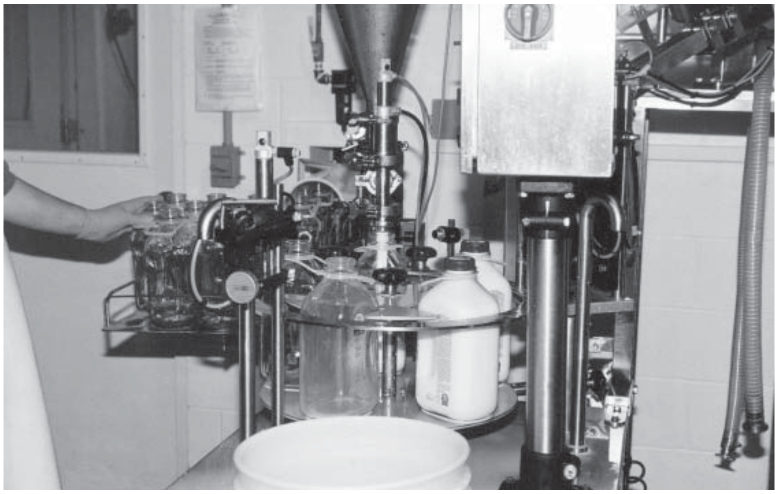
Dennis Johnson, professor and dairy specialist, University of Minnesota

David W. Kammel, professor and extension specialist, University of Wisconsin

Margot Rudstrom, agricultural economist, University of Minnesota

Christopher Wolf, associate professor (farm management production economics, dairy markets, and policy), Michigan State University

CHAPTER 7: VALUE-ADDED PROCESSING



Cream top milk in glass bottles is one value-added option that has been a hit for some dairies in the Midwest.

Background

Several things can motivate farmers to consider on-farm processing of their milk. In some cases, family members are planning to join the farming venture and if adding land or cows is not an option, the farm somehow has to increase the value of products sold. In other situations, the dairy owner may be frustrated with price fluctuations in the conventional milk market and want to try selling to consumers who will pay more for a locally produced farmstead product. In still other cases, family members may be interested in food preparation and cooking and want to make and sell dairy-based food products.

Any of these reasons may lead a dairy producer to explore the possibility of producing and marketing added-value dairy products by bottling milk or making cheese, butter, yogurt, ice cream, or other dairy products.

The decision to begin processing dairy products requires careful consideration. If a farm begins an add-on company, the business will demand an entire new set of skills and facilities. An operator who is primarily looking for ways to improve returns to the farm is often encouraged to first consider other options such as boosting productivity and labor efficiency before adding the processing unit.

Some dairy producers have observed a trend toward increasing opportunities for this kind of venture. A growing number of consumers are seeking direct connections with the producers of the food they eat. Many consumers are very interested in what happens on the farm. As a result, there is a significant and growing niche market for products sold directly from the farm, even if the product reaches consumers in a specialty or health food grocery

Smalldairy.com – a revolutionary resource

By Jeremy Lanctot

In the last year, I have found a resource that may revolutionize the growth of small scale on-farm dairy processing: www.smalldairy.com. This site didn't show up in the first several pages of my internet searches. I had to dig to finally discover it. Most internet searches yielded sites for larger operations and/or advanced processing knowledge. Most farmers do not have the time and background to jump into on-farm processing on this scale, so it can be quite intimidating.

The Small Dairy site is built with small homestead and artisan processors in mind. There are links to suppliers of all sorts who sell processing equipment of all sizes and prices: cheese, yogurt, kefir and ice cream making supplies, etc. If you're interested in classes and workshops, there is information about when and where they are offered. One of the most useful references on this site is for publications that will aid in the education of beginning dairy processors. This will be the place for most producers to start.

Through the Small Dairy site, I purchased two subscriptions for periodicals for on-farm processors. *The Home Dairy News* targets those who have a few dairy animals and just want to value-add for themselves and maybe a few friends.

…*Creamline* is the next step in dairy artisan reading. This periodical focuses on supporting the revival of the local creamery. In this publication, one will find in-depth information with the assumption that you are already doing some processing right now.

Contact information:

www.smalldairy.com – or – Creamline/Home Dairy News
P.O. Box 186-W
Willis, VA 24380

Reprinted with permission from *The CornerPost*, the newsletter of the Sustainable Farming Association of Minnesota. Spring, 2005.

store. Shoppers are interested in these items, and a number are willing to pay more for them. These customers are also willing to travel greater distances to obtain food that offers them a direct link with the farmer. Nonetheless, the farmer usually needs to make the first contact with those customers, and the customers must believe that the quality is very high.

Careful planning

Entrepreneurs in Wisconsin can seek the assistance of the Dairy Business Innovation Center, which is part of the Wisconsin Department of Agriculture, Trade and Consumer Protection. This Center encourages producers to link up with an agent at the department, who will guide the entrepreneur through every detail and provide technical assistance with plant design, processing advice, and marketing plans. Agents can also help create cash flow and debt retirement plans for fledgling businesses, and can help with market analyses.

There are also two other Wisconsin dairy programs that provide technical assistance, programs, short courses, and product testing for dairy artisans and specialty cheese makers They are the Center for Dairy Research at the University of Wisconsin Madison www.cdr.wisc.edu/, and the University of Wisconsin River Falls Department of Animal and Food Science www.uwrf.edu/food-science/Institutes. Entrepreneurs outside of Wisconsin can access the same assistance for a fee commensurate with the cost of courses or product testing. Other recommended resources are the Artisan Network www.wisconsindairyartisan.com and the Dariy Innovation Business Center www.dbicusa.org.

In Minnesota, the Agriculture Utilization Research Institute (AURI) www.auri.org works with value-added products from all kinds of farms. AURI aids in product development and helps individuals or groups test the feasibility of any plan. The institute also connects producers to people who can help with business and financial planning and market analysis. This is a free service to all agricultural businesses based in Minnesota. The Minnesota Department of Agriculture offers Dairy Business Planning grants to producers who want to explore the feasibility of making changes to their operations, including on-farm processing ventures.

Minnesota producers can also get help from the Minnesota Dairy Initiative www.mnmilk.org/mdihtm, which offers technical assistance to farms in order to improve productivity, profitability, and efficiency. In addition, the Minnesota Institute for Sustainable Agriculture's *Building a Sustainable Business: A Guide to Developing a Business Plan for Farms and Rural Businesses* (at www.misa.umn.edu) is a helpful publication.

The Michigan Department of Agriculture www.mda.state.mi.us provides counseling and helps dairies develop business plans. The staff also direct farmers to other sources of assistance. In Michigan, another significant resource is the Michigan State University Product Center for Agriculture and Natural Resources www.aec.msu.edu/product. Here, dairies can test recipes and procedures during the planning stage of an on-farm processing business.

Getting guidance from the state in which a farm is located is very important. State officials can link farmers with resources and advice that may prove invaluable as a processing business takes shape. Consulting with them early in the process can help make sure that the facility meets health and safety requirements. Grants are sometimes also available, including USDA Rural Development Value Added Producer Grants (www.rurdev.usda.gov), which provide planning grants and working capital.

Many farms seek advice from consultants and lenders in the first phases of their planning. These people can help the dairy owner carefully craft all of the details that will go into the new facility. Farmers who have successfully implemented similar types of businesses stress the importance of listing all the decisions that need to be made. Additionally, owners must consider the implications of all decisions carefully before proceeding with any plan.

Farmers can take classes, visit trade conferences, or attend seminars on making the products they are interested in offering. Food technologists can offer additional guidance on the processes and production of milk products (Frank, 2000).

Regulation

During the planning, construction, and operation of a plant, state inspectors will check to assure that facilities are up to regulatory requirements. Each state is responsible for the regulation of its own plants. Equipment, milk quality, and temperature testing continue throughout the life of the business. Facilities seeking an additional USDA inspection will usually work with two sets of regulatory officials — state and USDA.

Marketing plan

Simply making a product on your farm is not enough to assure that sales will follow. A detailed marketing plan is critical to locate and secure customers for any products and is an important first step in investing in a new enterprise. Many times, knowing what needs to be done and decided prior to starting a business simplifies any changes that may be necessary along the way. There are a number of important questions to consider as you develop this plan. They include:

- What product do you intend to sell?
- What is unique about your product that will attract customers?
- Who will buy your product? Consumers? Restaurants? Grocery stores or specialty food shops?
- If you sell direct, how many customers will regularly purchase your product?
- If you sell to shops and stores, how will your product reach those locales?
- Is your sales site conveniently located for shoppers?
- What are your costs, including overhead, ingredients, and labor?
- How much will your product cost?
- How much will the consumer pay for the product?
- How will you attract consumers to your product?
- How will you demonstrate the quality of the product?

(Frank, 2000; MDA, 2004; MISA, 2003)

Personnel

Anyone who will be working in the processing facility will need to acquire both knowledge and skills to use equipment and create the products that the farm will eventually offer for sale. The greater the number of products offered on the farm, the more equipment required to make these products, and the more complex skills workers will need.

Some farmers plan to create the products themselves, while others use hired labor. In the second situation, the dairy owner not only must train the workers, but also must supervise them. Depending on the size of the venture, employees may be a permanent addition to the processing business. In other cases, family members provide all the labor needed. Good communication is critical in either case.

Facility options

There are numerous choices for farmers when it comes to processing milk on the farm. First is the choice of products, which can include milk, cream, creamline milk (pasteurized but not homogenized, so the cream rises to the top), cheese, butter, yogurt, ice cream, and sour cream. Additional products can be added later, provided there is enough capital to invest in any additional equipment needed.

A producer needs to first decide whether to create a space on the farm for this effort. You can hire many cheese plants and dairy companies to follow your recipe and create your products under contract for a fee (this is commonly called "co-processing"). Storage space may still be necessary.

When planning an on-farm facility, state department of agriculture and/or health inspectors may be helpful advisors. If the farm decides to add a site on its own property, local and state regulations will dictate how the facility must be designed. Equipment must be up to code. Food safety laws govern a number of decisions. Some states require that a plan be submitted to the department of agriculture before any construction or remodeling commences. You should also check with your insurance company about liability coverage.

The location of any on-farm processing unit must be carefully considered. All wastewater must be treated and handled so it does not overwhelm the system. In some cases, the city sewer may be available. If the farm will be shipping products to markets, trucks will need to access the facility. Farm odors and prevailing winds need to be considered, because they can taint the flavor of the dairy products. Insects and dust can also create difficulties. A construction engineer can help with the planning of any new structure, and is a valuable advisor (Frank, 2000).

The final costs of any processing facility and equipment vary dramatically. A new system handling a large amount of milk will cost more than a system made of reconditioned used components. Smaller farms have remodeled existing spaces for around $65,000. Tremendous sweat equity goes into this type of facility. Larger sites with new equipment and numerous product offerings can cost $1 million.

Studies show that new enterprises often fail. The following list of "keys to success" was generated by interviews with successful farmer food entrepreneurs:

- Start small and grow naturally
- Make decisions based on good records
- Create a high-quality product
- Follow demand-driven production
- Involve the whole family or partners
- Keep informed
- Plan for the future
- Evaluate continuously
- Provide adequate capitalization

(Born, 2001)

Adding a business to the farm will mean lifestyle changes. The tasks will also be different than those of farming, and add to the overall labor requirements of any farm. With careful planning and execution, the venture can be a lucrative addition to the farm business.

If you are considering adding or changing a facility, see the *Resources* section at the end of this book.

TABLE 12: ***Value-added Dairy Processing***

START-UP COSTS	**$65,000 – $1 million**

Sources: Francis Thicke, personal communication, 2004;
Norm Monsen, personal communication, 2004

Resource people

The following people contributed information for this chapter. You will find complete contact information in the *Resources* section the end of this book.

Robert Craig, agriculture development director, Michigan Department of Agriculture

George Crave, grazing dairy and cheese maker, Waterloo, WI

Donna Gilson, public information officer for food safety and animal health issues, Wisconsin Department of Agriculture, Trade and Consumer Protection

C. Thomas Leitzke, food scientist and director, Bureau of Food Safety and Inspection, Wisconsin Department of Agriculture Trade and Consumer Protection

Florence and David Minar, organic grazing dairy with on-farm processing, New Prague, MN

Norm Monsen, Wisconsin Department of Agriculture, Trade & Consumer Protection and Wisconsin Dairy Artisan Network

H. Christopher Peterson, professor and director, Michigan State University Product Center for Agriculture and Natural Resources

Michael Sparby, project development director, Agricultural Utilization Research Institute

Francis Thicke, organic grazing dairy with value-added processing, Fairfield, IA

FARM PROFILE: CHEESE, PLEASE!

Cheese, Please!

Rick Adamski and Valerie Dantoin
Full Circle Farm
Seymour, Wisconsin

Adding a new business to a farm is not always the right choice. But for Rick Adamski and Valerie Dantoin, it was a fit that ultimately matched their goals and objectives. The business also improved the sustainability of their farm. Coupled with seasonal calving and grazing, the cheese-making venture capitalized on a special asset of the milk that was a result of the farm's grass-based production method.

The couple wanted to farm in the most environmentally friendly way possible, while also producing the best-quality food possible. They adopted managed grazing for their entire, 240-acre dairy farm. "I wanted to improve our pasture management and reduce our reliance on harvested crops in order to decrease our fuel and energy use, while also conserving soil," said Rick.

Valerie is enthusiastic about the human health benefits of the meat and milk from a grazed farm. "As farmers we have a responsibility to provide people with the most nutritious food we can produce," she explains. She also hopes to raise awareness that production method directly affects the quality of the food.

Cheese marketing

In the late 1990s, Valerie read about studies indicating that meat and milk from pastured cattle consuming little or no grain have very high levels of conjugated linoleic acid (CLA) and omega-3 fatty acids. Some research in test animals has indicated that both fatty acids have cancer-fighting properties and other health benefits.

In 2000, Valerie obtained a Wisconsin Agricultural Development Grant to test the CLA content of their farm's milk during the grazing season, and found that it was indeed substantially higher than the average for milk produced on confinement farms.

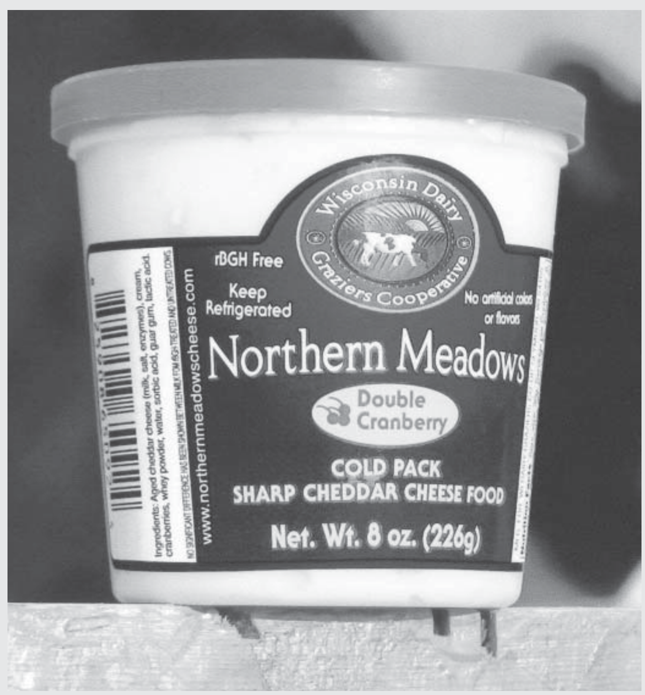
Rick and Valerie also saw this as an opportunity to help other grazing farms, and work with others to share ideas and risk. They invited some friends who graze their cattle to form a new organization, the Wisconsin Dairy Graziers Cooperative, which now has four member farms.

"We don't want to be successful just by ourselves. The best thing about being in a cooperative is being on a team with a group of people you want to be with," Valerie explains.

The co-op requires that pasture make up at least 50 percent of all forage dry matter consumption by the milking herds during the grazing season, and prohibits use of antibiotics, synthetic fertilizers, and hormones. In 2001 the co-op received a USDA grant to test and compare members' pasture-produced milk with that of some confinement dairies. They found that co-op members' milk from grazed cows was substantially higher in CLA, omega-3, and vitamins A and E.

Valerie said the group wanted to make a cheese that capitalized on these healthful attributes, while returning a higher value for their milk. They found a cheesemaker who was willing to do the job on a contract basis, and located firms to cut, wrap, label, and store the cheese.

"That's the advantage of living in Wisconsin. You can find people to do the job for you," Valerie said.



This cheese won a first place award at a 2004 world championship cheese contest.

FARM PROFILE: CHEESE, PLEASE!

Wisconsin Dairy Graziers markets the cheese under the label "Northern Meadows."

Valerie said she knew nothing about cheese marketing when she started the project. Wisconsin Dairy Graziers hired a cheese broker, a person who is paid to handle distribution and sales. The broker told Valerie that he could sell a substantial amount of cheese across the U.S., so the cooperative decided to have 70,000 pounds of cheddar made in 2001. However, the broker's promises did not materialize.

The cooperative changed strategies, deciding to concentrate initially on Upper Midwest sales. Valerie hired a friend with a marketing background and a strong interest in the product to make sales contacts.

Next, the cooperative found a distribution firm serving hundreds of smaller food stores, an avenue that now accounts for half of the cooperative's cheese sales. Smaller volumes are sold directly, including through a website. The co-op scaled back cheese production to 10,000 pounds per year in 2002 and 2003. Since tests showed that CLA content of members' milk was highest in late summer and early fall, cheese making does not start until July.

The cooperative has been successful in its goal of returning $16 per hundredweight to members for the milk sold as Northern Meadows cheese. However, the group has a line of credit and a bank loan to finance its unsold cheese inventories, and unpaid labor is not included in the milk price figure.

Valerie is paid for the average of 10 hours of work she does for the cooperative each week. She said there is reason to believe that the business can continue to grow, but adds that selling cheese is a difficult and unpredictable business. Increasing sales too quickly can be a mistake, so she said the cooperative needs to plan for moderate growth. "The field is plowed. It's a matter of how much seed we want to plant," Valerie said.

For many years, Rick has treated cows with organic-approved remedies. He's also avoided non-approved fertilizers. "We were always aware of the organic

Rick Adamski and Valerie Dantoin are dairy farmers and cheese entrepreneurs.

market, and we wanted to be prepared for that route when the opportunity came," he explains. In 2003, Rick and Valerie joined Coulee Region Organic Producers Pool (CROPP), and started receiving a substantial organic price premium for their milk.

Words of advice

Decisions to graze cattle and make farm business changes have to be made on a case-by-case basis, Rick stressed. "People have to figure out why they're in farming. They have to evaluate the options available," he explains. For instance, Rick and Valerie said they chose to cut back their dairy herd and go to organic production because of their land base, life stage, and personal philosophies. They say that on the other hand, a younger person with a larger land base and a passion for farming can do well milking more cows.

Valerie thinks marketing pasture-based dairy products holds promise and should continue to be pursued by farmers. Grazing-based dairy products appear to have a bright future. She notes that the label "grass-fed" can attract buyers because of its special attributes such as high levels of CLA, omega-3, and additional vitamins.

Yet the cheese business is complex and full of pitfalls, Valerie warns, and newcomers need to be flexible. "Don't be single-minded. Look around and see what other people are doing, so you can change if you need to," she said.

Valerie recommends that, to avoid financial risk, farmers not invest in processing equipment while learning cheese marketing. Do not base investments on plans to immediately sell large quantities of cheese at relatively high prices.

"Don't tie up all your capital in one place. You need to expect the possibility of failure, but learn to fail cheaply," Valerie said.

Farmers must also find a balance between doing too much and too little with a marketing enterprise. Wisconsin Dairy Graziers Cooperative members all operate farms and are raising families, and thus do not have the time to handle packaging, distribution, and sales efforts. At the same time, Valerie said she learned the hard way that farmers should not turn all tasks over to another party.

"The amount of cheese you sell is almost directly related to the amount of push the farmer puts into it," Valerie she. She has found that in selling cheese, having a good-tasting product is just as important as proven health benefits. "We have found that people like the taste of our cheese, and we can charge a higher price based on that taste," she said.

CHAPTER 8: MILKING CENTER OPTIONS

For some farms, the best way to improve labor efficiency, the health of the people milking cows, and sometimes even the farm's profitability and value, is to change the milking parlor. This can mean either building a new milking parlor or remodeling an existing building to create an upgraded milking parlor. The purpose of this section is to explore the options available for both remodeling and building new milking centers.

Because a significant investment is often required, a dairy operator must consider many factors before he or she decides to remodel a milking parlor or to build a new milking facility. A wide range of options is available, ranging from changing to low-cost swing parlors in an existing building to new construction with an automated milking system that includes individual animal ID and automatic gates. First and foremost, the dairy's current facility needs to be evaluated. Many parlors are not being used to capacity. A change of internal equipment may be all that is needed, and could reduce the costs of improving the milking system significantly.

Even if the current parlor is insufficient in terms of capacity or speed, the operator should plan and make allowances for the future of the dairy. Speaking with advisors, extension agents, engineers, and other farmers will help provide the best guidance for any farm looking for a new system that will work well both now and in the future.

Several things need to be considered as an operator plans to change the milking parlor either through a new construction or remodeling, including:

- How many people will be milking cows?
- How long should milking take?
- How will it affect the cost of milking on a per-cow basis?
- How will this parlor fit into the future of the farm?
- Will it improve cow and operator safety?
- Will cow care be part of the milking routine?
- Will employees be needed?
- Who will train employees?

Automated transponder ID systems, like the one worn by this cow, use computerized technology to feed individual rations and monitor milk production.

Finances and function

Improved milking setup can often mean improved efficiency of labor and working conditions for those milking the cows. For example, in a tie stall barn one person can milk about 25 cows in an hour. In a remodeled flat barn, even one with fewer stalls, one person can milk about 40 to 50 cows in an hour. In a double-10 parlor arrangement a person can milk around 60 cows per hour (Davis et al., n.d.; Galton and Karszes, 2001; Winsten and Petrucci, 2003).

The amount of automation included in the facility shortens the milking time. Generally speaking, it is most efficient to use the parlor as much as possible. Some economists suggest that larger dairies milk around the clock in order to maximize return to investment (Bruce Jones, personal communication, 2004). However, on some farms that may not be a desirable choice.

In a tie stall barn, one person can milk about 25 cows per hour. This increases to 40 to 50 cows per hour in a remodeled flat barn, 60 in a double-10 parlor, and as many as 100 per hour in a double-16 parlor.

Bankers, engineers, and consultants frequently suggest that the budget for the parlor be no more than 20 percent of a farm's annual gross milk sales. Costs can be significantly reduced if a farm remodels an existing structure, which eliminates a portion of the construction costs. For example, a new swing parlor can cost about $6,000 per milking unit, whereas remodeled parlors can cost $1,500–$3,000 per milking unit (Kammel, 1999; Vance Haugen, personal communication, 2004).

Reducing costs

Whether building a new parlor or remodeling an existing building, costs can be reduced in many ways:

- Simplifying design
- Incorporating existing infrastructure
- Reusing equipment and the milk house from the previous facility
- Investing sweat equity

A dairy can spend $20,000 per stall for a new double-8 parlor if working with a private dealer. The cost can be reduced dramatically by consulting an extension specialist with expertise in milking center design.

Remodeling

For dairies currently using a tie stall setup, the existing building can be recycled to provide an updated milking system that reduces the time per cow and reduces the physical strain on the milker. Remodeling also keeps the cost of an improved system low. Milking units, pipelines, bulk tanks, vacuum pumps, and the refrigeration system can all be taken from the old system and incorporated into a new or redesigned parlor. Costs can also be minimized by seeking and incorporating used equipment from other operations that are updating their own facilities or are liquidating. Grazier and Wisconsin county extension agent Vance Haugen encourages producers to plan carefully and think big, saying that after four or more years, many farmers end up regretting that they hadn't build a bigger parlor (Haugen, 2005).

In January, February, and March, 2005, *Graze* ran a series of articles by grazier and Crawford County Wisconsin Extension Agriculture Agent Vance Haugen offering practical tips about retrofitting parlors. Back issues of *Graze* are available at www.grazeonline.com.

Swing parlors are a popular option for a tie-stall barn renovation to a milking center. The tie stalls are removed and concrete is jackhammered for the construction of a pit where the cow alley was located, at the end of the barn nearest the milk room. The far end of the stable may be used for a holding area. The parlor is called swing because the milking equipment is located over the center of the pit and is moved from side to side as groups of cows enter to be milked and leave milking stalls on either side of the pit. Stall configurations are described under "Parallel" on the next page. Swinging the equipment reduces equipment investment with some loss of milking speed.

Rick Adamski and Valerie Dantoin (profiled in Chapter 7) reduced milking time and effort by building a New Zealand-style swing parlor at a cost of about $70,000.

A modified flat barn is a low cost option when remodeling a tie stall barn. This arrangement allows for cows to be milked in headgates at floor level or step up onto a platform where extra concrete has been poured; however, this plan doesn't eliminate stooping. Cows enter headfirst and back out of the milking stall. It may be possible for them to exit through the stall, if space is available and supplemental feed is provided at another location. The milking process is faster than carrying milking units from cow to cow, as is typical in a traditional pipeline system; the cows come to the milker rather than the milker being moved to the cows. Much of the existing tie stall equipment can be reused in a flat barn, and the arrangement allows for incorporation of many of the technologies that speed milking (Reinemann et al., n.d.). However, concrete usually needs to be poured for any kind of remodeled parlor and milker safety may be greatly improved by creating a pit parlor (Haugen, 2001).

The space inside any remodeled barn needs to be divided into a holding area and a milking area. If a producer is skilled in welding or carpentry, he or she may be able to build stalls for the cost of materials. Investing sweat equity can further reduce the overall out-of-pocket costs for a remodeled parlor. Sweat equity invested in the remodeling process, along with simplified design of the planned parlor, can keep the cost low (Kammel, 1999). Haugen advises paying special attention to pit depth, kick and rump rail heights, sturdiness, heat, lighting, slope, and wiring (Haugen, 2005).

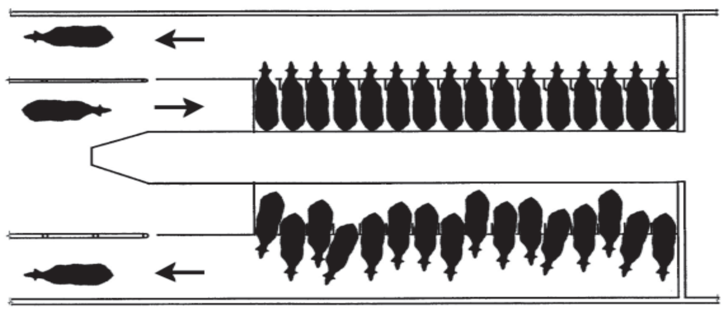
New construction

Location also needs to be considered, especially in the context of expansion that occurs in stages. The milking facility should be reasonably close to any cow housing that might be built in the future. This must be considered before any remodeling can be done.

Parlor styles

Parallel

For large herds, operators may opt for the parallel milking arrangement. The cows enter headfirst and stand side by side. This setup forces the first animal to walk all the way through to the furthest stall, and the others follow. The milking equipment is attached from behind the cow and all stalls have to be filled before the cow can be milked. The milker usually stands in a pit, with the cows perpendicular to the length of the pit.



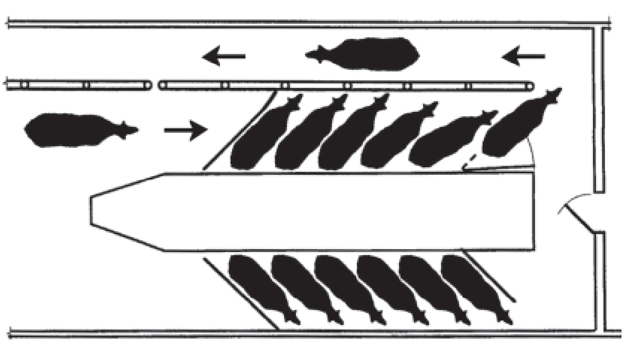
A parallel parlor decreases the distance between cows, which stand at a 90 degree angle facing away from the milker.

This style reduces the physical size of the parlor, and means less walking distance for the person milking to move from cow to cow. When parlors become large, the advantage of the parallel becomes more pronounced (Reinemann, 2003). The main advantage is that cows can exit the milking area rapidly. The main disadvantage is that the slowest cow in a set determines the milking rate of the entire group (Dennis Johnson, personal communication, 2005).

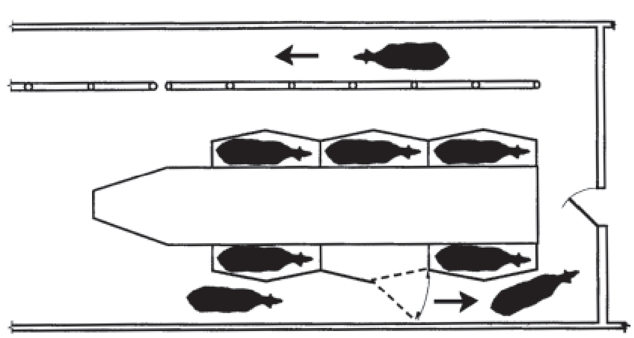
The parabone is a hybrid stall, with cows parked at about 70 degrees to the operator's area. There is little or no separation between the cows, and a minimal amount of steel provides breast rail, rump, and kick rails. Although cows stand at an angle, rather than perpendicular to the milker, the milking is still done from the rear of the cow. The advantage to this parlor is that it requires less exit space and therefore a smaller building (Kammel, 1999).

Herringbone and side-opening

In a herringbone setup, stalls are slanted at an angle of 45 degrees, allowing a side view of the udder and side access to attach milking equipment. In side-opening systems, the cows stand parallel to the milker. Some milkers who have previously been in a tie stall barn prefer these milking systems because they feel it provides them with a better view of the cow. Often, farms use this system if they plan to continue some individual cow management as part of their milking routine (Reinemann, 2003). Herringbone and side-opening systems were popular in the 1970s and 1980s and many are still in use. However, they have been largely replaced by the parallel and parabone styles, which can accommodate more cows per running foot of pit (Dennis Johnson, personal communication, 2005).



In a herringbone setup, the milking machine is attached from the side of the cow. In a parabone setup, the milking machine is attached from between the hind legs.

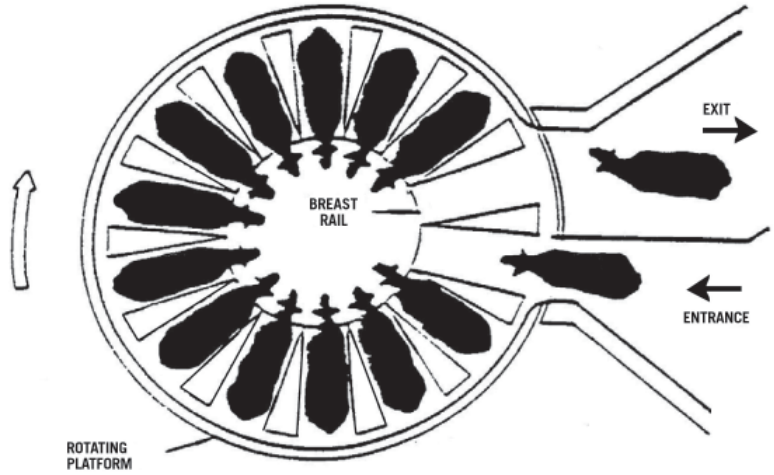


In a side-opening parlor, the cows stand parallel to the milker.

Parlor drawings from *Milking Parlor Types* used with permission from Douglas J. Reinemann and adapted by Amy Pressnall.

Rotary

In a rotary parlor, each cow steps onto a carousel and travels in a circle, usually facing inward, as she is milked. This system typically requires more labor. One worker performs pre-milking udder preparation and attaches the milking unit. Generally, automatic detachers take the milking unit off. Another worker does a post-milking dip treatment. The initial cost of a rotary unit is greater than the other parlor types and the units are not expandable. There are currently a few of these systems operating in the Midwest.

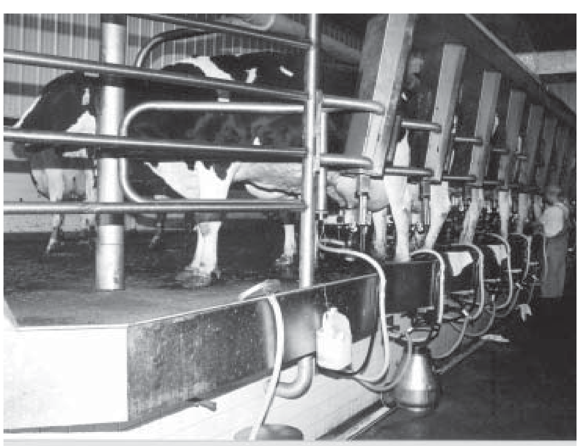


In a rotary parlor setup, cows stand on a rotating platform, usually facing inward, are milked as they travel around, and step off after traveling once around the circle.

Technology and labor efficiency

A number of technologies can enhance the speed of the milking system or improve herd management. Many of these can be retrofitted into an existing barn:

- Graziers sometimes feed grain or other supplements to the cow during milking.
- Milk meters allow dairy producers to track the productivity of each individual cow. These can be used with an auto identification system that reads the ear tag of each cow and stores production records.
- Automatic detachers can increase the speed of milking. They can shave about 10.2 to 15.6 seconds per cow from the milking time (Stewart et al., 2002).
- Holding area crowd gates encourage cows in the waiting area to move into the milking stations, reducing parlor loading time. Often the crowd gate is used in conjunction with a bell that trains the animals to move forward as cows leave after milking. These systems can range widely in price. Retrofitting a remodeled or existing parlor with automatic walk-through stall is very difficult (David Kammel, personal communication, 2004).



This fully-automated double-16 herringbone parlor can milk about 100 cows an hour.

In designing your parlor, be sure to consider regulatory requirements for sanitation — whether you are going to clean your equipment in place or are going to carry milking machines to the milk house for washing.

Also be sure to consider adequate lighting and cow flow during the planning stages of any remodeling or new construction. Cows used to being milked in another setting will take some time to adjust to the new parlor. Often, producers choose to allow the cow to explore the space on her own, in order to become accustomed to it. Some spread some manure to reduce the strangeness of the odors associated with new construction. Above all, the cow should be encouraged, rather than forced, into the new parlor. Whenever there is a dramatic change in the milking center, a training period is required for both the cows and the milkers.

Conclusion

As you consider remodeling or constructing a new parlor for your operation, you should visit farms that have the parlor types you are considering and talk to the producers and milkers who use them. Standing in the pit or next to the cow in a step-up parlor will give you the best impression of how a new milking center design would work for you and your operation.

TABLE 13: ***Capital start-up investment estimates for milking centers***

REMODELED SWING PARLOR	**$1,600 – 6,500 per milking stall**
NEW SWING PARLOR	**$15,000 – 20,000 per milking stall (including building, concrete, plumbing, electrical)**
CROWD GATES	**$3,000 – 20,000 each**
MILK METERS	**$1,000 or more per stall**
AUTOMATIC TAKEOFFS	**$800 – 1,000 per stall**

Sources: Chastain, 2000; Kammel, 1999; Kammel, 2001

If you are considering adding or changing a facility, see the *Resources* section at the end of this book.

Resource people

The following people contributed information for this chapter. You will find complete contact information in the *Resources* section the end of this book.

William Bickert, professor (Department of Biosystems and Agricultural Engineering), Michigan State University

Vance Haugen, grazier and county agent, University of Wisconsin Extension

Brian Holmes, professor (biological systems engineering) and extension specialist, University of Wisconsin

Kevin Janni, professor and extension engineer — livestock housing systems, University of Minnesota

Dennis Johnson, professor and dairy specialist, University of Minnesota

Bruce Jones, professor and farm management specialist, University of Wisconsin-Madison

David W. Kammel, professor and extension specialist, University of Wisconsin

Doug Reinemann, professor (milking machine and rural energy issues), University of Wisconsin

CHAPTER 9: ENTRY AND EXIT STRATEGIES

A person can't milk cows forever. And new dairy farmers have to come from somewhere. Farm transition is a complex process because it has both financial and emotional impacts. Senior farmers are not just transferring property — the dairy farm is also their home, their life's work, their income, their retirement fund, and a potential tax liability (Chuck Schwartau, personal communication, 2004). While neither the beginner nor senior farmer may have prior experience in a farm transition, both need to be aware of the deep-seated needs and emotions that come with the deal. When the transfer is not merely a quick-and-dirty sale, there is usually a trial period or extended time when the senior farmer observes the skills and commitment of the new farmer. This period also tests the willingness of the retiring generation to let go.

Beginners have more options than just inheriting a farm. In fact, a survey of Wisconsin dairy farmers showed that 88 percent of the respondents came from farm backgrounds, but only 20 percent took over their parents' farms (Barham et al., 2001). Several states have linking programs to connect these prospective and current farmers for purchase, lease, or jobs. Once a link is established, strategies for farm entry or exit can include the following:

- purchase/sale
- lease
- work-in arrangements
- sharemilking
- ag school

A farmer who is ready to retire must consider how to create a revenue stream that will serve as a pension or retirement income once he or she leaves farming. Sometimes, land rental or partial herd ownership can provide income. In other situations, farm assets may be sold. Such sales can take place directly or in installments. Accountants can help farmers understand tax implications for sales and gifts. Sometimes, farmers opt for piecemeal sales, in which they sell a percentage of the farm, or a certain number of cows or heifers, to the next generation a few at a time.

Outright sale/purchase of a farm is the quickest for the landowner and the hardest for the beginner. The landowner gets his money and gets to walk away from the farm completely. He also has to shoulder the risk of payment default and may have substantial capital-gains or income taxes to contend with.

The beginner has to come up with the cash to purchase the property. Few beginners can access the credit necessary both to buy property/livestock/equipment and to finance operating expenses (some financial advisors tell beginners to pick just one: own land or be a working farmer). High debt increases the risk of a bad year causing the collapse of the entire farm, and lenders are apt to constrain a leveraged beginner's management choices in order to protect the loan. Some programs are available to help with purchases, however, such as USDA's Farm Service Agency (FSA) Beginning Farmer farm ownership or farm operating loans. Several states have "aggie bond" programs that provide tax cuts for landowners selling to beginners.

Leasing/renting provides an alternative to buying to get control of land or livestock. The landowner retains ownership and has less risk for overall default, while finding fewer tax headaches. The beginner has a relatively smaller investment in starting up, and can sometimes rent the farm, livestock, and facilities in entirety. The lease describes the property to be used and the management responsibilities of each party, which can effectively remove the landowner from all management decisions, but only for a limited time. Financing from FSA may be available, as leases are farm operating expenses. Some states (like Nebraska) have tax credit programs to encourage renting to beginners.

Martin Kleinschmit and Wyatt Fraas of the Center for Rural Affairs contributed substantial portions of this chapter.

Work-in arrangements allow a controlled process for a beginner to buy into an existing farm while learning from the senior farmer. Beginners often start by working for the landowner and trade an increasing amount of their labor for ownership of farm assets. The landowner accesses the beginner's labor, and both learn about each other over an extended time.

Building equity in livestock is a key first step, perhaps through buying heifers, milking cows, or a portion of the calf crop. Concentrating ownership in income-generating assets allows the beginner's equity to grow as quickly as possible while limiting cash expenses, taxes, depreciation, or replacement costs.

In this process, the new farmer may eventually pay rent on land and facilities to the landowner and own a separate herd. In some cases, the two share labor, machinery, and buildings. Working together requires a very positive relationship between the beginning farmer and the existing farmer/owner. Many people in these relationships find that listing expectations in written form is beneficial (some examples are at www.cfra.org/issues/linking_strategies.htm and at www.farmprofitability.org/pracstrat.htm). Developing trust between the experienced farmer and the learning farmer is critical.

Sharemilking, which has long been used in New Zealand, is a type of work-in plan. This allows farmers who are exiting the dairy industry a way to recapture income from the facilities and the herd when there are no heirs who want to farm. In this arrangement, the farm owner shares a percentage of the milk check in exchange for the commitment of labor from a beginning dairy farmer. The beginners also usually take a portion of their pay as heifer calves, thus gradually increasing their equity in the farm (Stevenson et al., 1999).

This kind of cooperative work agreement allows for the increase of skills and knowledge along with a growing herd. Sharemilkers gain management skills, economic incentives, and can build equity over time without having to finance the purchase of land, livestock, machinery, and other assets simultaneously. Owners can benefit from secure strategies that reduce their workload, enable them to begin retirement gradually, or help them exit dairy farming (Tranel, 1996).

Well-designed, equitable agreements benefit both parties. According to dairy specialist Larry Tranel, "an ideal share lease agreement has two main objectives: 1) attaining the maximum economic efficiency in resource use, and 2) allocating the returns between owner and sharemilker based on their respective contributions (Tranel, 1996).

Most often, the sharemilker receives 20 to 30 percent of the farm's income for labor invested in the farm. If the time comes that the sharemilker owns most, or all, of the herd, the income from milking is usually shared equally.

At this point, the two farmers can decide if a formal partnership or corporation would benefit them. This can continue to transfer assets to the beginner and can be an estate-planning tool for the retiring farmer. Farmers often seek help in these arrangements from attorneys or accountants who specialize in estate planning. In addition, corporations sometimes prove easy to start and difficult to dissolve, so new and exiting farmers should seek legal guidance and proceed with caution.

Agricultural schools are another way to develop farming skills. For example, the Wisconsin School for Beginning Dairy Farmers at the University of Wisconsin teaches farm management skills and helps new farmers develop a support network. In Minnesota and other states, the Farm Beginnings business-planning course offers intensive instruction in goal setting, finances, and marketing alternatives. Many community and technical colleges also offer practical animal science, farm management, and dairy courses. Many schools have internship plans with nearby farms. In addition, lenders and prospective senior-farmer-partners often look favorably on technical farm training when interviewing a beginner.

USDA census data show that while dairy farm numbers are falling rapidly, the average age of dairy farmers is younger than that of farmers in general. It appears that many dairy farmers may be choosing to quit milking but continue farming. Beginners can address the reasons for "milking burnout" in designing their own dairy operation. For example, while individual farmers don't control the milk price, cooperatives do negotiate more successfully for better prices or hauling fees. And adding value to milk through strategies like making farm-processed butter or cheese, or producing organic milk, can result in higher prices. Renovating older facilities rather than building new construction can save a lot of cash, along with saving a lot of physical wear and tear on the operator (see Chapter 8, *Milking Center Options*) (Vance Haugen, personal communication, 2004).

Success often depends on the level of passion and commitment on the part of any new farmer. Those who are determined to become dairy producers generally find the means to do so.

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FARM INCOME WORKSHEET

This worksheet can help you make some cash flow projections about new systems you may be considering and compare them with your current setup.

ITEM	CURRENT SYSTEM $/COW	PROJECTED NEW SYSTEM $/COW
Farm cash income		
Milk sales		
Cull cow sales		
Calf sales		
Crop sales		
Other income		
Total cash income		
Farm cash expenses		
Veterinary medicine		
Dairy supplies		
Breeding fees		
Feed purchased		
Repairs		
Seed/chemicals/fertilizer		
Fuel/gas/oil		
Utilities		
Interest paid		
Labor hired		
Rent, lease and hire		
Property taxes		
Farm insurance		
Other cash expense		
Total cash expense		
NET CASH INCOME		

To calculate net cash income, subtract total cash expense from total cash income.

Derived with permission from Dairy Trans 4.0 Dairy Total Return Analysis System, Larry Tranel, author (Tranel, 2002).

TAKE STOCK OF RESOURCES AND GOALS: PART 2

Now that you've considered the many production options — and combinations of options — that exist, consider how these match with the values, skills, and goals you identified at the beginning of this book.

How comfortable are you with different types of risk? *(Mark with an X.)*

	COMFORTABLE	CAN TOLERATE	NOT COMFORTABLE
Carrying a lot of debt			
Being highly leveraged			
Needing to push my buildings and animals to ensure profitability			
Investing in expensive milking equipment			
Exposing my animals to extreme weather conditions			
Having limited market access for my type of operation			

How would you like to be viewed by your neighbors and community?
(Check all that apply.)

- ❑ Don't care
- ❑ As a leader
- ❑ As a steward of the land
- ❑ As a model, progressive dairy producer
- ❑ As an innovator who uses the latest, most up-to-date technology
- ❑ As a family farmer
- ❑ As a good community member
- ❑ As a successful business owner
- ❑ As an efficient business owner
- ❑ As a large business owner
- ❑ As having a close working relationship with my community

Which issues are of concern to your community and might impact your choice of a dairy production system? *(Check all that apply.)*

- ❑ Odor
- ❑ Environmental stewardship
- ❑ The farm is near housing development/urban sprawl
- ❑ Livestock concentration issues
- ❑ Dust
- ❑ Unsightly buildings
- ❑ Water quality/runoff
- ❑ Flies
- ❑ Hiring labor/purchasing equipment from outside the local area

How do the various systems fit your interests and preferences?

Rank the following with a score of 1 to 3 where 1 = no, 2 = somewhat, and 3 = yes

	TIE STALL	FREE STALL	PASTURE	ORGANIC	HEIFER	VALUE-ADDED
Require the kind of work you find satisfying?						
Meet your definition of success?						
Fit with the location of your farm?						
Make best use of buildings/ land you have?						
Address community concerns?						
Suit your risk tolerance best?						
Would meet your income requirements?						
Fit with your reason for staying in/getting into dairying?						
Best use your family's strengths and resources?						
Match your vision for your farm's future?						

What land resources are available to you?

TOTAL ACRES OWNED/		TILLABLE		PASTURE		OTHER	

How do the various systems fit existing farm resources?

Rank the following with a score of 1 to 3 where 1 = no, 2 = somewhat, and 3 = yes

	TIE STALL	FREE STALL	PASTURE	ORGANIC	HEIFER	VALUE-ADDED
Land						
Buildings						
Equipment						
Parlor						
Equity						
Cows						

Begin to describe your vision for your farm and business 5, 10, or 20 years into the future.

Are there family members interested in joining the business? Who?

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Wisconsin Dairy Artisan Website:
www.wisconsindairyartisan.com/why.html

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CROPP Cooperative
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www.organicvalley.com

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www.aec.msu.edu/product/index/htm

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SELECTED RESOURCES, GROUPS AND PUBLICATIONS

— ARRANGED BY TOPIC —

• General Information • Adding or Upgrading Facilities or Processing Units • • Entry/Exit Strategies • Grazing • Heifer Production • Milking Center Options • • Manure, Feedlot, and Wastewater Management • Organic Production

GENERAL INFORMATION

Forage storage cost calculation spreadsheet
Available online: www.uwex.edu/ces/crops/uwforage/CSTFORST-5-1-03.XLS
Creator: Brian J. Holmes
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Dairy Initiatives Newsletter
Available online:
www.ansci.umn.edu/dairy/di.htm
Editor, Jeffrey K. Reneau
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Extension Dairy Web Pages:
Michigan: www.canr.msu.edu/msue_thumb/pages/dairy_team/dairy_mgmt.htm
Minnesota: www.extension.umn.edu/dairy
Wisconsin: www.uwex.edu/ces/ag/teams/dairy

FINBIN – A farm financial and production database that summarizes actual farm data from thousands of agricultural producers who use FINPACK, a comprehensive farm financial planning and analysis software system developed and supported by the University of Minneosta Center for Farm Financial Management. You can create free benchmark reports to compare the production and economic performance of various dairy systems — including tie stall, free stall, and grazing — at the FINBIN web site:
www.finbin.umn.edu/

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mmpa@mnmilk.org
www.mnmilk.org

Michigan Milk Producers Association
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41310 Bridge Street
P.O. Box 8002
Novi, MI 48376-8002
(248) 474-6672
www.mimilk.com

Professional Dairy Producers of Wisconsin
P.O. Box 2
Fox Lake, WI 53933-0002
(800) 947-7379
mail@pdpw.org
www.pdpw.org

Wisconsin Milk Marketing Board, Inc.
8418 Excelsior Drive
Madison, WI 53717
(608) 836-8820
feedback@wmmb.org
www.wisdairy.com

ADDING OR UPGRADING FACILITIES OR PROCESSING UNITS

Michigan Department of Agriculture
Sue Esser, Food and Dairy Division
P.O. Box 30017
525 West Allegan Street
Lansing, MI 48933
(800) 292-3939
www.michigan.gov/mda

ADDING OR UPGRADING FACILITIES OR PROCESSING UNITS (cont.)

Michigan Department of Environmental Quality
Constitution Hall
525 West Allegan Street
P.O. Box 30473
Lansing, MI 48909-7973
www.michigan.gov/deq
Land and Water Management: (517) 373-1170
Waste and Hazardous Materials: (517) 335-2690

Minnesota Department of Agriculture
625 N. Robert Street
St. Paul, MN 55155
(651) 201-6000
(800) 967-2474
www.mda.state.mn.us
Dairy, Food, and Meat Inspection Division, (651) 201-6027
Meg Moynihan, Organic and Diversification Specialist, (651) 201-6616
David Weinand, Project Consultant, (651) 201-6646
Curt Zimmerman, Livestock Development Specialist, (651) 201-6456

Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155
(800) 657-3864
www.pca.state.mn.us
Representatives differ by county

Wisconsin Department of Agriculture, Trade and Consumer Protection
P.O. Box 8911
Madison, WI 53708
http://datcp.state.wi.us
Jim Cisler, agricultural innovation counselor, (608) 224-5137
Carl Rainey, grant/funding information, (608) 224-5139
Farm Center Helpline, (800) 942-2474

Wisconsin Department of Natural Resources
Terry Donovan, Water Resources Engineer
101 South Webster Street
P.O. Box 7921
Madison, WI 53707-7921
(608) 267-2340
http://dnr.wi.gov

ENTRY/EXIT STRATEGIES

Beginning Farmer and Rancher Opportunities
A web page from the Center for Rural Affairs
www.cfra.org/issues/beginning.htm

Sharemilking in the Midwest — Sharemilking considerations for dairy farmers.
By Larry F. Tranel. 1996. Bulletin A3670. Cooperative Extension Publications and University of Wisconsin Madison, WI. Available to order or free online at: http://cecommerce.uwex.edu (select “Agriculture” then “Farm Financial Management”) or call (608) 262-3346

Wisconsin School for Beginning Dairy Farmers
Center for Integrated Agricultural Systems
University of Wisconsin–Madison
1535 Observatory Drive
Madison, WI 53706
(608) 265-6437 or (608) 588-2836
www.cias.wisc.edu/dairysch.html

GRAZING

American Grassfed Association
P.O. Box 400
Kiowa, CO 80117
(877) 774-7277
www.americangrassfed.org

ATTRA—National Center for Appropriate Technology
A sustainable and organic agriculture information service that offers free information resources—bulletins, fact sheets, etc.
P.O. Box 3657
Fayetteville, AR 72702
(800) 346-9140
www.attra.ncat.org

GRAZING (cont.)

Forage Resources
University of Wisconsin Extension Forage Resources
www.uwrf.edu/grazing/

Graze (a monthly publication)
P.O. Box 48
Belleville, WI 53508
(608) 455-3311
www.grazeonline.com

Grazing and Fencing Information Links
www.ibiblio.org/farming-connection/grazing/home.htm

Grazing Systems Planning Guide
by Kevin Blanchet, Howard Moechnig, and Jodi DeJong-Hughes. 2005. BU-07606. University of Minnesota Extension Service, St. Paul, MN. Available to order or free online at: www.extension.umn.edu/distribution/livestocksystems/DI7606.html or call (800) 876-8636.

Pastures for Profit: A Guide to Rotational Grazing
By Dan Undersander, Beth Albert, Dennis Cosgrove, Dennis Johnson, and Paul Peterson. 2002. Bulletin A3529. University of Wisconsin, Madison, WI. Available to order or free online at: http://cecommerce.uwex.edu or call (608) 262-3346.

The Stockman Grass Farmer (monthly).
P.O. Box 2300
Ridgeland, MS 39157-9911
(800) 748-9808
http://stockmangrassfarmer.com/sgf

Grass Productivity
by Andre Voisin. 1989. Island Press. Covelo, CA.

Sustainable Farming Association of Minnesota
Publishes the quarterly *CornerPost* newsletter
29731 302 Street
Starbuck, MN 56381
(866) 760-8732
www.sfa-mn.org

USDA Natural Resources Conservation Service (NRCS). Staff members provide technical assistance for planning grazing systems. This agency also offers cost share programs that defray the costs of fencing and watering systems. Contact the NRCS at your county USDA Service Center. www.nrcs.usda.gov

Wisconsin School for Beginning Dairy Farmers
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University of Wisconsin–Madison
1535 Observatory Drive
Madison, WI 53706
(608) 265-6437 or (608) 588-2836
www.cias.wisc.edu/dairysch.html

HEIFER PRODUCTION

Professional Dairy Heifer Growers Association
801 Shakespeare, Box 497
Stratford, IA 50249
(877) 434-3377
www.pdhga.org

MILKING CENTER OPTIONS

Milking Parlors web page of the University of Wisconsin Research and Instruction Laboratory offers reports, plans, reviews, and calculators for planning parlor building or remodeling.
At www.uwex.edu/uwmril Click on "Milking Parlors."

MANURE, FEEDLOT, AND WASTEWATER MANAGEMENT

Environmental Protection Agency National Agriculture Compliance Assistance Center
901 North 5th Street
Kansas City, KS 66101
(888) 663-2155
www.epa.gov/agriculture/

Frequently Asked Questions about Anaerobic Manure Digestion for Livestock Operations
Minnesota Department of Agriculture, Available at:
www.mda.state.mn.us/renewable/waste/faqs.htm

MANURE, FEEDLOT, AND WASTEWATER MANAGEMENT (cont.)

Michigan Agriculture Environmental Assurance Program
A working committee that includes agricultural interest groups, agencies, commodity organizations, environmental groups, and producers
(517) 241-4730
www.maeap.org

Michigan Department of Environmental Quality
525 W. Allegan Street
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www.michigan.gov/deq

Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155-4194
(800) 657-3864
Feedlot hotline: (877) 333-3508
County feedlot officers are located throughout the state
www.pca.state.mn.us/hot/feedlots.html

ORGANIC PRODUCTION

Midwest Organic and Sustainable Education Services
P.O. Box 339
Spring Valley, WI 54767
(715) 772-3153
www.mosesorganic.org

Midwest Organic Dairy Producers Alliance
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Prescott, WI 54021
(715) 262-5879

Bob Mueller
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Melrose, MN 56352
(320) 256-7337

Minnesota Department of Agriculture Organic Web Page
www.mda.state.mn.us/esap/organic

National Organic Program
USDA-AMS-TMP-NOP
Room 4008–South Building
1400 Independence Avenue SW
Washington, DC 20250-0020
(202) 720-3252
www.ams.usda.gov/nop

National Organic Standards Board
A body, appointed by the Secretary of Agriculture, that develops standards for substances used in organic production and handling and that advises the Secretary on implementing the National Organic Program.
www.ams.usda.gov/NOSB

Northeast Organic Dairy Producers Alliance
c/o NOFA—VT
P.O. Box 697
Richmond, VT 05477
www.organicmilk.org

Organic Dairy Production. By Jody Padgham. Orang-utan Press. Gays Mills, WI. Available by calling (715) 772-3153

The Organic Decision: Transitioning to Organic Dairy Production
Cornell University Department of Applied Economics and Management
305 Warren Hall
Ithaca, NY 14853-7801
(607) 254-7412 or (800) 547-3276
fsb1@cornell.edu

Organic Livestock Production Workbook and ***Organic Livestock Documentation Forms***
ATTRA Publication—National Center for Appropriate Technology
P.O. Box 3657
Fayetteville, AR 72702
(800) 346-9140
www.attra.ncat.org

Transitioning to Organic
by Kathy Arnold. Northeast Organic Dairy Producers Alliance. Richmond, VT. Available at:
www.organicmilk.org/transitioning.html

GLOSSARY

Alley – A walking area for cattle within a barn (such as a loafing alley, feeding alley) or cross alley (walkway) from a barn to the milking parlor.

Alley scraper – A V-shaped mechanical blade that is dragged over an alley by chain or cable to pull manure to a collection channel at the end of the alley (or possibly the center of the barn). The blade then collapses and is drawn back to the opposite end of the alley.

Antibiotic – A metabolic product of one microorganism or a chemical that in low concentrations is detrimental to activities of specific other microorganisms. Examples include penicillin, tetracycline, and streptomycin. Not effective against viruses. Antibiotics kill microorganisms that cause mastitis or other infectious disease.

Automatic detacher or Automatic take-off – A device for sensing the end of milk flow in the milking machine. It shuts off the milking vacuum and releases the milking machine from the cow's udder.

Barn cleaner – Usually a chain-linked system of paddles that moves manure from gutters, up a chute, into a waiting manure spreader. Most often seen in tie stall or stanchion barns.

Bedded pack – Open housing in a barn commonly used in conjunction with an outside feeding area.

Bedding – Material used to absorb moisture and provide cushion. A clean, dry surface reduces the incidence of mastitis. Possible bedding materials include: straw, sawdust, wood chips, sand, ground limestone, separated manure solids, shredded newspaper, corn stalks, bark, peanut hulls, sunflower hulls, and rice hulls.

Biosecurity – Any of a broad range of practices enforced at a dairy farm to prevent transmittal of pathogens from other sources by feed, cattle, people, or other animals.

Bull – A sexually mature, uncastrated bovine male.

Bulk tank – A refrigerated, stainless steel vessel in which milk is cooled quickly to 2º to 4º C (35º to 39º F) and stored until collected by a truck for shipping to the milk plant.

Bunk – A feed trough or feeding station for cattle.

Bunker silo – A flat rectangular structure with concrete floors and walls used to ensile and store forages.

Calf – A young male or female bovine. Usually referred to as calves until reaching sexual maturity.

Colostrum – First milk following calving. High in fat, protein, and immunoglobulins that may be directly absorbed by the newborn calf in its first 24 hours of life.

Cow – A mature female bovine. Usually referring to any dairy females that have borne a calf. Some may consider females having given birth only once as "first-calf heifers" until they have a second calf.

Crowd gate – A motorized or manual gate at the end of the holding pen that may be moved forward to guide cows toward the entrance to the milking parlor.

Cull – To remove a cow from the herd. Culling reasons include voluntary culling of cows for low milk production, or involuntary culling of cows for reasons of health or injury.

Dairy cow – A bovine whose milk production is intended for human consumption, or that is kept for raising replacement dairy heifers.

Distillers dried grains – feed (containing protein, fiber, vitamins and minerals) that is a byproduct of the dry-mill ethanol production process.

Direct Microscopic Somatic Cell Count (DMSCC)
Microscopic count of the actual number of somatic cells in milk. This system is used to check and verify electronic cell count machines used in DHI laboratories.

Dock – To remove a cow's tail. This practice may keep cows' udders cleaner.

Dry cow – A cow that is not lactating or secreting milk because it has completed a lactation period following calving.

Dry lot – An open lot that may be covered with concrete, but that has no vegetative cover.

Equipment sanitization – The removal of microorganisms and fat, protein, and mineral residues in milking equipment through use of water, heat, and chemicals.

Flat barn – An area for milking cattle where the person milking is on the same level as the cow. May be used with a pipeline or bucket milking system. Generally the same area is used for cow housing.

Flush system – A manure removal system in which an area is cleaned by high volumes of fresh water, or gray water that is recycled from a manure pit or lagoon.

Food and Drug Administration (FDA) – An agency of the U.S. Government responsible for the safety of the human food supply.

Forage – Feedstuffs composed primarily of the whole plant, including stems and leaves.

Forestripping – Expressing streams of milk from the teat prior to machine milking to determine visual quality and to stimulate milk letdown.

Free stalls – Resting cubicles or "beds" that dairy cows are free to enter and leave, as opposed to being confined in stanchions or pens.

Fresh cow – A cow that has recently given birth to a calf.

Greenhouse barn – A hoop-type barn consisting of a translucent or plastic cover over a tubular steel frame.

Gutter – A shallow to deep channel located behind cows in tie stall barns to capture manure and urine.

Hay – Dried feed consisting of the entire plant. Alfalfa, clover, grass, and oat hay may be used in dairy rations.

Headlocks – Self-locking stanchions along a feed alley that cows voluntarily enter when going to eat. Cows may be held until herd health work is completed, and released simultaneously. Headlocks may also be adjusted to remain open, allowing cows to come and go at will, when restraining the cows is not necessary.

Heifer – A bovine female less than three years of age who has not borne a calf. Young cows with their first calves are often called first-calf heifers.

Herringbone parlor – A milking parlor in which cows stand side by side, angled toward the pit. This allows milking from the side of the udder.

Holding pen – An area in which cows congregate prior to entering a milking parlor to be milked.

Hutch – An individual housing unit for young calves. Often made of white fiberglass or polyvinyl.

Immunity – The power an animal has to resist and/or overcome an infection to which most of its species are susceptible. Active immunity is due to the presence of antibodies formed by an animal in response to previous exposure to the disease or through live or modified-live vaccines. Passive immunity is produced by giving the animal preformed or synthetic antibodies as with killed vaccines.

Lagoon – An earthen pond used as a primary storage site for manure.

Legume – Any of thousands of plant species that have seed pods that split along both sides when ripe. Legumes have a unique ability to obtain much or all of their nitrogen requirements from symbiotic nitrogen fixation.

Loose housing – Facilities that allow cattle access to a large, open bedded area for resting (also known as free housing). Loose housing should provide at least 200 ft^2 per animal for feeding and resting (free stall housing uses only 90 ft^2 per animal).

Mastitis – An inflammation of the mammary gland (or glands), usually caused by bacteria.

Mattress – Bedding material compacted to 3 to 4 inches and sandwiched in a heavyweight polypropolene or other fabric. Possible fillers include long or chopped straw, poor quality hay, sawdust, shavings, rice hulls, and shredded rubber.

Milk house – The area near a milking parlor where the bulk milk tank, cleaning units, and equipment are located.

Milk house waste – Water that has been used in cleaning the milking equipment and washing the parlor.

Milking pit – A sunken area that houses both the milker and some milking equipment during milking. A pit places the milker at shoulder level with udders and reduces physical demands.

Mycoplasma – An organism capable of causing mastitis.

Paddocks – Subdivision of a pasture designed to provide short-duration grazing followed by an appropriate (related to species, soil type, and weather conditions) rest period for regrowth and stand maintenance.

Parallel parlor– A raised milking area or platform where the cow stands perpendicular to the operator and milking units are attached between the rear legs. This may also be referred to as a "side-by-side."

Parlor – The specialized area on the dairy farm where milking is performed. Parlors come in many types: flat barn, herringbone, parallel, and rotary.

Pasture – Plants, such as grass, harvested by grazing animals. Also serves as a place to feed cattle and other livestock.

Pathogen – Any microorganism that produces disease (bacteria, viruses, yeasts, molds, and parasites).

Pipeline – A stainless steel or glass pipe used for transporting milk.

Pit – A contained unit usually with concrete walls in which liquid or semi-liquid manure is stored.

rBST – Recombinant bovine somatotropin — also called bovine growth hormone (BGH). A synthetically produced growth hormone that stimulates milk production. Sold under the trade name Posilac®.

Replacement heifers – Heifers that are raised to replace the cows currently in the herd.

Rotary parlor – A raised, round rotating platform or carousel on which cows ride while being milked.

Sand separator – A mechanical device used to settle sand from sand-laden manure.

Silage – Chopped green forage (grass, legumes, field corn, etc.) that is stored in a structure or container designed to exclude air. The material then undergoes fermentation, retarding spoilage. Silage has a water content of between 60 and 80 percent.

Silage bags – Large plastic tubes in which forages are stored and fermented. Plastic is removed and discarded as the ensiled feed is fed.

Silo – A storage facility for silage. Usually refers to upright concrete or fiberglass structures.

Slotted floor – A concrete floor design in which slats are positioned in the floor so that cows work manure through the slats and into a pit beneath the floor of the barn.

Somatic cell count (SCC) – The number of white blood cells per milliliter of milk, a measurement of the number of somatic cells present in a sample of milk. A high concentration of more than 500,000 somatic cells per milliliter of milk indicates abnormal condition in the udder. Elevation above 200,000 is an indication of mastitis.

Somatic cells – The combination of the leukocytes (white blood cells) from blood and the epithelial cells from the secretory tissue of the udder which indicate the presence of infection or injury in the animal.

Springing heifer – A heifer within 2–3 months of her due date for calving.

Stall – A cubicle that houses a cow.

Stanchion – A device consisting of two rails that close around a cow's neck after she enters a stall and keep her restrained there.

Step-up parlor – Cows step onto raised platforms for milking. The milking units are attached from the side.

Sterile – Clean, free of any living organisms. Also means unable to reproduce.

Superhutches – Calf housing structures, often open on one side, designed for a small number of calves when first grouped immediately after weaning.

Swing parlor – Parlor that has the milking units positioned in the middle of the parlor for use by cows on both sides.

Tie stall parlor – This kind of facility is frequently used for both housing and milking. Cows are tied and milked with the cow and operator on the same level.

Total mixed ration (TMR) – Feed mixtures that has been formulated to meet requirements of the cow. All of the ingredients are blended together in a mixer.

Source: *Derived from Purdue University Animal Science Department's glossary*

MINNESOTA DEPARTMENT OF
AGRICULTURE
FROM THE FARM TO YOUR FAMILY

MISA
Minnesota Institute for Sustainable Agriculture

North Central Region
SARE