

Your Dairy In Transition

Ag. Eng. 123SR942
A.R.M.E. E.B. 94-19
Animal Science Mimeo #177



A Planning Process for Considering Dairy Farm Expansion




***Developed by
Faculty and Staff***



**Cornell
Cooperative
Extension**



Workbooks in this series include:

-  Your Farm and the Industry
-  A Planning Process for Considering Dairy Farm Expansion
-  Winding Down Your Farm Operation

For Additional copies of Your Dairy in Transition Workbooks contact:

Cornell University
Media Services
Resource Center
Building 7
Business and Technology Park
Ithaca, NY 14853

Phone: (607) 255-2080

Fax: (607) 255 9946

Electronic Mail: dist_center@cce.cornell.edu

Cornell Cooperative Extension provides equal program and employment opportunities. No person shall be denied admission to any educational program or activity or be denied employment on the basis of any legally prohibited discrimination involving, but not limited to such factors as race, color, creed, religion, national or ethnic origin, sex, age or handicap. NYS College of Agriculture and Life Sciences, NYS College of Human Ecology, and NYS College of Veterinary Medicine at Cornell University, Cooperative Extension associations, county governing bodies, and U.S. Department of Agriculture, cooperating.

The information given herein is for education purposes only. References to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by Cornell Cooperative Extension is implied.

Your Dairy in Transition...

A Planning Process for Considering Dairy Farm Expansion

**Developed by
Cornell Cooperative Extension
Faculty and Staff**

Your Dairy in Transition

This series of workbooks has been developed to assist dairy farm operators with making decisions relative to the future of their farm businesses. An interdisciplinary group of Cornell Cooperative Extension faculty, specialists and agents worked together to develop these publications. The team that developed "A Planning Process for Considering Dairy Farm Expansion" include:

Your Dairy in Transition Co-Chairmen

Carl A. Crispell, Area Specialist - Farm Business Management, Chemung, Cortland, Tioga, Tompkins, and Schuyler Counties

Joan Sinclair Petzen, Business Management Agent, Cattaraugus County

"Your Farm and the Industry" Contributing Authors

George L. Casler, Professor, Department of Agricultural, Resource, and Managerial Economics

Jerome H. Cherney, Associate Professor, Department of Soils, Crops and Atmospheric Sciences, Cornell University.

Anita W. Deming, Agricultural Program Leader, Essex County

Stephen M. Emanuele, Area Specialist, Pro-DAIRY Program

Robert W. Everett, Professor, Department of Animal Science

Stephen E. Hadcock, Farm Business Management Agent, Columbia County

Stuart D. Klausner, Senior Extension Associate, Department of Soils, Crops and Atmospheric Sciences

Wayne A. Knoblauch, Professor, Department of Agricultural, Resource, and Managerial Economics

Gerald A. LeClair, Farm Business Management Agent, Broome and Chenango Counties

Thomas R. Maloney, Extension Associate, Department of Agricultural, Resource, and Managerial Economics

William Menzi, Jr., Area Specialist - Dairy, Chemung, Cortland, Tioga, Tompkins and Schuyler Counties

Robert A. Milligan, Professor, Department of Agricultural, Resource, and Managerial Economics

Alice N. Pell, Associate Professor, Department of Animal Science

Christine A. Rossiter, DVM, Extension Associate III, New York State Veterinary Diagnostic Laboratory

Kurt A. Ruppel, Dairy Agent, Washington County

Michael L. Stratton, Area Specialist - Farm Business Management, Genesee, Livingston, Monroe, Niagara, Ontario, Orleans, Seneca, Wayne and Yates Counties

Judith L. Wright, Field Crops Agent, Cayuga County

Acknowledgement

Special to **Bonnie Moore**, Agriculture and Life Sciences Secretary, Cattaraugus County, for the layout and design of these workbooks.

Additional Your Dairy in Transition Workbooks

"A Planning Process for Considering Dairy Farm Expansion"

"Winding Down Your Farm Operation"

Your Dairy in Transition

Table of Contents

A Planning Process for Considering Dairy Farm Expansion

Chapter 1. Business Planning	1
Business Planning	1
Why Do Business Planning?	2
Who Should Do Business Planning?	2
Steps to Business Planning	2
Develop Consensus for the Plan	6
Evaluate Your Present Business	7
Characteristics of Successful Managers	7
Chapter 2. Development Of Business Personnel and Organizational Structure	9
Role of the Manager	10
More Time Managing	10
Increased Importance of Interpersonal Relationships	12
Involving and Rewarding People	12
Become More of a Team Leader	13
Business Success and Personal Satisfaction	13
Organizational Structure	13
Formality of Staffing	15
Recruitment	17
Selection	17
Compensation	18
Training	19
Performance Management	20
Agricultural Employer's Checklist	21
Chapter 3. Facilities Decisions for Dairy Farms in Transition	25
Decisions	25
Farmstead Planning	26
Components and Costs	27
Decisions for Dairy Manure Handling	40
Alternatives for Manure Storage and Handling and Reducing Problems	40
Chapter 4. Putting Together the Financial Plan for Expansion	45
Balance Sheet	45
Income Statement	49
What's the Best Method Financially to Reach Goal?	55
Where can I get funding	56
Using a debt source - What are the lenders requirements?	56
What should you look for in a loan?	59
Chapter 5. Soils, Crops and Cows	60
Soil and Crop Resources	60
Predicting Cows' Needs	61
Rotation Planning	62
Rotational Grazing	63
Managing Forage Quality	64
Expanding Herd Size: Land Factor	65
Expanding Herd Size: Animal Factors	66

Where Are the Cows Coming From?	67
Health Considerations When Purchasing Cattle	67
Purchasing Heifers	71
Expanding Your Herd from Within	72
Review Your Current Situation Prior to Expansion	72
Chapter 6. Managing Risks Related To Herd Size Expansion	76
Sources of Risk	76
Your Attitude Toward Risk	77
Dairy Expansion Risks	77
Chapter 7. Expansion Strategy	84



Worksheet Listing

Worksheet 1-1.	Decision making grid	5
Worksheet 1-2.	Quick dairy evaluation	6
Worksheet 2-1.	Management self analysis quiz	9
Worksheet 2-2.	Accomplishments/Frustrations	11
Worksheet 2-3.	Your view of farm employees.	11
Worksheet 2-4.	Team leader	13
Worksheet 2-5.	Organizational chart questionnaire	14
Worksheet 2-6.	Organizational chart after expansion	16
Worksheet 3-1.	Factors to consider in farmstead planning	27
Worksheet 3-2.	Estimating costs for housing the milking herd	28
Worksheet 3-3.	Estimating cost of dry cow facilities	29
Worksheet 3-4.	Estimating cost of heifer facilities	30
Worksheet 3-5.	Estimating cost for milking center	33
Worksheet 3-6.	Amount of forage to be stored	35
Worksheet 3-7.	Bunker silo dimensions	36
Worksheet 3-8.	Bunker silo feedout rate	37
Worksheet 3-9.	Cost of forage storage	38
Worksheet 3-10.	Sizing mixer for total mixed ration	39
Worksheet 3-11.	Estimating size and cost of commodity storage	40
Worksheet 3-12.	Estimating costs for manure handling components	42
Worksheet 3-13.	Summary of facilities costs	44
Worksheet 4-1.	Summary of proposed change	46
Worksheet 4-2.	Current balance sheet and net worth analysis	47
Worksheet 4-3.	Projected balance sheet and net worth analysis after proposed change	48
Worksheet 4-4.	Estimating expenses	51
Worksheet 4-5.	Estimating receipts and profitability factors calculations.	52
Worksheet 4-6.	Farm repayment ability.	53
Worksheet 4-7.	Summary of financial worksheets.	54
Worksheet 4-8.	Planning the transition achieve to proposed change	57
Worksheet 5-1.	Estimated yearly feed needs vs. feed produced.	61
Worksheet 5-2.	Calculate the Ratios of Corn Silage and Haycrop Dry Matter Consumed to Total Forage Dry Matter Consumed for all Cattle on a Dairy Farm.	62
Worksheet 5-3.	Production factor goals	73
Worksheet 5-4.	Water Worksheet	74
Worksheet 6-1.	Willingness to take risks with a dairy expansion	83



Table Listing

Table 1-1.	Steps to planning business expansion	3
Table 3-1.	Total number of heifers needed (all ages) 100 cow herd	31
Table 3-2.	Performance of herringbone and parallel milking parlors by size, type of exit, and number of workers.	32
Table 3-3.	Capital cost of herringbone and parallel parlors, by size, type of exit and equipment.	34
Table 5-1.	A first approximation of animal density guidelines for dairy farms	66
Table 5-2.	Diseases purchased cows may bring to your herd	67
Table 5-3.	Strategies to control or manage introduced diseases	67
Table 5-4.	Feedlot respiratory disease incidence	69
Table 5-5.	Monitoring for early recognition and treatment of disease	69
Table 5-6.	Plan ahead to minimize introduced diseases and losses	70
Table 5-7.	Guidelines for Forage Evaluation and Allocation on Your Farm	73
Table 5-8.	Water Requirement of Dairy Cows	74



Figure Listing

Figure 5-1.	Reducing disease risk during expansion	68
-------------	--	----



Chapter 1. Business Planning

Herd expansions and other major business adjustments are a common event for many dairy farm managers. Decisions regarding facilities are all the more difficult because of the cost to build or remodel, and the fact that we must live with the consequences of our decisions for a long time. We tend to take the easy way out when changes are necessary. We choose a solution which solves the immediate problem instead of long-range planning and goal setting which should be part of the process.

The major movement toward larger dairy herds occurred in the 1980s. In 1982, dairy farms with 100 or more cows comprised 6.1% of all dairy farms in the United States. By 1991, farms with over 100 cows had increased to 11.5% of the total dairy farms nationally. During the same 10-year period, cow numbers on these farms increased from 34.7% to 45.4% of the total dairy herd. Now, nearly half of the nation's dairy cows are in herds of 100 cows or more. Expansion allowed producers to capitalize on the economies of scale needed to survive the depressed prices of the 1980s. Expanded herd size, coupled with production efficiency, labor efficiency, and continuing emergence of new capital-intensive technology resulted in increased production and profits for many producers. Such technology (e.g., improved parlors, feeding, and waste handling systems), once adopted, may not be fully utilized. However, herd expansion will spread fixed costs (including depreciation, interest, and property taxes) over more units of milk production and consequently have lower-per unit costs.

Expansion has not always resulted in higher income. Many farmers have experienced financial difficulty as a result of expansion. In some cases, the timing has been unfortunate in that profit margins fell due to unanticipated

rising costs, falling milk prices, and/or declining cow productivity. Others found that they were unable to cope with the labor and management challenges associated with a larger business. Some used debt that was excessive, overpriced, and/or inappropriately structured.

Effective planning can contribute to improved decision making about whether to expand or make other major adjustments in the business. Although profitability and cash flow are highly correlated, acceptable performance for one does not necessarily imply the same for the other. Thus, there is a need to analyze both. One should determine if the profits of the expanded business will generate sufficient cash receipts to meet its cash obligations in a timely manner without disrupting the operation. Cash flow analysis will determine if funds are available to pay operating expenses, income and Social Security taxes, retire debt, replace depreciable assets, maintain a contingency reserve, and provide for an acceptable living standard.

Business Planning

Business planning involves analyzing the business and environment as it is in order to create a master plan for taking the farm business to where management wants it to be in three to five years. Strategy refers to seeing the big picture with a vision for the forces that will shape the future. On the other hand, a tactical plan is for the short-run day-to-day, week-to-week decisions to attain shorter-run objectives.

The content of a business plan can vary considerably; however, such plans will usually contain the following common elements:

1. Mission statement - a summary of why the business exists based on personal

values of the owners. The mission also describes what products or services the business will market and their purposes.

2. Objectives and goals - statements of what the business wishes to accomplish in areas such as growth, profitability, volume of production, and cost control.
3. Alternative strategies - plans of action that can be taken to enable attainment of the specified goals.
4. Criteria to evaluate selected strategy.

Why Do Business Planning?

The purpose of business planning is to place the firm at a competitive advantage in the future. Specific reasons for doing business planning include:

- * Establish a clear direction for management and employees to follow.
- * Define in measurable terms what is most important for the firm.
- * Anticipate the future and take steps to profit from the situation.
- * Allocate resources more efficiently-- labor, equipment, buildings, and capital.
- * Establish a basis for evaluating performance of management and key employees.
- * Provide a management framework which can be used to facilitate quick response to changed conditions, unplanned events, and deviations from plans.

Who Should Do Business Planning?

Planning should be done by the operators/managers of the business. In some cases, this process can involve a hired manager,

but most of the time the operator and other members of the family involved with management should be involved in the planning. Business planning with typically close-knit farm families cannot be done in isolation from other family members, particularly when goals are set for the business. In such operations, business and family considerations are often so interwoven that it becomes artificial to try to separate the two.

Steps to Business Planning

Business planning involves seven steps, as discussed below:

Step 1. Define the mission of the farm business.

The mission statement defines the purposes of the business and answers the question, "What business or businesses are we in?" Defining the mission forces the operator/manager to carefully identify the products, enterprises, and/or services. This statement answers questions such as:

- What type of commodities to produce?
- Where are the markets?
- What, if any, other activities are we involved in and what are the priorities of these activities?
- Why are we in business?
 - For profits?
 - To provide employment/security for other family members?
 - To increase wealth?
 - To gain community status?

An example of a mission statement might be:

"To operate a profitable dairy farm business to support an adequate level of living for two families. Objectives are to build net worth, gainfully employ two full-time family members, provide a good environment to raise children, allow each worker suitable time off to enjoy family life, community activities, and hobbies. Provide for the transfer of the farm to the next generation, and provide adequate

retirement income to the owners."

If you have not completed the mission statement worksheet in Your Dairy in Transition ... Your Farm and the Industry, Chapter 3 of this series you might want to return to that section to develop a mission for your farm.

Table 1-1. Steps to planning business expansion

- | | |
|---|---|
| 1. Generate ideas | 12. Evaluate current industry and economic climate. |
| 2. Establish a mission statement of what the business is to accomplish. | 13. Budget and evaluate alternative strategies. |
| 3. Build consensus and unity of purpose within the family | 14. Obtain good water with adequate supply. |
| 4. Analyze and evaluate the different assumptions that each person is making. | 15. Make a site plan. |
| 5. Tour farms that have expanded, ask question, observe. | 16. Establish an acceptable profit goal for family living and capital investment. |
| 6. Identify expansion projects with potential for acceptable financial performance. | 17. Establish a growth period timetable. |
| 7. Analyze financial and production records to identify strengths and weaknesses of present business. | 18. Develop a long range farmstead facility layout plan. |
| 8. Share your ideas and records with outside advisors and seek their input. | 19. Obtain building plans. |
| 9. Prepare financial budgets for completed expansion as well as transitional period. | 20. Prepare business plan. |
| 10. Conduct sensitivity analysis and break even analyses on projected budgets. | 21. Analyze estate plan and business arrangement, make necessary changes. |
| 11. Consult with local planning boards for building codes, restrictions, etc. | 22. Search for and select contractors. |
| | 23. Begin construction. |

Objectives are general, observable directions for the farm business clarifying the mission. Examples might include increasing milk production or reducing labor. Goals then translate the objectives into concrete terms. Goals will be quantifiable and simple, straightforward statements such as the following: increase sales by 30% over the next five years; reduce labor costs by 25% next year; provide health insurance coverage for family employees. Goals should be chosen so that contribute to attainment of the objectives and mission.

Step 3. Assess the external environment.

Every business faces uncertainties beyond its control. Market forces may cause prices to fluctuate either in the long-run or short-run. Large crops, declining consumer demand, inflation, deflation, interest rates, changing government policies, and regulation of labor and pesticides are examples of external threats that make operating a business more difficult. On the other hand, new market opportunities are created with demographic changes, changes in consumer lifestyle, by population growth, and by technological breakthroughs.

It is important that the operator be informed about the economic, social, and technological forces that will impact the business, and to be able to form reasonable expectations about how different forces might affect the dairy industry; i.e., prices, interest rates, inflation rates, labor markets, and input prices. Expectations and information about the external environment can then be used to identify opportunities and threats to the business during the time period under consideration.

Step 4. Assess the present strengths and weaknesses.

The quality and quantity of resources within the operator's control is the first part of this assessment. What are the abilities and limitations of the operator? What skills and abilities do the employees have? How modern and efficient is/are the facilities? Is the resource base large enough? What are the soils on the farm? What is the cash position of the business? The process of providing accurate answers to these questions forces the operator to recognize that every business is constrained in some way by the internal environment--the physical and human resources that are available. Your Farm and the Industry, another publication in the series provides worksheets for evaluating the resources and past performance of your business. Chapter 2 describes the current industry situation and trends.

Step 5. Identify opportunities and threats.

Combine the data gathered in steps 3 and 4 to determine what problems and opportunities the business might encounter in the planning period.

Step 6. Develop and evaluate alternative strategies.

At this point the manager(s) develop alternative plans that describe the methods for attaining objectives and gaining competitive advantage.

What ways do production agriculture businesses have to gain a competitive advantage? The answer depends on whether the business is a "price-setter" or "price-taker." Dairy farms are traditionally price-takers. The individual business has little or no market power to influence the product price due to many producers and a homogeneous product. In this type of competition buyers can obtain the commodity at a price dictated by supply and

demand considerations. Consequently, high-cost production businesses or regions are at a distinct disadvantage.

Here are some strategy alternatives that an operator in a price-taking business can employ to attain a competitive advantage.

1. Become more efficient. Increase profits by:
 - a. Reducing input use while holding output constant.
 - b. Use more or higher quality inputs for increased output. (Value of additional output must exceed added costs of inputs.)
2. Establish alternative enterprises.
3. Horizontal integration - farm more units, expand, gain more complete use of existing resources, acquire additional resources.
4. Vertical integration - obtain more profit by moving higher or lower into the marketing and distribution channels.
5. Reduce risks through diversification of products produced and by hedging products on the futures market.
6. Find new markets.

Once alternatives are developed they must be evaluated. In practice, management may come up with a long list of possible alternatives. These usually can be "whittled down" by reasoning and logic. Once the obvious losers are eliminated, each remaining alternative should be budgeted for profitability, cash flow, break-even analysis, and investment analysis. Chapter 4 has detailed worksheets for completing these analyses.

Step 7. Select strategy.

Worksheet 1-1. Decision making grid

Ratings:

3 -- Good rating for criterion

2 -- Fair rating for criterion

1 -- Poor rating for criterion

Problem: _____

	Alternatives					
Rating Criteria						
(Totals)						
Ranking (order 1-6)						

Now it is time to select your strategy (an alternative or combination of alternatives) that will enable you to achieve the desired objectives. The final strategy may involve trade-offs, since one alternative is seldom likely to be superior over other alternatives for attaining each of the business objectives. In this sense, the process of business planning should be recognized as more an art than a science.

A decision-making grid, similar to the one pictured, is a tool to use in the selection process. The grid offers a formal method to compare alternative strategies with criteria that the owners/operators have developed and that strive toward their goals or objectives. Examples of criteria might be: low cost, less labor, easy to accomplish, fast results, more time off, enable new business arrangement, and/or enough land base.

Develop Consensus for the Plan

It is critical that agreement exists among the owners and operators that a larger operation is a desirable objective. A sizable expansion will probably mean increased personal stress, increased risk, and increased management responsibilities. Are you and your partners

willing to accept these challenges? If not, no amount of planning and analysis will assure a successful expansion program.

There should be consensus toward what the expansion is to accomplish; the objectives to be achieved. As stated earlier, you should develop a mission statement for your farm before any expansion begins. Identify the long-range objectives of the family business and the purpose of the expansion.

Worksheet 1-2. Quick dairy evaluation

Is your...

- _____ Herd average 18,000# per cow or higher?
- _____ Real net worth (after taxes) at least 50%?
- _____ Debt per cow \$2000 or less?
- _____ Milk produced per worker 600,000# or more?
- _____ Assets per cow less than \$6000?
- _____ Average age of first calving 25 months or less?
- _____ Average breeding cycle 13 months or less?
- _____ Involuntary culling less than 50% of culling rate?
- _____ (If appropriate) Milking parlor used at least 20 hrs/day?
- _____ Parlor throughput 50 cows per worker per hour?

Do you..

- _____ Prefer to manage people than rather milk cows?
- _____ Have the skills to effectively motivate people?
- _____ Enjoy analyzing records?
- _____ Have a positive attitude towards the dairy industry?
- _____ Enjoy the challenge of doing all the little things right all the time?

There are many reasons farm families choose to operate a dairy farm business as a career. For some it is the opportunity to work with cows. Others enjoy the field work. The way of life is usually a priority for many. All considered, the mission listed on a majority of farms is to generate an adequate living for the farm family, the next generation (if it's appropriate), and other staff. Why would someone expand if the mission is presently being met? Obviously, the mission has changed and some of the common reasons include:

1. To bring in a new partner or family member.
2. The desire for additional profits.
3. To change cattle housing and/or milking systems.
4. The challenge.
5. To keep up with the neighbors.
6. To keep pace with the industry.
7. To increase efficiencies.
8. To create jobs.
9. As an investment.
10. The desire for more free time.
11. Rebuilding after a casualty.

There is a need for the managers to agree on the purpose of the expansion and it is important to discuss these objectives with other members

of the team, be they employees, spouses, or children. Open communication will enable the team to more effectively strive toward the same objectives and identify projects with potential for acceptable financial performance.

Evaluate Your Present Business

A wise old economist once said that "one should to get better before getting bigger." Before any major expansion occurs it is recommended that the business be devoid of major business weaknesses. Pre-expansion problems often turn into post expansion crises. Benchmarks to consider for a profitable business expansion are listed in Worksheet 1-3.

Each benchmark is not equally weighted but it should be noted that the more "yes" answers you have, the higher the likelihood of a successful expansion.

Characteristics of Successful Managers

Six characteristics possessed by successful managers of large farms are:

1. The ability to manage people delegate responsibilities, and communicate; don't get bogged down in doing daily tasks.
2. The ability to make investments that can pay for themselves in 5-7 years, 10 years maximum. Even barns are being financed now for 10 years or less.
3. The ability to carefully monitor the business.
4. The ability to be organized with mission, objectives, goals, to do lists, and staff conferences. Larger farms cannot withstand disorganization.
5. The willingness to surround yourself with trusted people, share your information, and utilize a management team approach.

6. Charisma--the type of personality that people want to work and be associated with.

Summary

Business planning is the key to a successful expansion. Studying proposed business alternatives on paper offers the manager the opportunity to evaluate different methods without the investment risk. The operator needs to visit other farms that have expanded to view facilities and talk to personnel to learn the operations and communications systems. A notebook to take written notes and a good calculator for financial budgeting are two worthwhile investments.

Finally, evaluate yourself. Do you have the desire and fortitude to manage a large farm business? Would you rather milk cows and drive a tractor, or manage people and analyze records? You don't manage a fast food restaurant if your main interest is flipping hamburgers. A successful manager must concentrate on the big picture and establish the direction of the business.

References and Additional Information:

"Using Strategies Planning to Prepare for the Future", 1989 Yearbook of Agriculture, Farm Management -- How to Achieve Your Farm Business Goals, Gerald B. White, Agricultural, Resource, and Managerial Economics, Cornell University, Ithaca, NY.

"What the Wives Say About Expansion", Lorraine Stuart Merrill, Hoard's Dairyman, May 10, 1993, p. 412

"Look Ahead, Not Back", Robert E. Graves, Department of Agricultural and Biological Engineering, Penn State University, Agricultural News, Steuben County, N.Y., July 1993, Volume 74, No. 7.

"Financial Planning for Expansion and Other Major Adjustments", Gayle S. Willett, Professor, Extension Agronomist, Washington State University. Western Large Herd Management Conference, Las Vegas, Nevada, April 1993.

"Where Do You Want to be Tomorrow?". William G. Bickert, Professor, Agricultural Engineering, Michigan State University, East Lansing, Hoard's Dairyman, March 25, 1993, p. 253.

"For Large Herds...What it Takes to Survive and Profit", article on material prepared by Don R. Rogers, Farm Business Consultant, Farm Credit, Springfield Region, Hoard's Dairyman, April 10, 1993, p. 303.

Material presented by Gary Snyder, Farm Credit, Western New York, at a Cornell Cooperative Extension seminar on dairy farm expansion.

Chapter 2. Development Of Business Personnel and Organizational Structure

In this section we consider business personnel, their training, and responsibilities, and roles, and the organizational structure of the business. Business personnel include family members and business employees.

The following management self-analysis quiz is designed to assist you in assessing your attitudes toward and interest in the changes that are likely to result from a dairy farm business expansion. These questions and their answers are only for you. Answer them honestly and without thought of what answer the authors are

looking for. Your first reaction is probably your best answer.

The answers of "false" to any of these questions reflects attitudes that are consistent with a fairly small business with few people and with the manager primarily involved with the cows and the crops. The answer of "true" to these questions is more reflective of attitudes, values, and interests that would be important in a larger business where the manager is involved primarily with management, people, decisions, and to a lesser extent with the actual labor

Worksheet 2-1. Management self analysis quiz

- | | | |
|---|---|--|
| T | F | I enjoy making decisions, training employees and analyzing financial records more than milking cows and operating farm equipment. |
| T | F | I enjoy and gain satisfaction from interacting with employees and agribusiness personnel more than working with cows and machinery. |
| T | F | I believe the growth and development of the people in my business and the structure of the business are at least as important as the growth and improvement of the dairy herd. |
| T | F | I believe that people are the most important asset of my business. |
| T | F | I take great personal satisfaction from observing the accomplishments of business personnel resulting from my efforts to train and develop them. |
| T | F | I am willing to encourage business personnel to accept new responsibilities as part of their growth and development. |
| T | F | I have the patience required to explain new tasks to business personnel instead of just telling them to do it. |
| T | F | I view change as a challenge and look forward to managing the business to accommodate change. |

TOTAL (count number of each circled) T_____ F_____

activities involved with cows and crops. If you answered "true" genuinely to most or all of these questions, you have a very high probability of gaining satisfaction in the type of management position that you will find with a major expansion. If you answered "false" to many, or all of these questions, you should carefully examine the issues raised in these questions. It may be necessary for you to change your outlook on the business as well as your work activities. Be certain that you will be happy in a position that requires far more management and less labor than your current position in the business, or be willing to delegate significant responsibilities to someone else.

In this section on personnel and organizational structure, we look at three of the many issues that need to be considered in an expansion decision. The first section looks at the **role of the manager** in a larger business and reflects what was contained in the true false section. The second section deals with **organizational structure**; we argue that the development of the organizational structure for your expansion is every bit as important as the development of the financial plan that you will present to your lender. The final section deals with formality of staffing, with focus on the changes required when staffing a larger business.

Role of the Manager

As the physical, financial, and work force size of the business increases, the role of the manager changes. Some of the changes are:

- Increased emphasis on managing with less direct involvement in labor.
 - Increased involvement with performance of people and interpersonal relationships, with less involvement with cows and crops.
 - Greater emphasis on involving and rewarding people, telling people what to do.
 - Become more of a team leader instead of the bearer of all responsibility.
 - Business success will increasingly depend on the ability to train, coach, develop, and motivate other people.
 - Personal reward must increasingly come from the growth and accomplishments of others.
- We now discuss each change in more detail.

More Time Managing

We define management as: Determining what must be done and achieving results through the efforts of oneself and other people. Management is planning, organizing, staffing, directing, and controlling the business resources toward the accomplishment of established objectives and goals.

We also include five steps in problem solving:

1. Problem identification
2. Problem diagnosis
3. Generation of alternatives
4. Decision making
5. Tactical planning

Worksheet 2-2.

Accomplishments/Frustrations

In the spaces below list your three greatest accomplishments in the last week.

Accomplishments

Now list your three greatest frustrations.

Frustrations

Now go back to your list of accomplishments and frustrations and place an “M” after those that appear to be management oriented. Check to see that those remaining are labor oriented and place an “L” after them. If two or three of your accomplishments have an “L,” think of management oriented accomplishments and list them in the next column:

Take a few minutes and visualize your role after the expansion; you will almost certainly be spending more of your time in management oriented activities. Finally, ask yourself whether your vision of your role after the expansion is exciting or depressing.

Worksheet 2-3. In the space below, describe your view of farm employees.

[illegible]

Increased Importance of Interpersonal Relationships

Some dairy farm managers view personnel management this way:

“My success is 90% my people and 10% my physical assets.”

“I can replace cows and tractors but I could never replace my employees.”

Other farm managers have the following view of working with people:

“Those idiots that work for me could never do that.”

“I can’t hire anyone who wants to do an honest days work anymore.”

Now rate your view of farm employees on a scale of 1 to 5 with the first two statements representing a “5” and the last two representing a “1.” We would characterize the “5” as believing people are the most important asset of the business and the “1” as believing employees are a necessary evil.

The closer you are to a “5,” the more comfortable you should be with the changing role. If you did not rate yourself above a “3,” you should carefully analyze your attitudes toward employees and develop a plan to prepare yourself for your role as a manager of a larger business. The manager of a business can delegate some personnel tasks; however, satisfactory employee relationships are highly unlikely unless the manager has a positive attitude toward employees.

Involving and Rewarding People

Steven Covey, in his best selling book, The 7 Habits of Effective People, makes the point that a manager can buy an employee’s arms and back, but the manager must earn the employee’s heart and mind. As the size of the business grows, you will increasingly rely on other people to accept more responsibility and authority. Correspondingly, you will increasingly require other peoples’ hearts and minds.

To succeed in earning peoples’ hearts and minds, you will need to communicate effectively and utilize a variety of leadership styles. The secret to communication is very simple: do it. Provide feedback to your people, informally and formally praising them when you observe successes, and expressing concern when you have concerns. When communicating, be certain that you are treating whoever you are talking to with respect and remember that listening is more crucial than talking. When listening, be certain to hear what the person is saying, not what you think they are or should be saying.

Very authoritative leadership styles can be effective in gaining commitment of “arms and backs.” These styles can be characterized as telling people what to do. Gaining the commitment of “hearts and minds” requires that people be involved and feel they are an important part of the business. These additional leadership styles can be characterized as asking people. As your business grows, you will increasingly have to appropriately use a variety of leadership styles.

A vegetable grower related the experience of telling his tomato harvesting crew he would buy them pizza if they could get a 100 quality rating on a load of tomatoes. The situation is that a rating of 100 is almost never attained. But now, 100s are often attained, and the local pizza maker is very happy, as is the harvesting crew. A dairy farm manager has adopted this experience by providing pizza when a specified milking goal is exceeded.

Worksheet 2-4. Team leader

In the space below, write your thoughts concerning what makes an effective team. Think about what it takes for a sports team to succeed:

[illegible]

Become More of a Team Leader

We believe an effective team has two critical characteristics:

- All team members have a common vision of where the team is going and are committed to the common vision.
- The team capitalizes on the strengths of each of the individuals.

An effective team is not where everyone thinks alike and doesn't rock the boat . Rather, in an effective team communication is open and everyone has a role in meeting the common vision.

As your business becomes larger, your role will increasingly be a leader and developer of the team. As you consider your expansion, consider the following questions:

- Does the role of team leader excite me?
- How can I prepare to be a more effective team leader?

Business Success and Personal Satisfaction

The final two points in the list of changes in the role of the manager follow logically from the discussion to this point. They bear repeating as points for you to ponder:

- Business successes will increasingly depend on your ability to train, coach, develop, and empower other people.
- Your personal satisfaction must increasingly come from the growth and accomplishments of others.

Organizational Structure

In planning your expansion, you no doubt have carefully planned the physical layout of your facilities. You also need to carefully plan how business personnel relate to each other and who has what responsibility and authority. This planning is referred to as developing the organizational structure of the business.

The basis of developing the organizational structure is the organizational chart. To initiate this discussion, you should now complete the Organizational Chart Questionnaire (Worksheet 2-5) as you think things will be after the expansion.

The answers to the questions on the Organizational Chart Questionnaire (Worksheet 2-5) provide the information needed to complete part of the organizational chart for your business. Worksheet 2-6 is the skeleton of an organization chart.

Answer these question as you think things will be after expansion

1. List all individuals who will have an input into decisions regarding the future direction of the farm business.
2. Who will have the final say and/or greatest input into decisions regarding the future direction of the farm business?
3. Who will be in charge of the day to day operation of the farm business?
Who will make the day to day financial decisions?
4. Will there be other members of the management team responsible for specific enterprises or components of the farm business? Who and which enterprise?

The chief executive officer (CEO) of a major corporation does not have complete authority. In fact, he or she reports to a board of directors that holds the ultimate responsibility for the direction of the business. Similarly, in a farm business several people, often family members, have a say in the direction of the dairy farm business. Your answer to the first question is the board of directors for your farm business and should be entered in the organizational chart. Further, your answer to question 2 should be entered as the chairperson of the board of directors.

A business needs someone to be in charge of the day-to-day operation of the farm business based on the directions and policies of the board of directors. In a partnership, it is best to designate one partner as the general manager; of course, all partners are on the board of directors. Your answer to question 3 is the general manager. Some partnerships operate successfully without identifying a general manager; to be successful, the board of directors must be very active and responsibilities must be very clearly outlined.

The answer to the final question defines the operations managers in the organizational chart. These individuals have the responsibility for segments of the business--herd manager, crops manager, business manager, etc.

Completion of the organizational chart requires a determination of the numbers and types of positions that will be required in each part of the business and thereby supervised by the general and operations managers. You should now work toward completing the organizational chart.

You also need to define each position. General and operations managers identify the responsibilities and authorities of each position. Ultimately, this determination should be agreed to by the board of directors. Job descriptions should be developed for all of positions.

Many expansions fail or do not reach their potential because the positions are not effectively organized for the larger business size. Careful planning of the organizational structure of the expanded business will increase the probability of success and ease the transition to the new larger business.

Formality of Staffing

Small business research has shown that as businesses grow in size require more employees, there is a strong tendency to adopt more formalized staffing practices. When the business is small requiring only a few or no employees, the owner-operator can usually assume most personnel management functions without great difficulty. When the business grows and the number of employees increases, the owner-operator can no longer handle all the staffing functions informally on a daily basis. Consequently, procedures must be set up to provide consistency in dealing with personnel to ensure that staffing functions are carried out properly.

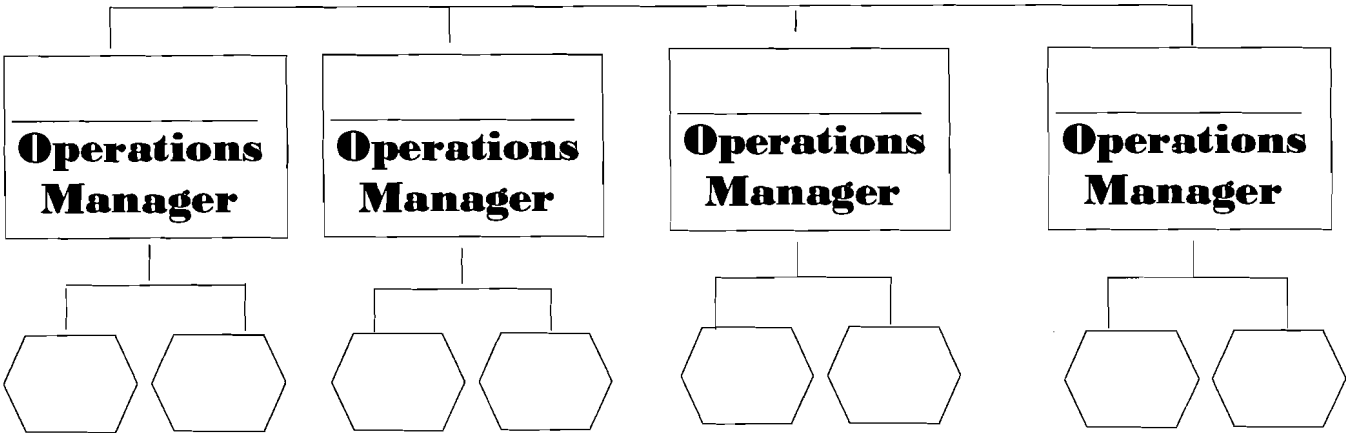
The process of staffing includes the functions of recruiting, selection, compensation, training, and performance management. As you consider expansion of the dairy farm business, it is important to consider how these staffing functions will change between the current business and the projected new business. The following section defines each staffing function and outlines the formal and informal aspects of each function. This section is designed to allow managers who are contemplating farm expansion to consider staffing changes that will be needed before the expansion takes place.

Worksheet 2-6. Organizational chart after expansion

Board of Directors

Chairman

General Manager



Recruitment

Recruitment is the process of attracting individuals on a timely basis in sufficient numbers and with appropriate qualifications to apply for jobs within a business. This definition implies an organized managed process of recruitment, as opposed to hiring employees on a walk-in basis. The most important concept involved in proper recruitment is that of attracting an applicant pool containing at least a few highly qualified applicants. Some of the recruitment methods used on dairy farms include: recommendations from current employees, word of mouth, want-ads, government job services, placement offices, posting job announcements, and executive search firms. The majority of farm businesses use only one or two recruitment methods. A variety of recruitment methods should be used and time should be invested so that they are utilized effectively.

Informal approach

- Use of informal interview procedures
- Tendency not to interview from a written list of questions
- Tendency not to ask each applicant same questions
- Tendency not to use application forms and skills tests
- Occasional use of reference checks

Formal approach

- Use of formal interview with written set of interview questions
- Use of application forms
- Occasional use of skills tests
- Frequent use of reference checks
- Increase in amount of selection time to ensure the best candidate is hired

Selection

Employee selection is defined as choosing from the group of applicants those individuals best suited for a particular job. Managers use a variety of selection tools including application forms, reference checks, interviews, and skills tests. Almost all dairy farmers use the job interview as a selection tool. Many use it informally and do not use the other selection tools referred to here. Selecting the right person for the job can have a payoff in job performance and ultimately the success of the business. As the business grows in size, it becomes more important to effectively use selection practices to ensure that the best possible candidate is hired.

Informal approach

- The use of word of mouth
- Use of employee referrals
- Relatively small pool of applicants
- Limited time invested in the recruiting process

Formal approach

- Increase in time spent recruiting
- Use of want ads
- College placement offices and employment services
- Well written job announcements and help wanted ads
- Increase in the number of highly qualified applicants applying for the job

Informal Approach

- Focus primarily on wages
- Limited benefits provided
- Limited time off provided
- Little use of incentives or bonuses
- Compensation not always competitive with other employers in the community

Formal Approach

- Employer determines wages of other employers in the community and attempts to provide competitive wages
- Comprehensive benefit packages tailored to the wants and needs of employees as provided
- Tendency to consider benefits such as health insurance, profit sharing, incentives and retirement plans that will encourage employee retention and productivity
- Tendency to provide more time off, flex time and paid vacation time

Compensation

The term compensation refers to the exchange of pay in return for work. Compensation includes both cash wages and a variety of benefits. The primary goal of the compensation plan is to help an employer attract, retain, and reward capable workers. To accomplish this goal, the following are necessary:

1. The compensation plan must be competitive with those of other businesses in the local labor market. Dairy farm employers in an area not only compete among themselves but with the rest of the business community as well.
2. Employees must understand the compensation policies and believe that they are being impartially administered.
3. The compensation package should help create a climate in which employees will be motivated, productive, and goal oriented.

As dairy farm businesses grow, they usually adopt more advanced technology. The skills required in the dairy farm labor force also increase. In some dairy expansions it is important to create a level of middle management. Consequently, a dairy farm expansion usually requires a more highly skilled work force. The complexity of wage and benefit packages offered are likely to increase as the business grows.

Training

Training is a planned sequence of learning experiences designed to improve employee performance and contributions to the business. Management efforts focused at employee training and development are intended to orient new employees to the job, improve employee performance in the present job, and to prepare employees for new jobs. As the level of technology and sophistication of dairy production increase, there will be a much greater need to train and retrain employees to help them more effectively meet the goals of their position and the goals of the business.

Informal approach

- Orientation is superficial if done at all
- Primary method of job training is on the job training
- Limited or no off site training of employees
- No plan for individual employee growth and development

Formal approach

- Orientation carefully planned and conducted
- Written training plan for each individual employee developed
- Off site training is encouraged
- Employer pays for appropriate training
- Employer creates a business climate which encourages individual growth and development

Performance Management

Performance management is the daily process of working towards previously established expectations, followed by a formal performance review. The traditional performance review or appraisal is part of this process. Performance management represents the following three-step process conducted under the leadership of the manager.

Step 1. Convey performance standards

Step 2. Provide regular coaching and feedback regarding employee performance

Step 3. Conduct periodic performance appraisals

Currently, a very small percentage of dairy farmers are conducting formal performance appraisals. In the absence of appraisals, the employer should help the employee set performance goals and provide the necessary coaching and feedback. As the business grows and personnel practices become more formalized, it is even more crucial that the business adopt a performance appraisal program to ensure a constructive dialogue between an employer and employees regarding their performance and the goals of the business.

Informal approach

- Performance standards conveyed verbally
- Coaching and feedback provided inconsistently
- No formal performance appraisal
- Limited employee involvement in the performance management process

Formal approach

- Written job descriptions and performance standards
- Continuous coaching and feedback
- Formal performance appraisal conducted once or twice each year
- Employee participation encouraged throughout the entire process

Agricultural Employer's Checklist

Several government agencies administer laws and regulations pertaining to the employment of farm workers. The likelihood of your farm business being inspected by one or more regulatory agencies, increases as the number of employees increase. A checklist for reviewing your compliance with labor regulation in effect in September 1993 is on the next four pages check for rule change since that time.

- 1) Assume interviewing and employee selection is completed.
 - A. You may want to review employee vs. contractor rules.
- 2) **Prior to hiring** you must have in your work place:
 - A. Employer Identification Number - Federal
 - B. Posters
 1. OSHA Job Safety and Health Protection - Federal all employers; remember, Form 200 Injury Report should be posted for the previous month.
 2. Right to Know - New York State, all employers
 3. General Work Agreement for Agriculture Employees - NYSDOL - salary ranges, regular hours, benefit policy, paid holidays, unacceptable behavior (ex. being drunk on the job), etc. You may include a variety of provisions. New York State requires wages and hours only.
 4. Worker's Compensation poster - if wages exceed \$1200/yr

5. New York State Farm Minimum Wage poster - if wages exceed \$3,000/year
6. Federal Minimum Wage poster - if 500 man days of labor are used in a calendar quarter (this is approximately 5.5 full-time equivalent in any 3 months)
7. Unemployment Insurance poster - if wages exceed \$20,000 in any calendar quarter or more than 10 employees in each of 20 weeks.
- C. Worker's Compensation Insurance if wages are over \$1200/year plus Disability for all non-agricultural, non-laborer employees
- D. Circular A - Agricultural Employers Tax Guide
- E. WT-100 New York State Withholding Tax Guide
- 3) **At hiring**, the farm employer should make a folder for each employee and include:
 - A. Their job application form with name, address, and Social Security number.
 - B. I-9 Employment Eligibility Verification.
 - C. W-4 Federal Employee Withholding Certificate.
 - D. IT-2104 New York State Employee's Withholding Allowance.
 - E. W-5 Federal Advanced Earned Income Credit (if the employee requests it).

- ___ F. Work Agreement and/or Job Description signed by both employee and employer with a copy for each.
- ___ G. Signed authorization for any deduction other than those required by law. This must be for employee's benefit and has a maximum of 10% of gross wages.
- ___ H. For Youth
 - ___ 1. Date of birth for youth employed at youth rate
 - ___ 2. Work Permit for 14- and 15-year-olds.
 - ___ 3. Certificate of Training if 14-15 years old and drives a tractor.
 - ___ 4. Youth Rate Certificate if paying youth rate minimum wage (from New York State Dept. of Labor). (If you qualify as a Federal employer then you need an additional Federal form on file.)

4) **First Day Job Training and Orientation**

- ___ A. Tell who supervisor is.
- ___ B. Show where information is kept on:
 - ___ 1. List of hazardous conditions - There are specific rules for safe handling of anhydrous ammonia, pulpwood logging, Roll Over Protective Structures (ROPS) on tractors, PTO guards in place, and safety signs and labels in place.
 - ___ 2. Location of Material Safety Data Sheets (MSDA) for all chemicals.

- ___ C. Show location of personal protective equipment required for use on the job, especially pesticides.
- ___ D. Keep a file on job training, especially as it relates to safety (when it was done, and what was taught).
- ___ E. Procedures in the event of injury or illness.
- 5) **Farm Employee Pay Issues** - be sure to include for each payroll period:
 - ___ A. Employee Wage Statements
 - 1. Name and address of employer
 - 2. Name of employee
 - 3. Rates paid
 - 4. Gross wages
 - 5. Deduction and allowances
 - 6. New wages
 - 7. Number of hours worked (even if piece rate). If piece rate, you also need number of pieces produced, piece rate paid, and size or weight of piece rate units.

- ___ B. Payroll Records
 - 1. Name and address of employee
 - 2. Social Security number
 - 3. Total hours worked daily and weekly
 - 4. Gross wages, deductions, net wages

5. Allowances claimed as a part of minimum wage

Transmittal of Income and Tax Statements - annually

6. Cash advanced

7. Wage rates

8. If piece rate, you keep record of units produced daily and weekly

4. Form 940 Employers Annual Federal Unemployment (FUTA) Tax Return if you have over 10 employees or pay more than \$20,000 in a calendar quarter

5. Keep a list for 40 years of all employees that have worked with OSHA List Part Z substances.

6) Reporting and filing requirements

A. Federal

1. Form 8109 Tax Deposit Coupon - deposit for Federal withholding and Social Security if pay more than \$150/worker, or \$2500/year in salaries combined.

- If deposits were less than \$50,000/in 1991 file by 15th of following month (An alternative for the rest of 1993 only - if your deposits are less than \$500/month, carry it over to the next month.).
- If deposits were greater than \$50,000/in 1991, file semi-weekly unless over \$100,000/eighth month, then you must file by next banking day.
- Current deposits will include: Social Security @ 6.2% each from employer and employee on wages up to \$57,000, Medicare @ 1.45% each from employer and employee on wages up to \$135,000, and any income taxes withheld.

2. Form 943 Employers Annual Tax Return for Agricultural Employees - annually

3. W-2 Wage and Tax Statements for each employee and a W-3

6. Keep records of hazardous condition and job safety training (when done, who did it, and what was taught)

B. New York State

1. Return of Tax Withheld -
- If you withhold less than \$700 in calendar quarter, then you file quarterly; use form WT-4-AEZ
 - all others file within 3 days of collecting \$700 on form WT-1

2. Form IA-5 New York State Unemployment Insurance - deposit quarterly if eligible under Federal rules

Additional Resources:

Covey, Stephen R., *The 7 Habits of Highly Effective People*.

3. Form WT-4-A Employers Quarterly Report of Wages Paid to Each Employee - no payment, but must report all wages and Social Security number to New York State quarterly

Employee Recruitment and Selection, Teaching Manual, October 1990, A.E. Ext. 90-25, Department of Agricultural, Resources, and Managerial Economics, New York State College of Agriculture and Life Sciences, A Statutory College of the State University, Cornell University, Ithaca, New York, 14853-7801.

4. Form WT-4-B gave here Report annual wage and withholding information on Form WT-4-B with the final wage reporting return of the year.

Grossman, Dale A., Henderson, Mark J., and Cosgrove, Jeremiah P., *Farm Labor Regulations, Information Bulletin 204*, a Cornell Cooperative Extension Publication.

5. Report all on-the-job injuries to Workers Compensation Board.

Maloney, Thomas R., Bratton, C. A., Embrey, Kay, Petzen, Joan S., *Human Resource Management on the Farm: A Management Letter Series*, Department of Agricultural, Resources, and Managerial Economics, New York State College of Agriculture and Life Sciences, Cornell University, Ithaca, New York 14853.

7) Termination

A. Try to get written reason for leaving. If firing then document reasons, and include in their file. Especially if you fall under Unemployment Insurance requirement

Managing Farm Personnel in the 90's, 1991 Proceeding from a conference for agricultural managers with emphasis on understanding the issues and practices involved in Managing our vital Human Resources.

B. Give employee a written summary of total gross and net earnings for the employment period and a listing of all deductions. This may be mailed.

C. Get a forwarding address for their W-2's

D. Keep all farm payroll records at least 3 years

Chapter 3. Facilities Decisions for Dairy Farms in Transition

Increasing cow numbers usually involves much more than just adding space for milking cows. Options must also be considered for additional dry cows, heifers, feed storage, and possibly manure storage facilities. Also additional equipment may be needed to up-grade feed handling, milking, and manure disposal.

This section focuses on the options one should consider when developing plans for expanded facilities. It includes information on housing types for cows, heifers, and dry cows, along with considerations for milking systems, manure and feed storage, etc.

The worksheets are helpful in developing estimates of costs for various expansion components. Costs can then be used in budget projection.

Decisions

On dairy farms the primary income comes from selling milk. After improving the milk production, improving operating efficiency, and reducing costs, one turns to improving facilities and increasing cow numbers to remain competitive and profitable. With these changes in facilities and/or management, both the risks for losses and the opportunities for profits increase. Moderate steps in growth allow easier learning adjustments, but a major change in facilities forces major changes in management. Dairies in transition are often expanding and the degree of expansion or percent increase in cow numbers is an indicator of whether a capital investment can be justified.

1. If the increase is less than 50%, add similar housing facilities.
2. If the increase is 50 to 150% and if the site and buildings are adequate, add freestalls plus feeders and switch herds for milking in a tiestall barn, or use the milking parlor longer each day.
3. If the increase is greater than 150% or if existing facilities are older than twenty years, add a new freestall barn with central drive feeding and, use an existing milking parlor to the maximum, or add a new milking center.
4. If hired labor or operator health problems make milking in tiestalls or a 'flat barn' difficult, then add an elevated milking parlor and move cows from existing housing to the new milking center.
5. If cow injuries, mastitis, and health problems cannot be corrected and are increasing due to inadequate bedding, small stalls, obsolete milking equipment, poor ventilation, etc., then remodel or replace with a new and modern dairy system.
6. If calf mortality exceeds 10%, go to calf hutches outside or under open front barns. Find careful and concerned caretakers for calves.
7. To improve the health, nutrition, and care at calving, segregate springing heifers. House dry cows in two groups in a low-stress area with spacious dry bedding, ample feed mangers, and portable calving pens. These may be adjacent to convenient treatment stalls and facilities for veterinary care.

- 8. If purchased feed costs, forage losses, time required for feeding, and repairs to feeding equipment are too high, improve feed storage and handling facilities. Consider commodity sheds and multiple horizontal silos for storage. Use face-shaving unloaders and mobile weigh and mix equipment to deliver fresh rations to flat shaded feed mangers. There is one example of modern, efficient feed-handling systems.
- 9. If the runoff of crop nutrients is excessive, or if neighbors complain about odors when spreading manure, then go to manure storage for six months and high-capacity equipment for transport and plow-down.

Together with any future partners, take time to learn about modern dairy systems and the fit, advantages, and faults of the components. Compare, discuss, and evaluate the "best" complete systems that you can find and determine where special skills are critical to success. Look for unnecessary frills, and health and safety hazards as well as simple improvements that save time and labor. Compromise with your partners and plan for the complete "ideal" system for the twenty-first century. The best today will still be good twenty years later.

Owner-operators should develop and coordinate a planning team. This team should compare and evaluate bids, expedite changes, check delivered materials, and inspect the work so that performance and expectations are met. This requires full attention during construction; a dairy manager who supervises a building project should delegate responsibility to others for cows and crops.

Farmstead Planning

Farmstead planning can lead to a successful building program if initiated prior to the investment of thousands of dollars in facilities and equipment. When completed, farmstead planning offers several benefits including: a review of the present operation; an assessment of the near future; and direction for the distant future.

Increasing efficiency, convenience, or profits are all valid objectives of farm growth. Farmstead planning should include all farm activities, and examine the "big picture." Plan not only for the near future but also for the distant future. A building in the wrong place is a lifetime mistake!

There are a number of factors that should be considered to assure successful farmstead planning. The following factors may not apply in every situation, but are common to most farmstead plans.

Worksheet 3-1. Factors to consider in farmstead planning

Directions: Check when completed or evaluated.

- _____ Is an adequate supply of potable water available?
- _____ Does the proposed farm site contain adequate surface and subsurface drainage? Will substantial site work be required to provide adequate drainage?
- _____ Are off-farm factors present, such as rural housing or urban development, which may limit the site development?
- _____ Can the facilities be oriented to achieve maximum efficiency in animal traffic, manure management, and feed storage and delivery?
- _____ Is adequate room available for driveways, access roads, snow removal, and road right-of-ways?
- _____ Is three-phase electrical power available from your power supplier?
- _____ Do the proposed buildings and sites allow for major growth in the future of the farm?
- _____ Has an agricultural waste management plan been developed for the farm site by the Soil Conservation Service (SCS)?
- _____ Can livestock and other farm buildings be located downwind of farm houses, neighbors or adjacent?
- _____ Are local planning or zoning laws in effect that will impact upon the farm plan?
- _____ Will building permits need to be obtained prior to starting the project?
- _____ Have building plans been submitted to your milk inspector for approval?

Components and Costs

The best estimates for building costs come from similar completed projects and from detailed estimates or bids from experienced builder-contractors. Building and equipment costs depend greatly on supply and demand. They vary seasonally, at different locations, and with the quantity and quality of work performed. Lower cash costs occur with homegrown lumber, used equipment, and low-cost labor. Higher costs occur with excess space and/or deluxe features. The low and high unit costs used here come from hearsay information volunteered by farmers, contractors,

and equipment suppliers, for typical, complete, contracted rural projects. These costs usually do not include grading, fill, and roads; providing potable water or electric power or final landscaping or improved parking areas. The worksheets in this chapter determine size and configuration of the facilities and equipment. Capital costs are estimated in each worksheet but quotes from local contractors or equipment suppliers will be more accurate.

1. The tiestall barn represents an insulated barn with a ventilation system, two or four rows of stalls, gutter cleaners, milking pipeline, water bowls, and can

Worksheet 3-2. Estimating costs for housing the milking herd

How many additional milking cows are you planning for?

100

What are the expected weights of cows?

1150

minimum

1300

maximum

Will stalls be tie stalls, free stalls, or other?

Freestalls

Why?

Will build new for milk cows, old facilities
will be used for dry cows and heifers

With additional housing, how many groups will there be?

2

How many stalls will there be in each group?

90

Cost Estimate*

Housing type	Cost per stall	Number of stalls	Low	High
Tie stall barn	\$1,500 to \$2,500	X _____	= _____	= _____
Free stall barn	\$ 800 to \$1,200	X <u>180</u>	= <u>144,000</u>	= <u>216,000</u>

*Place the total cost here and on line 1 of Worksheet 3-12.

include pens or box stalls, a milkroom, and manure loading shed. Usually not included: mechanical feedcarts, auxiliary summer fans, and bulk milk tanks.

- The freestall barn unit costs represent a range of barns between two row, open-front barns approximately 40 feet wide with drive-by feeding to six-row, 100 foot wide, central drive barns with automatic curtains. These are naturally ventilated with limited insulation, and paved, bedded freestalls. Costs may include self-locking headgates or automatic alley scrapers, but not slotted floors with gravity flow channels for manure or skid-steer loaders.
- The range in costs for housing of heifers and dry cows consists mainly of bedded pack or freestall housing. Low-cost

housing would usually be bedded pack

with no concrete under the pack area, and open front or outside feeding. High cost would represent freestalls, covered feed area, and possibly manure removal equipment. It should be remembered that ultimately, building costs relate to the square footage of building and concrete that are constructed. Efficient use of space per animal or stall will result in lower-cost buildings.

Worksheet 3-3. Estimating cost of dry cow facilities

How many dry cows will you have?
(you may assume 20% of the herd)

Will you need additional dry cow facilities?

If **NO** go to
next
worksheet

45
If **YES**
complete this
worksheet

How many dry cows will be housed in new facilities?

How many dry cow groups will you have?

Cost estimate

Housing type	Cost per cow	Number of cows	Low	High
Free stall and feed area	\$600 to \$1,100	_____	\$_____	\$_____
Bedded pack and feed area	\$500 to \$ 900	_____	_____	_____
Total cost*			\$_____	\$_____

* Place here and on line 2 Worksheet 3-12

Worksheet 3-4. Estimating cost of heifer facilities

What is the total number of heifers needed to provide replacements for this herd? (Actual number or estimate from Table 3-1 on the next page)

Will you need additional facilities for heifers? If **NO** go to next worksheet

140
If **YES** complete this worksheet

How many heifers will be housed in the new facility?

Number of calves on milk

Number of weaned calves up to one year of age

Number of yearlings and bred heifers

Cost estimate

Animal type	Cost per animal	Number of animals	Cost estimate	
			Low	High
Calves on milk	\$100 to \$300	X 6	= \$ 600	= \$ 800
Calves to 1 year of age	\$300 to \$600	X 30	= 9000	= 18,000
Yearlings & bred heifers	\$400 to \$800	X _____	= _____	= _____
Total cost*			= \$ 9,600	= \$ 19,800

*Place here and on line 3 of worksheet 3-12

4. The milking center or system represents both a large capital investment, 5 to 20% of total capital investment, and a large labor requirement, 20 to 35% of total labor requirement. Keep in mind, that because of the high capital cost, a new milking center may be a lower priority compared to investments in cows and housing. You may want to consider the following options:
- 1) **Milking the cows in the present tiestall barn.** Switching of groups usually involves more than one person at each milking. Twenty to twenty-five cows per hour per person is the average. This system requires little, if any, capital investment.

2) **Milking the cows in a flat-barn milking system.** This system utilizes a portion of the tiestall barn, usually 8 to

Table 3-1. Total number of heifers needed (all ages) 100 cow herd¹

-----Age at 1st Calving-----								
Cull Rate	22	24	26	28	30	32	34	36
% =====								
20	40	44	48	51	55	59	62	66
22	44	48	52	56	61	65	69	73
24	48	53	57	62	66	70	75	79
26	52	57	62	67	72	76	81	86
28	56	62	67	72	77	82	87	92
30	61	66	72	77	83	88	94	99
32	65	70	76	82	88	94	100	106
34	69	75	81	87	94	100	106	112
36	73	79	86	92	99	106	112	119

¹ Number may be used as a percent for various size herds.
 Number includes a 10% allowance for mortality and culling.
 Adapted from "Planning Heifer Housing Facilities", Menzi, W.,
 Dairy Housing II, American Society of Agricultural Engineering, 1983.

10 milking stalls, with an investment of \$2,000 to \$3,000 per stall. One person is usually involved, and 35 to 45 cows can be milked per hour per person. County agents have additional information on design and performance.

- 3) **Install parlor, with used or new milking equipment, into the existing tiestall facility.** Capital investment, depending on selection of equipment and facility conditions, usually range between \$30,000 and \$75,000 for double-6-to-10 parlors.

- 4) **Build new milking facility and install new equipment.** Capital investment is usually \$3,000 to \$5,000 per milking unit for equipment and \$25 per square foot of milking center building, excluding holding area. Holding area (15 sq. ft per cow) usually costs \$8 to \$12/sq. ft. Crowd gate is not included (cost ranges from a few hundred to several thousand).

Table 3-2. Performance of herringbone and parallel milking parlors by size, type of exit, and number of workers.¹

*	Parlor Type and Size											
	Herringbone						Parallel					
	2x6	2x10	2x14	2x20	2x28	2x40	2x6	2x10	2x16	2x20	2x28	2x40
---Cows Milked Per Hour---												
Parlor Performance												
• <u>Conventional Exit</u> ^a	45	70	--	--	--	--	--	--	--	--	--	--
1 Worker	53	82	--	--	--	--	--	--	--	--	--	--
2 Workers												
• <u>Rapid Exit</u> ^b												
1 Worker	48	80	110	--	--	--	55	87	119	125	--	--
2 Workers	56	94	129	160	210	280	--	--	140	160	230	--
3 Workers	--	--	--	188	247	330	--	--	--	200	200	380
^a Exit is one cow at a time from front of parlor. ^b Exit as a group from side of parlor.												

Data indicate one worker is capable of operating up to a double 10 to 12 conventional exit, herringbone parlor; up to a double 12 to 14, rapid exit, herringbone parlor; and up to a double 16 to 20, rapid exit parallel parlor. Each additional operator may increase cow throughput by 10 to 20%.

¹Proceedings from the National Milking Center Design Conference, Northeast Agricultural Engineering Service, 1992.

Worksheet 3-5. Estimating cost for milking center

Do you need to consider
a different milking system?

If **NO** go to next
worksheet

If **YES** complete
this worksheet

What type of milking system are you planning?

Complete the appropriate section below
depending upon whether you plan to renovate
or build new.

Cost estimate

	Cost per Stall	Number of stalls	Low	High
Renovating facilities				
Building	Low \$ _____ High \$ _____	X _____	= \$ _____	= \$ _____
Equipment	Low \$ _____ High \$ _____	X _____	= \$ _____	= \$ _____
	Total Cost*		= \$ _____	= \$ _____
New facilities (from Table 3-3)				
Building	Low \$ _____ High \$ _____	X _____	= \$ _____	= \$ _____
Equipment	Low \$ _____ High \$ _____	X _____	= \$ _____	= \$ _____
	Total Cost*		= \$ _____	= \$ _____

*Place here and on line 4 of Worksheet 3-12

Note: Table 3-2 provides cow throughput information for different sizes and types of parlors and Table 3-3 provides capital cost for new construction by parlor type.

Table 3-3. Capital cost of herringbone and parallel parlors, by size, type of exit and equipment.

Parlor Type and Size												
	Herringbone						Parallel					
	2x6	2x10	2x14	2x20	2x28	2x40	2x6	2x10	2x16	2x20	2x28	2x40
Dollars												
Capital Cost												
• Conventional Exit Milking Center* (with holding area) ^b	43,875	70,800	--	--	--	--	--	--	--	--	--	--
Equipment												
Arm Auto Take-Off	114,110	147,100	--	--	--	--	--	--	--	--	--	--
Non-Arm												
Auto Take-Off	104,510	129,250	--	--	--	--	--	--	--	--	--	--
Computer Milk												
Weight System	20,910	25,500	--	--	--	--	--	--	--	--	--	--
• Rapid Exit Milking Center* (with holding area) ^b	49,875	80,800	101,250	145,400	178,350	241,950	48,375	68,550	101,000	124,000	165,500	228,750
Equipment												
Arm Auto Take-Off	116,110	149,600	228,990	354,875	445,315	575,875	--	--	--	--	--	--
Non-Arm Auto												
Take-Off	106,510	131,750	200,400	319,175	395,335	515,185	107,440	139,400	225,675	317,475	395,335	515,185
Computer Milk												
Weight System	20,910	25,500	26,180	34,000	40,460	57,800	20,910	25,500	27,200	34,000	40,460	57,800
Derived from 1992 milking machine company price lists. Holding pens sized for milking times of 1 1/2 hours per group.												
*Milking complex without milking equipment. Includes milk room, machine room, office and bathroom, breezeway, parlor, and holding area.												
^b Standard holding pen of 15 square feet per cow.												

1 Proceedings from the National Milking Center Design Conference, Northeast Agricultural Engineering Service, 1992.

Worksheet 3-6. Amount of forage to be stored

Determine the forage dry matter requirement of animals to be fed (milking cows, dry cows and replacements) by using the tables found in the Pro-DAIRY Feeding or Forage management Manuals.

OR

Figure 6 to 8 tons of total forage dry matter is required per milk cow.

904 tons DM

Estimate the ensiling dry matter losses:

Good management--5 to 20% per year

Average management--20 to 30% per year

Poor management--30 to 50% per year

(Forage required X Percent loss)

+ 181 tons DM

Estimate forage dry matter losses during harvesting and feeding processes

Guide: 5 to 15%

(Forage required X Percent loss)

+ 90 tons DM

Total Forage Needed

= 1,175 tons DM

5. Feed storage and delivery can change dramatically when dairy farms expand. Often, higher cow numbers will enable the farm to consider a move away from: 1) tower silos to bunker silos, 2) individual feeding to TMR mixers, and 3) from storing complete feeds to storing individual ration commodities, or group mixes. Worksheets 3-5, 3-6, 3-7, 3-8, 3-9, and 3-10 are designed to help determine capital needed for these potential feed storage and delivery changes in your farm situation.

Tower silos become difficult to manage as herd size approaches 200 cows. Time required to unload for several feedings, more than one time per day, becomes a strain on labor. Often existing tower silos can be utilized, along with new bunk silos, as storage for special forages (e.g., extremely high quality haylage for early lactation cows, grass haylage for dry cows or older heifers).

Worksheet 3-7. Bunker silo dimensions

	Corn Silage	Hay Crop Silage
Forage Dry Matter to be Stored	588 tons	588 tons
Pounds per ton	X 2,000 lbs.	X 2,000 lbs.
Density factor	÷ 18 lbs./cu. ft.	÷ 15 lbs./cu. ft.
Bunker Silo Space Required *	= 65,333 cu. ft.	= 78,400 cu. ft.

Guidelines for Wall Heights **

Cows	Wall Height	Avg. Crowned Height
100 to 200	8 feet	10 feet
200 to 300	10 feet	12 feet
300 to 400	12 feet	14 feet
> 400	16 feet	18 feet

Width of Bunker Silo ***

Build 45 ft. wide silo
20 ft. Corn
25 ft. hay

Cows	Width
100 to 200	25 to 30 feet
200 to 300	30 to 40 feet
> 300	40 to 60 feet

Length of Bunker Silo	Corn Silage	Hay Crop Silage
Space required	65,333 cu.ft.	78,400 cu. ft.
Avg crowned height	÷ 14 ft.	÷ 14 ft.
Width	÷ 20 ft.	÷ 25 ft.
Length	= 233 ft.	= 224 ft.

- * Dimensions can be calculated for separate corn silage and hay crop silage storage or the total space required can be added together to calculate the size of a single storage for both forages
- ** Minimum silage depth to control spoilage is 8 ft. Maximum average crowned height may be 2 ft. greater than wall
- *** Narrower than 25 feet causes problems with equipment maneuverability; wider than 60 feet makes it difficult maintain a fresh face

Milk production per unit of ration cost has been reduced in many farm situations when TMR rations replace individual forage and grain-fed rations. Larger herds can more easily justify the capital cost of a new mixer, as the cost is spread over more cows.

Cost advantages of commodity over complete feeds will be determined by the manager's ability to match commodity specifications to changing forage quality, and to procure consistently high quality concentrates at competitive prices. Larger herds will be able to turn over larger volumes of concentrates, and may be better able to support middle-management personnel who are qualified in these areas of feeding management.

Worksheet 3-9. Cost of forage storage

Walls	
Height	12 ft.
Length	X 230 ft.
	X 2
Cost per square foot of wall; estimate = \$7.35	X \$ 7.35 /sq.ft.
Cost of Walls	= \$ 40,572
Floor	
Width	45 ft.
Length	X 230 ft.
Cost per square foot of floor; estimate = \$1.35	X \$ 1.35 /sq.ft.
Cost of Floor	= \$ 13,973
Cost of Walls	+ \$ 40,572
Total Cost of Bunker Silo* 12 45 230 Height x width x length	= \$ 54,545
* Place here and on line 5 of Worksheet 3-12.	

Worksheet 3-10. Sizing mixer for total mixed ration

Maximum number of cows in one group to be fed	
Minimum number of feedings per day	÷
Maximum dry matter intake per cow per day for this group (guideline -- 40 to 55 lbs.)	X lbs.
Minimum percent dry matter of total mixed ration (guideline -- 55% to 40%)	÷ %
Pounds of total mixed ration per bushel (guideline -- 25 lbs.)	÷ lbs.
Mixer capacity needed	= bu.

Use quotes from local equipment dealers for the mixer size calculated for your cost estimate. Put the cost on line 6 of Worksheet 3-12. TMR mixers with scales, chassis and tires generally cost from \$15,000 to \$25,000.

Worksheet 3-11. Estimated size and cost of commodity storage

Bay Size	The size of front end loader planned for the farm must be considered when establishing bay dimensions		
Average size load of concentrate delivered			tons
Pounds per ton	X	2000	lbs.
	X	1.5	
Height (6 to 10 feet)	÷		ft.
Width (8 to 12 feet)	÷		ft.
Density factor (commodity densities range from 20 to 40 lbs./cu.ft.; 30 lbs./cu.ft. can be used as an average)	÷		lbs./cu.ft.
Length of bay	=		ft.
Number of bays -- Consider number of commodities to be used in TMR rations plus bedding and fertilizer needs			
Additional bays for rotation of feeds	+	2	
Total number of bays	=		
Cost per bay (range \$1,000 to \$5,000 per bay)	X \$		

Decisions for Dairy Manure Handling

Concerns about protecting water sources and the fresh, clean air in rural environs increase the importance of reducing pollution when handling dairy manure. Manure contains valuable nutrients for growing crops. Balancing the crop needs with specific application rates represents an ideal use for manure. Since animals produce manure daily and crops grow seasonally some banking or storage of these nutrients is desirable. Variable amounts of plant nutrients are stored in the soil, but limited by soil permeability, surface slope and cover, rainfall intensity, evaporation, and other factors. Frozen soils reduce the infiltration of nutrients and very porous soils let nutrients pass quickly. Incorporating the nutrients into a wide variety of soils without runoff losses, excessive water

pollution, or odors that neighbors consider a nuisance leads to several alternatives for handling manure. Larger concentrations of dairy animals tend to increase and focus any problems.

Alternatives for Manure Storage and Handling and Reducing Problems

1. If manure nutrients and odors are under control and if equipment operates satisfactorily during all seasons, then minimal storage and DAILY SPREADING require the least capital investment. For all-weather operations:
- Use floatation tires and four-wheel-drive tractors with safety cabs;

- Avoid slippery slopes and pull loads lighter than tractors;
 - Spread on well-drained ridges during snow season;
 - Spread on select distant fields during growing seasons; and
 - Plan to replace tractors and spreaders in five to ten years.
2. If storms, mud, and equipment problems restrict manure handling and field spreading, then **SHORT-TERM STORAGE** (two months to two weeks) and monthly or weekly spreading can reduce weather risks with moderate capital investment.
 3. To utilize manure nutrients and limit manure spreading in bad weather, then 6 to 12 months storage allows one to manage and mobilize high capacity loading, unloading, transporting, plowing, or injecting equipment for spring and/or fall spreading.
 4. To reduce the peak labor load for spring spreading, and to reduce odors close to the farmstead and neighbors, consider several remote storage, field stacks or earthen basins close to fields where manure will be used.
 5. If manure is a stackable solid (more than 15% dry matter) or has ample dry bedding (more than 5% by weight), collect and transfer to field spreaders with gutter cleaners, alley scrapers, tractor scrapers and/or skid-steer loaders. Short-term storage may be loaded directly, but stacking conveyors are useful for loading long-term storage.
 6. If manure is an extremely slow flowing semi-solid (13 to 16% dry matter) with moderate amounts of bedding (approximate 3 to 5%), collect and transfer to field spreaders with gutter cleaners, alley scrapers, tractor scrapers and/or skid-steer loaders. Manure may also be scraped directly into storage or into hoppers before transfer through large underground pipes. Since drier mixtures do not flow readily, pneumatic systems with compressed air forcing a charge of manure through large pipes are more effective than large piston pumps. Any manure push-off lips or ramps should have safety barriers. All manure storage should be fenced, or covered to prevent accidental entry by employees, children, animals and emergency personnel.
 7. Manure slurry (10 to 14% DM) with surface slopes less than 3% flows slowly by gravity and approaches the same level as stored manure. Slotted floors, channels and underground pipes can direct the flow into storage. With mobile scrapers, hoppers provide surge loading. If the level of the stored manure is uphill or only slightly downhill from the barn, then combinations of mechanical scrapers, conveyors, pumps, and safety valves are useful. Avoid slugs of drier materials when using pneumatic systems, augers, pumps, or gravity-flow systems. Manure slurry tends to stay in suspension without mixing and can often be unloaded from storage with gravity and twin valves or with tractor-powered pumps.
 8. Adding liquid to manure and reducing solids below 10% makes it flow rapidly through channels and to pumps. Adding an equal amount of water to manure cuts the solids percentage in half (approximate 6% DM), doubles the number of loads transported, but simplifies spray irrigation. Flushing alleys in moderate climates or adding

Worksheet 3-12. Estimated costs for manure handling components

Manure Storage	Unit Costs ¹	X No. ² =	Your Estimate	
	\$		Low	High
Paved Bunker partial walls	25 to 40	X _____ =	_____	_____
Concrete Tank - no top	33 to 67	X _____ =	_____	_____
with heavy top	40 to 160	X _____ =	_____	_____
Earthen Basin	17 to 33	X _____ =	_____	_____
Equipment	X \$1000	X% Use ³	Low	High
Tractor and Spreader	30 to 80	X _____ =	_____	_____
Tractor, Scraper and Bucket	12 to 30	X _____ =	_____	_____
Skidsteer Loader	20 to 42	X _____ =	_____	_____
Gutter Cleaner only ⁴	8 to 14		_____	_____
Alley Scraper ⁴	20 to 42		_____	_____
Manure Flow system ⁴	25 to 40		_____	_____
Gravity Flow system ⁴	40 to 90		_____	_____
Stacker -	8 to 10		_____	_____
Large Piston Transfer	10 to 16		_____	_____
Chopper Pump Transfer	12 to 20		_____	_____
Pneumatic Transfer	15 to 24		_____	_____
		Total Cost	_____	_____

(Place here and on line 9 of Worksheet 3-12)

¹ Unit Costs are not verified.

² Each 70 cubic feet of storage for one cow-month.

³ Choose a percentage for equipment charge for handling manure.

⁴ Each 200 stalls to spreader loading, or with pipes to storage.

Reference: Holmes and Klemme, '88 U Wisc.; Holmes, '91, U Wisc.; Barrington and Cap, '91, McGill U. (Canadian Agric. Eng'ng. 381-386).

milk house effluents makes liquid manure handling practical. Dilution increases the volume of manure handled, speeds separation of solid particles, and may increase the odors from long-term storage.

9. To conserve manure nutrients and reduce ammonia loss, limit manure temperatures, surface area, air velocity over the surface, and exposure time. Less ammonia is released if absorbed in bedding or water, if gutters and alleys are cleaned more frequently, and if manure storage are loaded from the bottom, beneath drier crusts.

10. About two-thirds of the nutrients (nitrogen, phosphorous and potassium) purchased as feed and fertilizer remain on dairy farms. Excess nutrients pollute water supplies, and processing and exporting nutrients should be considered. If manure nutrients must be moved off farmland, composting manure or separated manure solids is more practical than solar drying and is cheaper than drying with fuels.

11. To reduce offensive odors and complaints about manure:
- Immediately clean up any spills on public land or roads;
 - Add bulking materials or bedding to manure, and compost;
 - Limit storage periods to less than two weeks, or aerate;
 - Conceal manure storage and keep walls high;
 - Minimize agitation or mixing of open liquid manure storage;

- Spread manure thinly, during gentle storms, in the morning;
- Don't spread or irrigate manure close to neighbors, on holidays, when winds blow towards town, or on hot, sultry afternoons;
- Inject or plow down strong smelling manure quickly; and
- Operate an anaerobic digester and produce biogas for energy.

To estimate cost for manure handling, use Worksheet 3-12 on 43 page.

Additional References:

Dairy Free Stall Housing, Proceedings from the Dairy Free Stall Housing Symposium, Harrisburg, Pennsylvania, Jan 15-16, 1986. Northeast Regional Agricultural Engineering Service, 152 Riley-Robb Hall, Cornell University, Ithaca, New York 14853.

Dairy Manure Management, Proceedings from the Dairy Manure Management Symposium, Syracuse, New York, February 22-24, 1989, Northeast Regional Agricultural Engineering Service (NRAES-31), 152 Riley-Robb Hall, Cornell University, Ithaca, New York 14853.

Worksheet 3-13. Summary of facilities costs

		Cost Estimate	
		Low	High
1). Housing for Additional Milking Cows	Worksheet 3-2	\$ <u>144,000</u>	\$ <u>216,000</u>
2). Housing for Additional Dry Cows	Worksheet 3-3	\$ <u>0</u>	\$ <u>0</u>
3). Housing for Additional Heifers	Worksheet 3-4	\$ <u>9,600</u>	\$ <u>19,800</u>
4). Cost of Milking Center or Additional Milking Equipment	Worksheet 3-5	\$ <u>0</u>	\$ <u>0</u>
5). Cost of Additional Forage Storage	Worksheet 3-9	\$ <u>45,000</u>	\$ <u>57,000</u>
6). Cost of Feed Delivery Equipment	Worksheet 3-10	\$ <u>20,000</u>	\$ <u>25,000</u>
7). Cost of Commodity Storage	Worksheet 3-11	\$ <u>18,000</u>	\$ <u>18,000</u>
8). Cost of Manure Storage Structure and Equipment	Worksheet 3-12	\$ <u>28,000</u>	\$ <u>56,000</u>
Total Cost of Facility		\$ <u>264,600</u>	\$ <u>391,800</u>

Milking Center Design, Proceedings from the National Milking Center Design Conference, Harrisburg, Pennsylvania, November 17-19, 1992, Northeast Regional Agricultural Engineering Service (NRAES-66), 152 Riley-Robb Hall, Cornell University, Ithaca, New York 14853.

Milking Systems and Milking Management, Proceedings from the Milking Systems and Milking Management Symposium, Harrisburg, Pennsylvania, January 13-14, 1988, Northeast Regional Agricultural Engineering Service (NRAES-66), 152 Riley-Robb Hall, Cornell University, Ithaca, New York 14853.

Silage Production - From Seed to Animal, Proceedings from the National Silage Production Conference, Syracuse, New York, February 23-25, 1993, Northeast Regional Agricultural Engineering Service (NRAES-67), 152 Riley-Robb Hall, Cornell University, Ithaca, New York 14853.

Expansion Strategies for Dairy Farms, Notebook for the Expansion Strategies for Dairy Farm, Regional Conference, Mercer, Pennsylvania, November 18-19, 1993, The Pennsylvania State University, The Ohio State University, Northeast Regional Agricultural Engineering Service.

Chapter 4. Putting Together the Financial Plan for Expansion

If you are considering a change in your business, you may be getting some building plans from a contractor. Within those plans, the contractor has details of how the new structure will be built. Like the plans for your new building you need a well-developed financial plan as well. There are three parts to a successful financial plan: 1) a balance sheet, 2) an income statement, and 3) a debt repayment worksheet. Each of these parts must be completed to get "the big picture" of the proposed change.

Although profitability and cash flow (repayment ability) are related, acceptable performance for one does not necessarily imply the same for the other. Therefore, both have to be evaluated.

The three financial parts are needed to address three key questions about the expansion proposal: (1) Will the expansion be profitable? (2) Can I make debt payments? (3) Are the risks acceptable? The overriding concern about expansion is whether acquiring control of additional resources will generate a profit sufficient to compensate you for the added risks.

To make decisions and assumptions about the expansion, an expansion goal is needed. For example, you could list building a new freestall barn, milking parlor, and increasing the milking herd to 250 cows. An average future year is some point in the future that you have reached your goal for the proposed change. An average future year could be two, three, or five years from now.

To make information from the worksheets more meaningful, you need first to establish base year information. You need to look at two to three years of previous financial information. Previous years' information may not truly reflect what happened in the business. You may have had an unusually high machinery repair expense or a poor corn silage crop. You need to adjust your prior year's data to reflect an average, rather than the extremes.

Balance Sheet

Let's look at each part of the financial plan in detail and how to use it. The balance sheet can be thought of as the foundation of your financial plan. It is a listing of all the assets and liabilities in the farm business. Information from the balance sheet will help you (and possibly the lender) determine if the risk of added liabilities will

be adequately compensated by increase in assets. Inventory information from the assets will be needed for calculating farm profitability.

Figuring out what method to use to determine asset values can be a challenge. When making projections that will have major impact on the business in the future, you should use accurate values for assets. When projecting values for future assets, consider if the asset has any "lost capital". Lost capital can be described as an immediate depreciation of an asset. For example, the day that you start to use the new cow barn, the value of it will be less than the construction cost. Therefore, the difference between the market value on the first day of use

"Since expansion generally requires a major capital investment, profitability needs to be measured in terms of capital performance (for example, rate of return on the added investment). Expansion may also imply an increase in operator labor and management and it is important to determine if sufficient income accrues to these personal resources." -- Gayle S. Willett, Extension Economist, Washington State University

Worksheet 4-1. Summary of proposed change

Name: Dave & Elaine JohnsonDate: 1/11/94Proposed change: Expand to 230 cows

	Average Future Year		
	Base Year	Without Major Change	With Major Change
Number of milk cows, milking and dry	110	115	230
Number of heifers and calves	75	80	180
Pounds of milk sold per cow	18,000	18,000	20,000
Number of crop acres	380	380	380
Milk price per cwt.	12.93	12.50	12.50
Total cwt of milk sold	19800	20,700	46,000
Capital purchases to be made	Year 1	Year 2	Year 3
Machinery and equipment			
Milking equipment	0		
Feeding equipment	25,000		
Manuare storage and handling equip.	42,000		
Other	1,500	50,000	40,000
Animals- cows	144,000	34,800	24,000
- Heifers			
Structures			
Barn	175,000		17,500
Feed storage	52,000	18,000	
Other			
Land			
Total Capital Needed			

Worksheet 4-2. Current balance sheet and net worth analysis

Name: Dave + Elaine JohnsonDate: Jan. 1, 1994**Assets****Current**

Cash, checking and saving 24,000
 Account receivable 26,000
 Prepaid expenses 0
 Feed and supplies 96,000
Total 146,000

Intermediate:

Dairy cows
 owned 110,000
 leased 0
 Heifers 44,750
 Bulls/other livestock 0
 Machinery/eq. owned 160,000
 Machinery/eq. leased 0
 Farm stocks or certificates 0
Total 314,750

Long-Term:

Land and buildings:
 owned 300,000
 Financial lease (structures) 0
Total 300,000
Total Assets = 760,750

Debt**Current**

Accounts payable 5,000
 Operating debt 0
 Short term debt 0
 Advanced govt. receipts 0
Total 5,000

Intermediate:

Secured debt:
 Int. Loan #1 Valley Bank 60,500
 Int. Loan #2
 Int. Loan #3
 Int. Loan #4
 Financial lease
 Machinery
 Cattle
Total 60,500

Long Term:

Secured debt:
 LT Loan #1 Valley Bank 174,000
 LT Loan #2
 Financial lease (structures)
Total 174,000
Total Debts = 239,500
Net Worth (A)* 521,250
Total Debt and Net Worth 769,750

Net Worth 521,250
 Total Assets + 769,750
 Percent Net Worth = 67%

Total Debt 239,500
 Total Assets + 769,750
 Debt: Asset Ratio = .31

* Net worth = Total Assets - Total Debts

Worksheet 4-3. Projected balance sheet and net worth analysis after proposed changeName: Dave + Elaine JohnsonDate: Dec 31, 1998**Assets**

Current:

Cash, checking and savings 12,390
 Accounts receivable 43,000
 Prepaid expenses 0
 Feed and supplies 183,200
 Total 238,590

Intermediate:

Dairy cows:

owned 230,000
 leased 0

Heifers 107,500Bulls/other livestock 0Machinery/eq. owned 203,000Machinery/eq. lease 0Farm stocks or certificates 25Total 540,525

Long-Term:

Land and buildings:

owned 460,000Financial lease (structures) 0Total 460,000**Total Assets =** 1,239,115**Debt**

Current:

Accounts payable 5,000
 Operating debt _____
 Short term debt _____
 Advanced govt. receipts _____
 Total 5,000

Intermediate:

Secured debt:

Int. Loan #1 Valley Bank 213,798

Int. Loan #2 _____

Int. Loan #3 _____

Int. Loan #4 _____

Financial lease _____

Machinery _____

Cattle _____

Total 213,798

Long-Term:

Secured debt:

LT Loan #1 Valley Bank 246,793

LT Loan #2 _____

Total 246,793**Total Debts =** 465,591Net Worth (B)^a 773,524Total Debt and Net Worth 1,239,115Net Worth 773,524Total Assets + 1,239,115Percent Net Worth = 62 %

Change In Net Worth (1) =

Projected Net Worth (B) - Current Net Worth (A) (from Worksheet 4-2)

= 252,274Total Debt 465,591Total Asset + 1,239,115Debt:Asset Ratio = .38^a Net Worth = Total Assets - Total Debts

and the cost of constructing the building is lost capital". Lost capital can be one-third to two-thirds of new investment in buildings and new equipment.

Debt balances are easier to estimate than asset value. In some instances, principal balances are reported on monthly loan statements. If you don't know what a particular loan balance is, contact your lender for the information.

Prepare a base year balance sheet and then a balance sheet for the proposed change using Worksheets 4-1 and 4-2. After the asset and debt information is entered on the worksheet, calculate the net worth and debt asset ratio for both the balance sheets. Debt:asset ratio demonstrates the relationship between your debt and assets. The inverse of debt asset ratio is percent equity. For example, a debt to asset ratio of .25 is the same as 75 percent equity. The changes in net worth between the base and proposed change year is one way to decide if the proposed change is a sound financial investment.

Income Statement

An income statement is one tool to measure profitability. It can be used to evaluate current profitability and to project future profitability of a business as well. Base year information can be used to project future earnings with and without major changes Worksheets 4-3 and 4-4 can be used to evaluate and project farm profitability. Net farm income is neither "take-home pay" nor family living withdrawal. Net farm income is the "return" to the operator's labor and management time, unpaid family labor, and equity capital.

Base year expenses must be adjusted to an accrual basis. Accrual adjustments allow you to determine what the "true" income and expenses are. Cash expenses must be adjusted for changes in accounts payable, inventory and prepaid expenses to determine actual cost of production. To arrive at total farm expense,

machinery and building depreciation and replacement livestock expense must be included.

Base year receipts have to be adjusted to an accrual basis as well. Some products may be sold, but the cash payment is not received until the following year. The most common account receivable is the milk check; you are paid for milk that you produced in the previous month. Therefore, the value of the current month's production is an account receivable. Some products may be added to inventory for use during the following year. It is important to include these changes in inventory and accounts receivable in your list of receipts.

Estimating future expenses can be difficult. You need to figure out what expenses will change in proportion to the change in size of business (such as feed costs and milk marketing costs), and what others will remain relatively fixed (such as real estate taxes). However, even fixed costs can change and need adjustment as well.

Obtain current cost estimates on items that you intend to buy. Once you have determined current prices of expense items, multiply them by expected cost increases in percentages. Estimating future receipts is not much easier. Good data may not be perfect, since no one can forecast precise future prices or future production. Base projections on the past performance of your business, research, and information from other sources such as Cooperative Extension, USDA, or Farm Credit System budget information.

There are a variety of ways to measure farm profitability. No one profitability method should be used to determine if a plan is financially sound or not. The easiest method to calculate profitability is net farm income (NFI). Net farm income is calculated by subtracting total farm receipts from total farm expenses. Net farm income is residual return available for compensation of owner's labor and management.

Another measure of farm profitability is labor and management income. This measure shows what return to your labor and management was for this business. It is calculated from the net farm income by subtracting the value of unpaid family labor and interest on equity capital. Changes in labor and management income is one way to determine if you are being adequately compensated for the additional risk of expansion.

Return to farm assets and rate of return on assets are two related methods of calculating farm profitability. Return to farm assets helps you to see how much money you are generating to be able to put back into the farm or other investments. The value of labor and management is your best estimate of the value of YOUR labor and management on the farm. One way to estimate this value is to figure out how much you would have to pay someone to do your job on the farm. The rate of return on assets can show what percent the farm is returning to the asset value. Is it higher than what you could invest the money for in a bank or other investments?

Repayment Ability

Completion of the first two financial tools will help answer the profitability question for you. The cash flow question will be answered by determining the debt repayment ability. The ability of the farm business to repay debt is determined by adjusting to the net cash inflow. Repayment ability can be calculated using worksheet 4-5. Cash receipts and expenses should be used in figuring repayment ability. Refer to the records that you used to make base year projections in the income statement for cash receipts and expenses.

Cash receipts not only include cash income from the sale of products, but the sale of capital items as well. Some examples of capital sale would be cull cows or machinery. Add cash operating receipts, capital sales, and non-farm income together to determine total cash inflow.

Interest payments have to be excluded from cash farm expenses to determine the total amount available for operating expenses, family living, debt payments, and investment. Now subtract the cash farm expenses to determine the amount available for family living, debt payments, and investment. The next step is to subtract family living expenses from cash value. Use previous years' financial records to project what your living expenses are going to be.

Next, subtract cash to be used for asset replacement. Yearly asset replacements (such as machinery purchases, barn repairs, cattle purchases) should not be 100% financed. You should be able to pay for some purchases with cash from the business.

After these two subtractions are made, the amount left is the amount available for debt service. Subtract planned debt payments to determine if you have any cash left over. You should have some cash left over to protect yourself from some sudden changes (such as decline in milk price) in the business.

Sensitivity Analysis

You may have doubts about the validity of the financial reports that you developed. This is because you operate in an environment in which weather, interest rates, prices, costs, and other factors can vary unpredictably. To measure the impact that changes in any factor (yields, prices, sales, etc.) will have on balance sheet, net income, and repayment ability, perform a sensitivity analysis. Identify the one or two key factors (such as milk price or production per cow) that, if changed from the expected value, will most effect profitability. A sensitivity analysis will increase your confidence in profitability projections. When the sensitivity analysis is done, evaluate the revised statements.

Worksheet 4-4. Estimating expenses

Name: Dave + Elaine JohnsonDate: 6-15-94

Average Future Year

Expenses	Base Year ^a	Without Major Changes	With Proposed Changes
Hired Labor	+ 43,000	+ 54,000	+ 120,400
Purchased concentrates	+ 50,500	+ 58,900	+ 172,500
Purchased forages	+ 1,500	+ 1,600	+ 5,000
Non-dairy feed	+ 0	+ 0	+ 0
Custom work	+ 0	+ 0	+ 0
Machinery repairs	+ 14,000	+ 14,500	+ 17,000
Auto expense (farm share)	+ 500	+ 500	+ 1,000
Fuels, oil and grease	+ 4,500	+ 4,500	+ 6,500
Purchased livestock	+ 0	+ 0	+ 0
Breeding fees	+ 4,000	+ 4,200	+ 8,500
Veterinary and medicine	+ 6,500	+ 6,825	+ 14,000
Milk marketing	+ 12,500	+ 13,750	+ 26,000
Other dairy expense	+ 11,000	+ 11,000	+ 20,700
Lime and fertilizer	+ 7,000	+ 7,000	+ 6,500
Seeds and plants	+ 6,000	+ 6,000	+ 6,500
Spray, and other crop expense	+ 4,500	+ 5,000	+ 6,000
Land, building, and fence repair	+ 4,500	+ 6,000	+ 6,000
Taxes	+ 6,000	+ 6,000	+ 6,000
Insurance	+ 4,500	+ 4,600	+ 6,300
Rent	+ 0	+ 0	+ 0
Telephone (farm share)	+ 500	+ 550	+ 1,000
Electricity (farm share)	+ 8,000	+ 8,200	+ 15,000
Interest paid ^b	+ 20,500	+ 16,000	+ 40,493
Miscellaneous expenses	+ 1,500	+ 1,675	+ 2,100
Cash farm operating expenses	= 211,000	= 230,800	= 487,493
Depreciation of machinery	+ 27,500	+ 27,500	+ 31,000
Depreciation of buildings	+ 7,500	+ 7,500	+ 29,500
Expansion livestock	+ 0	+ 0	+ 0
Total farm expenses	= 246,000	= 265,800	= 553,993

^a Adjust all expenses to an accrual basis^b Interest paid is interest on average debt outstanding over the life of the investment

Worksheet 4-5. Estimating receipts and profitability factors calculation

Name: Dave + Elaine JohnsonDate 6-15-94

Average Future Year

Receipts	Base Year ^d	Without Change	With Change
Milk sales	256,000	247,500	575,000
Calf sales	+ 5,000	+ 5,000	+ 12,000
Cattle sales	+ 17,500	+ 17,500	+ 41,400
Crop sales	+ 20,000	+ 20,000	+ 0
Custom work	+ 0	+ 0	+ 0
Government payments	+ 2,000	+ 2,000	+ 0
Gas tax refund	+ 100	+ 100	+ 100
Other receipts	+ 4,400	+ 4,400	+ 4,400
Total farm receipts	= 305,000	= 296,500	= 632,900

Profitability Factors Calculation

Total farm receipts	305,000	296,500	632,900
Total farm expenses	- 246,000	- 265,800	- 553,993
Net farm income (2)	= 59,000	= 30,700	= 78,907
Interest on equity capital ^d @ <u>5</u> %	- 25,301	- 27,500	- 36,966
Value of unpaid family labor ^e	- 16,800	- 0	- 0
Labor and management income (3)	= 16,899	= 3,200	= 41,941
Net farm income	59,000	30,700	78,907
Interest paid on debt	+ 20,500	+ 16,000	+ 40,493
Unpaid family labor	- 16,800	- 0	- 0
Value operator management and labor	- 30,000	- 30,000	- 30,000
Return to total farm asset (4)	= 32,700	= 16,700	= 89,400
Total farm asset	+ 760,750	+ 750,000	+ 1,239,115
Rate of return on assets% (5)	= 4.3 %	= 2.2 %	= 7.2 %

^c Adjust all receipts to an accrual basis^d A percent of the average equity for the year. A typical value is 5%^e Value of unpaid family labor = number full time months worked x \$ per month.

Example: value unpaid family labor = 3 months x \$1200/mo. = \$3600.

^f Value operator labor and management is an estimate what value you place on managing and operating your farm.

Worksheet 4-6. Farm repayment ability.

Name: Dave + Elaine JohnsonDate: 6-15-94

Average Future Year

	Base Year	Without Major Changes	With Major Changes
Total farm receipts	305,000	296,500	632,900
Capital sales	+ 0	+ 0	+ 0
Non-farm income	+ 0	+ 0	+ 0
Total cash inflow	= 305,000	= 296,500	= 632,900
Interest paid	+ 20,500	+ 16,000	+ 40,493
Cash farm expenses	- 211,000	- 230,800	- 487,493
Cash available for family living, debt repayment, and investment	= 114,500	= 81,700	= 185,900
Family living expense ⁹	- 30,000	- 30,000	- 30,000
Cash for asset replacement	- 30,000	- 30,000	- 40,000
Cash available for debt payments (C)	= 54,500	= 21,700	= 115,900
Subtract: planned debt payments (D)	- 37,500	- 35,500	- 120,840
Cash excess/deficit (6)	= 17,500	= -13,800	= -4,940

⁹ Along with regular living expenses, includes income and self employment taxes, health insurance, medical expenses, savings, etc.

Worksheet 4-7. Summary of financial worksheets.

Name: Dave + Claire JohnsonDate: 6-15-94

	Average Future Year		
	Base Year	Without Proposed Change	With Proposed Changes
Annual change in net worth ^a	36,500	15,500	78,407
Net farm income (2) Worksheet 4-5	59,000	30,900	78,907
Labor and management income (3) Worksheet 4-5	16,899	3,200	41,941
Return to total farm assets (4) Worksheet 4-5	32,700	16,700	89,400
Rate of return on assets (5) Worksheet 4-5	4.3%	2.2%	7.2%
Able to service debt? Y/N (6) Worksheet 4-5	Yes	No	No

^a Annual change in net worth = Net worth year end - Net worth beginning of year

What's the Best Method Financially to Reach Goal?

You have made a decision to make a major change in the business. The next step is to brainstorm alternatives to reach your goal. For example, if a farmer decides that expanding the herd from 100 to 250 cows in three years is the best goal, what alternatives does he or she have? These could be:

- A. Buy all of the animals needed for expansion at once,
- B. Buy some expansion animals and reduce culling rate to supply the rest of the expansion animals, or
- C. Lease animals to supplement expansion.

In addition, a variety of other alternatives exist.

The next step is to evaluate each alternative to decide which one will be the best financially. The worksheet 4-7 will help you to financially evaluate each alternative that you have developed. Remember, the goal applies to an average future year, which may be three to five years from now. However, to get to the profitability of the average future year, some low income years may occur before reaching profitable periods. By evaluating each alternative for several years, you can decide which alternative will have the least negative impact on your financial position.

The first step in evaluating the alternatives is to determine projected income. On worksheet 4-7, write down the scenario for each year. Include projected cow numbers, production per cow, and milk price per hundredweight (cwt) in the scenario. Write your projections for each year at the top of the second page of worksheet 4-7. Multiply the number of cows by milk shipped per cow (in cwt) and milk price per cwt to figure out projected milk income. Depending on how you plan to achieve your goal, adjust cull cow sales to determine expected income. Calf sales will be determined from the projected number of cows for that year. To determine

other business income, look at your base year income (Worksheet 4-4) and add all that is not milk or animal income together to determine other business income. Project how other business income will change as cow numbers change.

Estimating projected expenses for each year is next. Using base year expenses as your guide (Worksheet 4-3), adjust each expense item. Remember, some expenses are directly influenced by the number of cows (such as concentrate, milk marketing, etc.). Other expenses remain relatively fixed or don't change in proportion with cow numbers (such as crop expenses, machinery expenses, utilities, etc.). There is no need at this point to project interest payments, since this will be taken into account in the next worksheet.

Total both receipts and expenses and place totals in the repaymentability section of Worksheet 4-7. Subtract expenses from receipts to find net cash inflow. Then add nonfarm income to determine cash available for family living, investment, and debt payment. Subtract family living expense from the cash available figure. Be realistic in your estimate of family needs. Is there a child going to college soon? Are there any other major family expenses coming up? Subtract the amount that you plan to set aside for capital purchases during the year. Capital purchases should not be purchased with credit entirely. You should plan to use some of your money each year to partially fund capital purchases. After these two subtractions are made, you have the amount that is left for debt payments. Project planned debt payments for each year and subtract it from cash available for debt payment. Is there a cash excess or a deficit after the calculation is made? As with the repayment worksheet, calculate the cash flow coverage ratio.

How did you make out with your analysis? Do you have one or more years in the projections where you don't have enough money for debt payments? If you do not have any

deficit years, then this alternative is one that should be considered to help you reach your goal. To improve your confidence in this alternative, perform a sensitivity analysis.

Where Can I Get Funding?

Once you have determined that the expansion is economically feasible, you need to decide on the best way to finance the project. Borrowing money, whether from yourself or other sources, has a cost associated with it. Interest charges, origination and other fees, and loss of liquidity are just a few of the considerations that must be made in determining which method of financing is right for you.

Funds for your expansion can be classified under two primary categories: equity sources and debt sources. Equity sources include borrowing from your savings, future inheritance, or even finding outside investors. Each of these opportunities represent a means of financing an operation without the burden of interest or "rent" payments for use of the money. However, consideration must be made for the loss of liquidity caused by these methods. Liquidity is an important part of the operation of the business. If funds are needed for an unforeseen contingency, the level of liquidity of the business will be the most important factor for continued existence of the farm. Needless to say, use of equity capital must be balanced with the need for easily accessible reserves such as cash.

Most farm operations do not have the ability to generate enough equity capital to finance expansions. Therefore, debt sources of capital must be looked at for the necessary funds. Debt sources require that interest or "rent" be charged for the use of the funds. Included in this category would be loans from family, friends, or commercial lenders, as well as the agricultural credit market such as Farmers Home Administration and the Farm Credit System.

It is important to note that loans from family members must comply with IRS regulations. These regulations dictate specific allowable repayment periods and interest rates for each type of loan. The minimum allowable interest rates are published monthly by the IRS and may be obtained from your accountant or financial advisor.

Another alternative available for expansion is leasing your property. Leases are categorized as operating or financial. Under the typical operating lease, the property is "borrowed" for a designated period of time. The owner of the property (the lessor) retains title and is responsible for taxes, insurance, and major repairs. This type of lease is usually for short-term, "seasonal" property use.

Financial leases are for longer term and are usually oriented toward "rent-to-own" arrangements. The lessee (farm operator) generally assumes responsibility for taxes, insurance, and repairs during the life of the lease while the lessor retains title to the property. At the end of the term, the lessee typically has an option to purchase the property at a percentage of fair market value. One example of a popular financial lease is the land contract method of property transfer.

Using a debt source - What are the lenders requirements?

When you talk with lenders about borrowing funds, what are they looking for in a good loan? Well, typically, they look at what is often called the three R's: Risk-bearing ability, Returns, Repayment capacity. In other words, can the farm withstand financial losses without being forced out of business; does the proposed use of credit contribute to the viability of the business; and will the investment generate sufficient and timely revenues for debt repayment? (It is important to address these issues, especially the

Worksheet 4-8. Planning the transition achieve to proposed changeName: Dave + Elaine JohnsonDate: 6-15-94Scenario for year 1: Build freestall barn + bunker silo, buy mixer wagon and 120 Cows.Scenario for year 2: Buy 29 Springing heifers and build commodity shed.Scenario for year 3: Build heifer barn, buy 20 Springing heifers

Scenario for year 4:

Scenario for year 5:

Farm Expenses	Year 1	Year 2	Year 3	Year 4	Year 5
Hired labor	+ 65,500	+ 107,700	+ 107,700	+ 120,400	+
Purchased concentrates	+ 75,900	+ 163,900	+ 172,500	+ 172,500	+
Purchased forages	+ 0	+ 5,000	+ 5,000	+ 5,000	+
Custom work	+ 0	+ 0	+ 0	+ 0	+
Machinery repairs and Auto	+ 18,000	+ 18,000	+ 18,000	+ 18,000	+
Fuels, oil, and grease	+ 6,500	+ 6,500	+ 6,500	+ 6,500	+
Purchased livestock	+ 0	+ 34,800	+ 24,000	+ 0	+
Breeding fees	+ 5,200	+ 8,500	+ 8,500	+ 8,500	+
Veterinary and medicine	+ 8,500	+ 14,000	+ 14,000	+ 14,000	+
Milk marketing expense	+ 14,400	+ 24,700	+ 26,000	+ 26,000	+
Other dairy expense	+ 13,600	+ 20,700	+ 20,700	+ 20,700	+
Lime and fertilizer	+ 6,500	+ 6,500	+ 6,500	+ 6,500	+
Seeds and plants	+ 6,500	+ 6,500	+ 6,500	+ 6,500	+
Spray and other crop exp.	+ 6,000	+ 6,000	+ 6,000	+ 6,000	+
Real estate repair	+ 5,500	+ 6,000	+ 6,000	+ 6,000	+
Taxes	+ 6,000	+ 6,000	+ 6,000	+ 6,000	+
Insurance	+ 6,000	+ 6,300	+ 6,300	+ 6,300	+
Rent	+ 0	+ 0	+ 0	+ 0	+
Telephone (farm share)	+ 1,000	+ 1,000	+ 1,000	+ 1,000	+
Electricity (farm share)	+ 9,300	+ 15,000	+ 15,000	+ 15,000	+
Miscellaneous expenses	+ 2,100	+ 2,100	+ 2,100	+ 2,100	+
Total Farm Expenses (less interest)	= 256,500	= 459,200	= 458,300	= 447,000	=

Worksheet 4-8. Planning the transition to achieve the proposed change

Name: _____

Date: _____

Farm Receipts	Year 1	Year 2	Year 3	Year 4	Year 5
Number cows	140	230	230	230	
Production/cow (cwt)	x 180	x 190	x 200	x 200	x
Price milk/cwt	x 12.50	x 12.50	x 12.50	x 12.50	x
Milk income	= 315,000	= 546,250	= 575,000	= 575,000	= S
Cull cow sales	+ 26,000	+ 41,400	+ 41,400	+ 41,400	+
Calf sales	+ 7,000	+ 12,000	+ 12,000	+ 12,000	+
Other business income	+ 4,500	+ 4,500	+ 4,500	+ 4,500	+
Total receipts	= 352,500	= 604,150	= 632,900	= 632,900	= A

Repayment Analysis

Total farm receipts	352,500	604,150	632,900	632,900	
Farm expense without interest	- 256,500	- 459,200	- 458,300	- 447,000	- M
Net cash inflow	= 96,000	= 144,950	= 174,600	= 185,900	=
Non-farm income	+ 0	+ 0	+ 0	+ 0	+
Cash avail. for family living, debt payment, and investment	= 96,000	= 144,950	= 174,600	= 185,900	= E
Family living expense	- 30,000	- 30,000	- 35,000	- 40,000	-
Cash for asset replacement	- 0	- 0	- 0	- 0	-
Cash available for debt payment (A)	= 66,000	= 114,950	= 139,600	= 145,900	=
Planned debt payments (B)	- 59,600	- 120,840	- 120,840	- 120,840	-
Cash excess/deficit	= 6,400	= -5,890	= 18,760	= 25,060	=

use of insurance. Insurance can help to reduce both risk and provide for cashflow in the case of an emergency.)

What should you look for in a loan?

When you finance a loan, you are purchasing a service. Shop around for the loan best suited for you. Most loans can be tailored to a particular situation and need. Interest rate, length of loan, and repayment schedule are important in putting together a loan that is right for you. Most people want to take the loan with the lowest interest rate. However, that is not always the best choice. Repayment period significantly affects the total dollars that must be repaid. The longer a loan is drawn out, the more interest will be charged against the outstanding principal balance. So, a shorter term with a slightly higher interest rate may cost less than a long-term, low interest rate loan. You must also consider the difference between fixed and variable interest rates. A variable rate will allow the interest rate to fluctuate and be recalculated at specified times of the year. You stand a chance that the interest rate you are paying will increase; likewise, a chance that the rate will decrease. With a fixed rate loan, you will typically pay a slightly higher rate but you are insulated against the interest rate increasing (However, you also risk foregoing a lower available rate in the future).

Deciding on the rate at which you will pay back the loan is also important. The more frequently payments are made, the less principal there will be to charge interest on. However, consideration needs to be given to what schedule will work best with your cash flow. For instance, if you receive income from milk production every two weeks, you might consider having a bi-weekly payment plan. However, you would not want a weekly payment schedule unless there was sufficient income being generated on the off-weeks. The point being, set a payment schedule that works for you. Other options may be monthly, bi-monthly, quarterly, or even annually. Some loans that are

tied to operating funds are often made payable in lump sums following the production period.

Finally, you should consider how you want to chip away at the principal portion of the loan. One of the most common repayment methods is the level payment. Using this method, the entire loan amount is calculated based on length of loan, interest rate, and payment schedule. A uniform payment is calculated and that is what you would pay each scheduled time. This works fine for a fixed rate loan, but it must be recalculated each time the rate changes on a variable rate loan.

The other popular alternative is to repay your loan with level principal payments and accrued interest. Using this method, the principal is divided by the total number of payments to be made. Each payment would then be the calculated principal amount plus the accrued interest. With level principal loans, as you make more payments, the amount of each payment is smaller. This might be very beneficial over a level payment plan where each payment is for the same amount (unless your loan used a variable rate).

Resource: Gayle S. Willett, Washington State University. Cornell Dairy Farm Business Summary (DFBS), Cornell University. Farming Alternatives, Nancy Grudens-Schucketal, NRAES-32.

Chapter 5. Soils, Crops and Cows

Change for the sake of change will not put money in the bank. Dairy farming is a business, and as such, its success is evaluated primarily by profitability. Large-scale operations are not required for profitability. However, as with any business, profitability can be increased by increasing efficiency and/or by increasing the size of the business. Increased size helps only if you have already reached a certain level of efficiency, otherwise expansion can put you deeper in the hole.

Below is a self analysis to aid in assessing your business. The process is for your benefit. Results do not need to be shared with others. The statements are aimed to provide a starting point for evaluating your dairy-forage operation.

TRUE FALSE

- | | | |
|---|---|--|
| T | F | 1. I spread manure on those fields where it is needed according to a nutrient management plan. |
| T | F | 2. I test my soil routinely and fertilize crops according to the university's recommendations. |
| T | F | 3. (If you graze) I use a grazing system to optimize the nutrients of the pasture. |
| T | F | 4. Considering my soil resources I am reaching my yield potentials for crop production. |
| T | F | 5. Forages are sampled routinely and they fall within optimum quality ranges. |
| T | F | 6. I have sufficient storage |

facilities for forages.

- | | | |
|---|---|--|
| T | F | 7. The quality and quantity of my forages match current needs. |
| T | F | 8. Overall herd health is good to excellent. |
| T | F | 9. I have attained the maximum production per cow. |
| T | F | 10. I am satisfied with my current profit per cow. |

If you did not mark true for all 10 statements there is potential for increased profitability by becoming more efficient in those categories. Improvements can be made in all categories without resorting to expansion of the dairy herd.

Soil and Crop Resources

When making a change one needs to evaluate current soil and crop resources available to determine if they are capable of handling the demand. Many times the term "quality forage" is misused. Quality can be measured differently, such as protein content, color, and brightness. One must realize that grass can be of good quality, as well as mixtures, and not all alfalfa is good quality. For instance, 16% protein alfalfa may not be in the same quality class as 16% protein grass. For discussion purposes, quality forage will be defined as **roughage that has high potential to optimize the productivity and profitability of individual or groups of animals.**

Is there any direct relationship between quality and quantity of forage that can be

produced from a given land resource? Do poor-quality soils (poor drainage, high clay content, shallow soils or whatever) produce poor-quality forages? This generally is not true, although it can be more difficult to get high quality and high yielding forage produced on a poor quality soil resource. Quality forage can be grown on virtually any soil resource. It is through good management that high quality forage is actually harvested. Yield, however, is very dependent on soil capability as well as management.

Alfalfa and corn are frequently planted in fields not suited to these crops. Low corn silage yield may not cover production costs. Alfalfa will not thrive if there are pH or drainage problems. Both corn and alfalfa are often planted on marginal sites because these two crops are perceived as "high quality." Grass, on the other hand, is more often perceived as "low quality" and is ignored as an option on many dairy farms. Researchers are currently

evaluating various methods to intensively manage grass varieties as quality forage. This may be an excellent option for expanding dairies that need more forage but have only marginal soil resources. These problems exist because the soil-crop system has not been properly analyzed.

Predicting Cows' Needs

Dairy cattle will eat a fairly predictable amount of forage in a year. This amount can be used in determining the amount of forage that will be needed in an expansion and if the land resources under control of the farm are capable of producing it, or if the balance will need to be purchased. (Worksheet Yearly Estimated Feed Needs vs Feed Produced will help with this.) Often crop production does not match what we prefer to feed. A major objective on some farms is to bring the ratio of forages in the ration into agreement with production. If you

Worksheet 5-1. Estimated yearly feed needs vs. feed produced.

YEARLY FEED NEEDS (Dry Matter)

$$\begin{array}{rcl}
 (\text{_____} \# \text{ cows}) \times (6.5 \text{ tons DM/cow}^*) & = & \text{_____} \text{ Tons DM for cows} \\
 (\text{_____} \# \text{ heifers}) \times (2.75 \text{ tons DM/heifer}^{**}) & + & \text{_____} \text{ Tons DM for heifers} \\
 & = & \text{_____} \text{ Total tons needed}
 \end{array}$$

YEARLY FEED PRODUCED (Dry Matter)

$$\begin{array}{rcl}
 (\text{_____} \text{ acres corn silage}) \times (\text{_____} \text{ tons/acre}) \times (.35) & = & \text{_____} \text{ Total tons DM corn silage} \\
 (\text{_____} \text{ acres hay crop}) \times (\text{_____} \text{ tons/acre}) \times (.90) & + & \text{_____} \text{ Total tons DM hay} \\
 & = & \text{_____} \text{ Total tons supplied}
 \end{array}$$

Do total tons needed = total tons supplied?

* = 6.5 tons of Dry Matter/year is based on a 5.5 tons consumption plus 18% loss from fermentation and harvesting losses.

** = 2.75 tons of Dry Matter/year is based on a 2.25 tons consumption plus 22% loss from harvesting and fermentation. This is a higher loss than for the cows to reflect the higher % hay often fed.

This is based on average quality feed, remember as quality increases, dry matter intake increases, which increases the amount of feed needed.

Worksheet 5-2. Calculate the Ratios of Corn Silage and Haycrop Dry Matter Consumed to Total Forage Dry Matter Consumed for all Cattle on a Dairy Farm.

Milk Cows		Dry Cows		Heifers		Herd		DM Fed
(lbs corn s.)	+	(lbs corn s.)	+	(lbs corn s.)	=	corns s. lbs x % DM		=DM lbs corn silage
(_____ lbs)	+	(_____ lbs)	+	(_____ lbs)	=	_____ lbs x _____% DM		= _____ DM lbs corn silage
(lbs haylage)	+	(lbs haylage)	+	(lbs haylage)	=	haylage lbs x DM %		= DM lbs haylage
(_____ lbs)	+	(_____ lbs)	+	(_____ lbs)	=	_____ lbsx _____% DM		= _____ DM lbs haylage
(lbs hay fed)	+	(lbs hay fed)	+	(lbs hay fed)	=	hay lbs x % DM		= DM lbs hay fed
(_____ lbs)	+	(_____ lbs)	+	(_____ lbs)	=	_____ lbs x .90		= _____ DM lbs hay fed
							Total	= _____ DM lbs forage needed
(DM lbs corn silage)	+	(DM lbs haylage)	+	DM lbs hay	=	DM lbs forage needed		
(_____ lbs)	+	(_____ lbs)	+	_____ lbs	=	_____ DM lbs forage needed		
(DM lbs haycrop)	+	total DM lbs forage needed)	x	100 =		% total DM from hay crop		
(_____ lbs)	÷	(_____ lbs)	x	100 =		_____ %		
(DM lbs corn s.)	+	total DM lbs forage needed)	x	100 =		% total DM from corn silage		
(_____ lbs)	÷	(_____ lbs)	x	100 =		_____ %		

are feeding on a dry matter basis, 60% haylage (or hay) and 40% corn silage and you are harvesting 40% hay and 60% corn silage, then your production and feeding system are out of balance. The result may be that you will run out of haylage to feed and have to switch back to all corn silage. You may then run out of corn and have to switch back to haylage. Changing feed rations is one of the largest limitations to increasing milk production; a stable diet is easier to improve than a wildly fluctuating one.

Rotation Planning

Crop rotation planning is the forgotten management tool for meeting yield, quality, and cost of production goals. Rotations have a tremendous impact on the profitability of the farm. It underlies the entire crop program,

which is the basis of your cost of feed, which is part of the cost of producing milk, and regulates a great deal of profit potential. **Crop costs** have been identified by the major lending agencies as the **"biggest hidden profit loss on the farm today."** Crop rotation can be used to adjust the ratio of corn silage to hay crop that is fed. A crop rotation is planned to become the core of the forage production plan. During a herd expansion will your rotation be thrown off? The suggested rotation for New York is up to three years of corn followed by up to five years of legume/grass hay. More than three years of corn limits the potential to meet nitrogen needs of the corn from manure. Higher pesticide costs and deteriorating soil conditions will also reduce corn yields. More than five years of hay crop results in decreasing yields and quality, limiting top profit and production potential. Soils should drive the rotation which drives what the

cows are fed. If you feed differently, purchase the difference from off the farm.

Having a supply of forage available on a year round basis requires thoughtful management because the growing season is about six months long and there is need for feed every day of the year. In dairy operations designed for year-round milk production, demand for feed is fairly consistent throughout the year. Experience shows that successful livestock operations produce most, if not all, of their forage-feed requirements. Balancing supply and demand can be done by trial and error, but planning is a better approach. One can either start with forage production and determine how many animals can be supported on a year round basis, or inversely, one can determine how much forage production is needed to furnish the yearly feed supply for a given set of livestock. The procedures are not exact, but they enable one to get a good idea of the forage/livestock balance in various plans. Such insight is quite useful when faced with an unfamiliar management situation.

The basic elements in any forage production plan are: 1) an inventory of the available land resources, and 2) an estimate of how much feed can be produced on those resources. The first step in formulating a crop rotation plan is to identify the soil resources as to the land-use capability and drainage class. The county soil survey and the local office of the Soil Conservation Service are sources of accurate information. Associated with each land-use capability class is a rotation requirement of the minimum number of years out of five that the land should be in a soil-protecting perennial crop. You should consider that conservation tillage reduces the minimum requirement for perennial crops. After the rotation is selected, it must be assigned to land parcels. To do this, each kind of land being managed with the same rotation should be subdivided into as many equal-size parcels as there are years in the rotation. The objective is to have the same acreage in each stage of the rotation in each

year and to have all of the land in question managed in the same rotation. As a final check on the rotation plan, you should be able to calculate the acres in each crop for each year of the rotation to confirm that each year is identical.

If the rotation involves the same number of acres of each crop in each year, the average yield of the land resource will be the same in each year. One then needs to complete average annual yields. The best source for yield information is from actual harvest tonnage. Next, compute animal numbers and purchased feed requirements. To do this, calculate how much dry matter of each kind of feed from each land class is actually available for animal consumption. Next combine all the tonnages of all kinds of feed to find the available animal feed for the whole farm. Then select a general ration by looking at the general ratio of hay crop to corn silage. Finally, from the available tonnage of hay crop and the selected ration requirement, you can calculate the number of cows that can be supported on the soil resource. "Planning a Forage Production Program" (SCAS Teaching Series No.T93-3) Sept, 93 by Gary W. Fick is useful in designing a rotation.

Rotational Grazing

Is rotational grazing a desirable management option? Rotational grazing is not for everyone, but properly managed, it may be the most economical forage management option for many dairy farms. Some points to ponder when considering rotational grazing for dairy cattle are:

- 1) Am I willing to invest less in equipment and more in management?
- 2) Can I provide separate, accessible grazing for lactating cows, dry cows, and heifers?
- 3) Am I willing to deal with fencing, both permanent and temporary?

- 4) Can I provide water, one way or another, to all fields that will be grazed?
- 5) Am I willing to get out and walk the pastures every day?
- 6) Can I substitute alfalfa with grasses?
- 7) Am I willing to manage animals more closely as far as bloat and parasites are concerned?
- 8) Am I willing to accept a slightly lower milk production per animal?
- 9) Can I live with less gross income and more net income?
- 10) How much can I expand herd size and still be able to use rotational grazing?

Although grazing-type alfalfa varieties are now available, you still need to plant them in fields suitable for alfalfa production. Species selection for grazing is even more important than for nongrazed fields. When switching from confined feeding to rotational grazing, you simply substitute one set of concerns for a different set. However, confined feeding and the harvest management necessary to produce stored feed will still be required. Grazing generally adds one more management concern without eliminating any of the other harvest options from the plan. Therefore, grazing does add one more layer of complexity to the management strategy. For success in rotational grazing, more management input is needed, not less.

Managing Forage Quality

Dairy cattle have high nutrient requirements, relative to other classes of ruminants, and the overall feeding objective is to maximize performance by maximizing feed intake (depending on feed costs). Maintenance and production requirements are affected by age, sex, stage of lactation, and environment. Dairy

cows produce milk more efficiently at higher levels of production, because most production costs are fixed. Also, as production per cow increases, so does the concentrate feed component of the diet--as well as the chances of upsetting the animal.

Dairy farming is a business. Estimates of forage production, storage capacity, and animal requirements should be used in enterprise planning as a framework to operate the business. A strategic plan should be in place that estimates the quantity and quality of forage needed for each animal class, where the forage will be produced, and what the storage and access options will be. The plan should include a means of providing high quality forage to young growing heifers and lactating cows (first 100 days of lactation) 365 days a year. Profitability will be reduced if high quality forage is fed to animals with low nutrient requirements, or if medium- or low- quality forage is fed to animals with high nutrient requirements.

Feed allocation is an important management function that uses various storage structures for both high and low quality forages. This in turn allows for matching animal needs to the form and capacity of storage structures. Also, how one handles the forage during preservation and storage can influence the quality of that forage. **The Hay and Silage Storage and Preservation Self-Examination** below may help in this area.

1. Am I satisfied with the split between hay and haylage production on my farm?
2. Do I think there are significant quality changes or losses taking place between the standing crop and the forage delivered to the animal? Have I forage tested before cutting and after storage of the same material?
3. What are the target moisture levels for removing forage from the field for hay or haylage?

4. By what means is the moisture content determined for either hay or haylage production? Does the method seem accurate?
5. About what percent of my forage crop gets rained on during field curing?
6. Does the complement of storage facilities on the farm seem either too small or too large?
7. Am I able to leave the silos closed two weeks before unloading them, as recommended for maximum preservation?
8. Is soluble protein of hay crop silage a concern?
9. Is there enough flexibility so that the high and quality forage can be stored separately and accessed when needed?
10. Are silo unloading rates fast enough in the summer months to stay ahead of surface spoilage?
11. Have alternative silage storage facilities been considered (bags, bunkers, etc.)?
12. Do you use or have you considered using hay or silage preservatives? If you are using one, what are your objectives for it, and does it seem to be fulfilling them?

Expanding Herd Size: Land Factor

A concern that can no longer be ignored is the appropriate management of nutrients from fertility and manure. The objective is to use manure as the major source of plant nutrients with fertilizer used to supplement additional needs. Implement good soil and water control measures to reduce loss. Nutrient management problems tend to get worse as the size of the livestock enterprise increases if there is inadequate land. The number of animals per

land unit and the capacity of the land to receive waste must be in harmony (Table 1).

The potential to successfully manage nutrients will depend on the amount of cropland available for manure application relative to the size of the herd. Farms with a low animal density (small number of animals relative to the number of acres) have a greater potential to utilize nutrients efficiently than farms with a very high animal density. The need for effective nutrient management categories and their impact on the potential for efficient nutrient recycling is presented as a guideline in Table 1. The management skill of the operator is the most important aspect of an effective plan. This guideline is not intended to serve as a basis for regulatory action nor does it guarantee the success or failure of a particular nutrient management category.

A first approximation of animal density guidelines for dairy farms is given by Stu Klausner, Cornell University. Some overall assumptions include: animal units (a.u.) are 1,000 lbs., and that manure contains 6 lbs. of organic nitrogen per ton at 50% availability to the crop with little or no ammonia conservation. All of the nutrients are used on the farm, and good management practices are followed. The guidelines are based on maximizing nitrogen use.

These guidelines are not intended to serve as the basis for regulatory action nor does it guarantee success or failure of a particular animal density category. The management skill of the farmer is the most important aspect of the plan. A poor manager of a low density farm may do more harm than a good manager of a high density farm.

Category One is low-animal density and a probable deficient nutrient status. If you fall into this category, there is adequate land base for spreading manure and the nutrients available in the manure may be less than the crop requires. The nutrients in manure are used efficiently and there is good impact on

economic return from manure but supplemental fertilizer input is necessary. Relative nutrient loss potential is low. Management considerations include: 1) it is not necessary to

management plan is important.

Category Three is very-high-animal density with a surplus nutrient status. In this category, the total nutrients in the manure exceed crop requirements, and there is inadequate land base for spreading. Good management may not prevent nutrient loss resulting in negative impact on economic returns if there is a cost to reduce nutrient inputs. Relative nutrient loss potential is high to very high. Management considerations include: 1) consideration given to transporting excess nutrients off the farm, 2) purchasing additional land for nutrient utilization and 3) reducing animal density. A nutrient management plan may not be effective in utilizing 100% of these nutrients on the farm.

Table 5-1. A first approximation of animal density guidelines for dairy farms

Category	Animal Density	Crop Rotation	1000# animal unit/tillable acre
One	Low	corn-legume	<1.00
		corn-grass	<1.50
		grass	<2.25
Two	High	corn-legum	1-1.50
		corn-grass	1.50-2.25
		grass	2.25-2.50
Three	Very High	com-legum	>1.50
		com-grass	>2.25
		grass	>2.50

Footnote:"This guideline is not intended to serve as the basis for regulatory action nor does it guarantee the success or failure of a particular nutrient management category. The management skill of the operator is the most important aspect of an effective plan."

Expanding Herd Size: Animal Factors

Whether you increase herd size by 10, 30 or 300 animals, the same factors must be considered in long term (5-10 year) planning. Each

apply manure to legumes, 2) ammonia conservation may be important to conserve nitrogen, and 3) a detailed nutrient management plan to avoid overloading may not be necessary.

Category Two is high-animal density with nutrients most likely in balance. In this category the nutrients in the manure should approximate crop requirements; usually there is adequate land base for spreading. There is a need to maximize manure management practices to prevent their loss with minimal supplemental fertilizer needed. Relative nutrient loss potential is moderate to high. Management considerations include: 1) the necessary to apply manure to legumes in corn-legume rotations, 2) ammonia conservation may not be important to conserve nitrogen, and 3) a nutrient

day, the cows must be milked, given feed and water, checked for heat, treated for any illness, provided with clean and comfortable stalls, and have manure removed. Increasing animal numbers will complicate each of these tasks. Time spent gathering information, developing a business plan, goal setting, and organizing before the animals arrive is time well spent.

Table 5-2. Diseases purchased cows may bring to your herd

- ⇒ Contagious mastitis
- ⇒ Bovine Viral Diarrhea (BVD)
- ⇒ Pneumonia - shipping fever syndrome
- ⇒ Foot infections - hairy foot wart, foot rot
- ⇒ Johne's disease
- ⇒ Bovine Leukosis (BLV)

Where Are the Cows Coming From?

This is one of your most important decisions. Are you going to expand herd size from within your herd by keeping more heifers? Should you buy bred or springing heifers? Are you buying animals at a herd dispersal, sale barn, or from a cattle broker? Should you buy young heifers and invest time and money in raising them?

The answers to these questions will depend on how quickly you want to expand, the size of the expansion, the quality of your herd, facilities on the farm, and your budget. Buying cattle is like buying a used car. You can evaluate the outside appearance but you know little about the inside condition. Unfortunately we are not allowed the option of "test driving" the cows prior to purchase. Too often, we hear about purchased animals that do not do well or bring contagious diseases into a herd.

Health Considerations when Purchasing Cattle

Most dairies must purchase cattle to accomplish a major expansion. There is a significant health risk when cattle are purchased. This risk is amplified when the resident or host herd has been closed for a number of years.

Strategies to reduce health risk involve pre-purchase examination, vaccination, isolation of incoming animals, minimizing stress, and early recognition and treatment of sick animals. Many also recommend buying first calf heifers and moving them to your farm to acclimate a few months prior to calving. Your veterinarian is a critical partner for assistance with planning a disease control program for your herd expansion.

The host herd may be vulnerable to diseases it has not been previously exposed to. The most prevalent one are listed in table 5-2. The first and probably most important factor in preventing large losses due to introduction of disease is to strive for optimal health and immune status in the home herd. Sound nutrition management and an appropriate up to date vaccination program are very important to maintaining a high immune status. Further minimizing health risks involves having a plan, table 5-3, that should be developed with your veterinarian for your specific situation.

5-3. Strategies to control or manage introduced diseases

1. **Protect home herd** - Optimize management and vaccination status of your own herd..
2. **Monitor additions**
 - ◇ **Prepurchase** (if possible) - Acquire history, inspect, screen, vaccinate (3 weeks), and/or premedicate.
 - ◇ **Post-purchase** - Identify, segregate, minimize stress, monitor closely, provide plentiful ventilation, feed, and water, test, re-vaccinate, and treat or cull immediately when needed.

Figure 5-1. Reducing disease risk during expansion

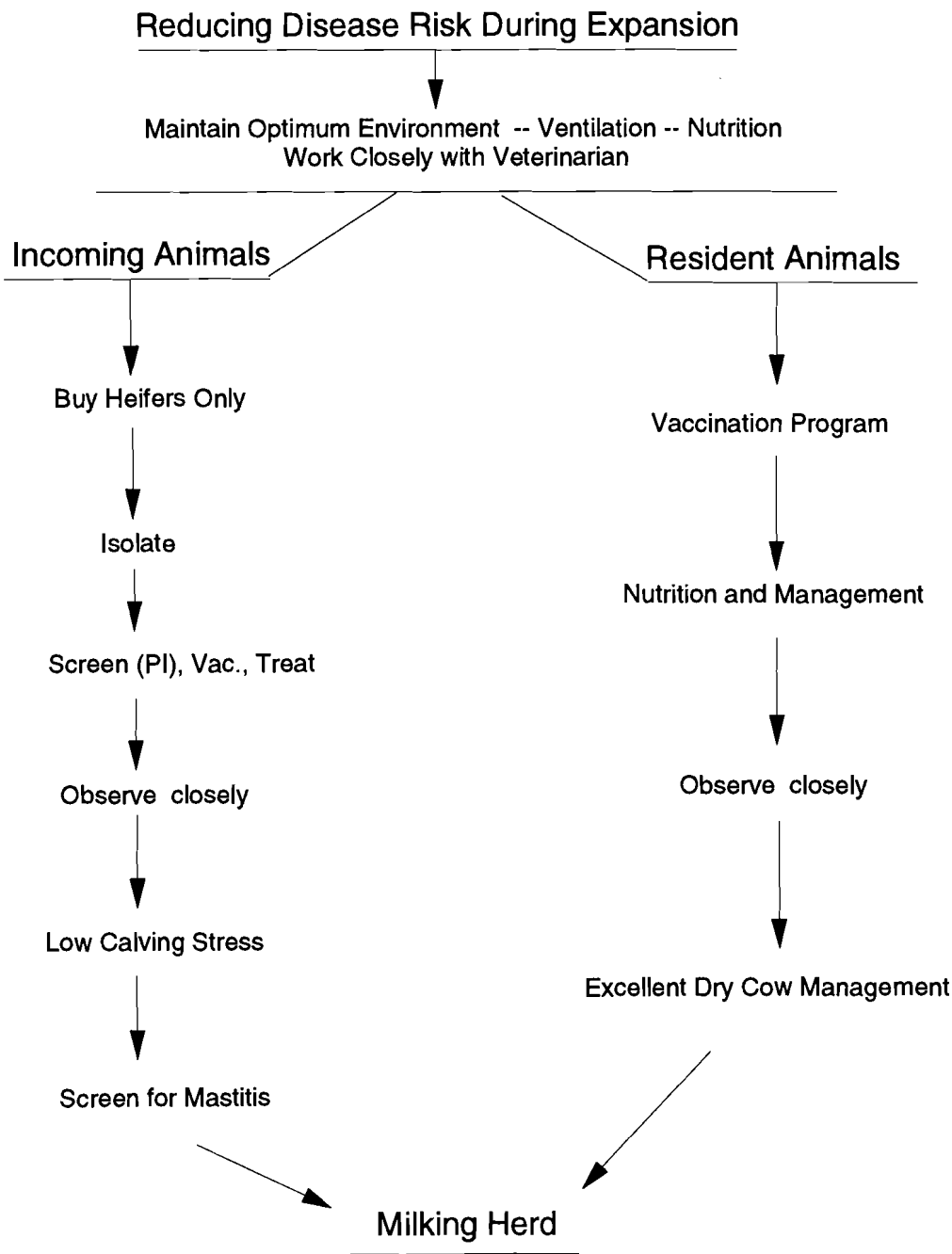


Table 5-4. Feedlot respiratory disease incidence

Auction Market Derived Calves	25- 60%	require treatment	3 - 5% die
Ranch Derived Calves	5 - 25%	require treatment	2 - 3% die

The pre-purchase examination is the first critical step. Well-grown, healthy cattle are needed to maximize milk production. The pre-purchase exam provides an opportunity to observe cattle closely. Weights of first calf heifers should be evaluated using either a heart girth measurement or scales. A history or records on health of the herd may be helpful. Ultimately, however, one is wise not to rely on history alone; take all precautions, regardless. When purchasing milking cows, this is the ideal time to evaluate the level of mastitis infection. A series of three bulk tank cultures taken within one week will yield a ninety five-percent accurate assessment of the mastitis causing organisms present in the herd being considered for purchase. Additions can also be screened for BVD, Johne’s disease and Bovine Leukosis prior to purchase.

Feedlot studies show that the risk of disease and death is greater when feeders are purchased at auctions. Experience of feedlot operators as shown in Table 5-4, indicate that there is likely to be less health risk associated with purchasing cattle directly from another farm rather than through a sale barn. Although these figures pertain largely to pneumonia or shipping fever, the concept applies to all contagious infectious diseases.

Both vaccination and sound management practices are critical to controlling infectious diseases. An effective vaccination program to starts with a well implemented program in the host herd. Vaccination in calves and continued in heifers is the foundation of a disease control program, particularly for BVD and respiratory

disease complex. Immunity in the host herd is maintained by following through with regularly timed vaccination of mature animals. Purchased animals should be vaccinated three weeks

prior to moving, when they are moved, and again within a few weeks of arrival at your farm. Your veterinarian will be able to help you determine the specific vaccines to use and the timing of injection.

When new cattle are moved to your farm it is safest and best to isolate them from the host herd for a few weeks. This can be accomplished using a segregated fenced lot during most of the year. This situation provides the maximum ventilation for dilution of disease-causing agents. Close observation of new animals should be planned for the first month they are on your farm as outlined in table 5-5. Experience of feedlot operators shows us that clinical disease symptoms are most likely to be observed 12 to 25 days following a move. The incidence of disease outbreak usually ends after 35 days. Isolation also allows the purchased cattle to be milked last until culture results are received and mastitis infected animals have either been culled or treated.

Tables 5-5. Monitoring for early recognition and treatment of disease

1. Plan in advance.
2. Allot labor and facilities for close observation and immediate treatment.
3. Establish diagnostic criteria.
4. Put a treatment plan in place.
5. Assess treatment successes.
6. Assess treatment failures.

Mastitis is frequently unnoticed in the early months after cows are added to a herd. It takes time for the imported mastitis causing organisms to spread through the host herd and for infections to develop to clinical stages. Frequently, mastitis that is brought into a herd during expansion results in increased culling before the problem is recognized. To reduce the potential for increased mastitis when cattle are purchased, milk the new cows last. Culture each cow while she is in isolation and take appropriate treatment or culling action before your herd is exposed to the mastitis causing organisms that the new cows carry to your herd.

The incidence of infectious pododermatitis (foot rot) can be increased by introduction of infected new animals. Recently a more aggressive foot rot, which is not responsive to traditional treatment has been observed in some herds. Hairy or Strawberry heel warts is very contagious and has become a new problem in recent years. It causes severe lameness in many cows and can be very costly to a dairy. Dry matter intake frequently is reduced because it is so uncomfortable for cows to stand at the bunk and eat. The use of a tetracycline or formaldehyde foot bath that is changed daily are the better methods used to date for controlling heel warts. However, prevention is the best control method through a good history, isolation, good sanitation, and management of new and home herd animals. Again, your veterinarian is the expert in how to manage this disease.

Reproductive management sometimes slips during construction and early months of an expansion. Monitor your heat detection and breeding closely during expansion. Average days open to first breeding is a good indicator of reproductive performance. The last thing a newly expanded dairy needs is a barn-full of long lactation cows that are not due to freshen for several months. This mistake takes at least nine months after it is recognized and corrected for any financial response to occur and

Table 5-6. Plan ahead to minimize introduced diseases and losses

- | | |
|----|---|
| 1. | Work with your veterinarian ahead of time. |
| 2. | Identify potential risks before you buy: <ul style="list-style-type: none">◇ Review health, management, and vaccination status of home herd.◇ Investigate infection and vaccination status of additions. |
| 3. | Develop strategies to identify and control or manage introduced diseases. |
| 4. | Compare the cost of preventive measures to the cost of treatment and potential animal losses. |

generally years to recover from the cash shortfall it creates.

Health risks associated with the expansion of a dairy enterprise can be reduced significantly with careful planning and attention to the details of a sound herd health program. Table 5-6 shows some key points to address. It is most important to make sure the home herd is well protected. Pre-purchase examination, vaccination, stress minimization, proper ventilation, isolation and careful monitoring of both newly acquired animals and the host herd are crucial. "Let the buyer beware" should be the motto of the purchaser of cattle. Use all the tools available to protect your herd and assess the health of cattle you are considering for purchase. Keep watch on them once they arrive at your facility. Take control of critical areas for your dairy herd through regular monitoring. These practices will reduce the risk of health related problems for your dairy.

Estimating the Potential Production of Purchased Animals in Your Herd

When possible purchase cattle with records (DHIA, etc.). The motto "Buyer Beware" applies to cattle without records. It has been assumed that conformation or type influences the longevity of dairy cows. Conformation or type score has limited value in predicting longevity or milk production in a herd. Studies which investigated the relationship between type and longevity report that relationship to be negative. As type score increased, milk yield and longevity decreased. If you are limited to an evaluation based upon type, focus on udder attachment both fore and rear, udder depth and dairy character (angularity). These traits have a stronger association with milk yield than other traits.

With the increased use of AI, genetic differences between herds are becoming smaller. Genetic differences among herds account for about 10% of the difference observed in milk production herd averages among Holstein herds. Environmental and management factors account for 90% of the difference in milk production herd averages among farms. To predict how any purchased animals will do in your herd, follow these simple steps:

1. Subtract your herd average from the herd average of the seller's herd and multiply the difference by .10 (or divide by 10).
2. Subtract the herd average of the seller's herd from the records of the cows you wish to purchase. If the number is positive; add it to your herd average. If the number is negative; subtract it from your herd average.
3. Add results of 1 and 2 to your herd average.

Don't purchase any animals that would decrease your herd average.

Example 1. Herd average of a Seller's herd is 19,000 lbs. Production record of the cow you want to buy from that herd is 21,000 lbs. Your herd average is 17,000 lbs.

1. $\frac{(19,000 - 17,000)}{10} = 200$
2. $21,000 - 19,000 = 2,000$
3. $17,000 + 2,000 + 200 = 19,200$ = how this cow should perform in your herd.

This cow should improve your herd average, so purchase her if she exceeds other standards or criteria you select.

Example 2. Herd average of seller's herd is 24,000 lbs. Production record of the cow you wish to buy from that herd is 22,000 lbs. Your herd average is 17,000 lbs.

1. $\frac{24,000 - 17,000}{10} = 700$
2. $22,000 - 24,000 = -2,000$
3. $17,000 + (-2,000) + 700 = 15,700$ = how this cow should perform in your herd.

Don't buy this cow, she will not improve your herd average. A below average cow in a high-producing herd will perform below average in your herd. Remember, 90% of the differences between herd averages is due to the environmental and management factors within the home herd.

Example 3. Herd average of seller's herd is 18,000 lbs. Production record of the cow you wish to buy is 22,000 lbs. Your herd average is 20,000 lbs.

1. $\frac{18,000 - 20,000}{10} = -200$ lbs
2. $20,000 - 18,000 = 2,000$ lbs
3. $20,000 + 2,000 + (-200) = 21,800$ lbs Buy this cow, even though she comes from a herd with a lower herd average than yours. Once in your herd, she should respond to your level of management and environment. Buy only those animals with production records greater than the herd average of the seller's herd.

Purchasing Heifers

If you have surplus good quality forage and a clean, well ventilated heifer barn, then consider

Purchasing bred heifers. Bringing them to the farm six to seven months prior to calving will allow time to change body condition as needed. It will give the heifers time to adjust to your system. The cost for this opportunity will be approximately $\$1.50/\text{day} \times 210 \text{ days} = \325 per heifer.

If within six months after expansion you will need additional income to meet debt payments, then purchase springing heifers or a dispersed herd. These animals will add to your cash flow but may not adapt well to your system or feeding program. If you have a free-stall barn, buy animals from another free-stall operation. They will adjust easier than cows from a stanchion barn. If you plan to use rotational grazing as part of your program, then buy cows from other farms using a grazing system.

Expanding Your Herd from Within

To limit your debt per cow, expand herd size from within your herd. You must be able to manage the heifers so that they weigh about 1250 lbs at 24 months of age. You must also have a low involuntary cull rate in the herd. This will work best if you plan to increase herd size gradually over five to ten years and currently have excess space. If your present facilities are crowded, determine if the current

herd can support debt payments on a new larger barn until herd size increases.

Review Your Current Situation Prior to Expansion

Step 1. Evaluate the current management of your herd using Worksheet 5-3.

If your herd is below the goal for A, B, and C then improve your labor efficiency, feed bunk management, and feed program prior to expanding the herd.

If your herd is above the goal for D then improve your sanitation, milking technique and mastitis control prior to herd expansion. Develop a routine herd health program with your local veterinarian.

If your herd is above the goal for E and F, then you must increase herd size without increasing debt per cow. Determine if it is possible to sell some assets, such as surplus forage or heifers with poor genetic potential, to provide capital to purchase new animals.

If your herd is below the goal for G, or above the goal for H, then develop a cost control plan prior to increasing herd size.

Worksheet 5-3. Production factor goals

A) Pounds milk sold per cow/yr	18,000+
B) Pounds of milk sold/yr per worker	600,000+
C) Cows per worker	35 - 45
D) Bulk tank somatic cell	< 250,000
E) Debt per cow	< \$2000
F) Yearly debt service per cow	\$300-500
G) Net farm income per cow/yr	\$500+
H) Operating cost to produce 100 lbs milk	< \$11.00

It is important to complete step 1 because expanding herd size will only compound any problem areas identified in step 1.

Step 2. Determine if the soil and water resources of the farm can handle increased cow numbers.

You must be able to produce higher quality forages in sufficient quantity to match forage quality with the nutrient needs of the animal. Higher quality forages need to be allocated to early lactation cows and calves.

Forage Quality is the single most important factor influencing feed cost.

If land resources limit forage quality, don't expand herd size without planning to purchase high quality forage.

If you consistently produce forage of good to excellent quality or are willing to purchase this forage, go to the next step.

If greater than half your forage is less than good or average quality do not expand herd size till you solve the problem.

Step 3. Facilities and the Delivery of Cost-Effective Rations

The best ration can be ruined by a lack of clean, fresh water. Abundant, clean drinking water is essential. Table 5-8 and Worksheet 5-4 will help you estimate the water needs of your herd.

If cows are consuming pasture or the ration moisture content is below 50%, decrease estimated water consumption by 25%

Example: There are 80 cows/group. Milk production of the group is 60 lbs/cow. Season of the year is summer. There are 2 water troughs which hold 300 gallons each.

Daily water needs per cow from table = 27gal/cow/day

Water required by group = $80 \times 27 = 2,160$ gal/day

Maximum available water when tanks are full = $2 \times 300 = 600$ gallons

Table 5-7. Guidelines for Forage Evaluation and Allocation on Your Farm

Forage	NDF %	ADF %	% CP	Allocation
Alfalfa, 1st cutting Prebloom, vegetative Excellent Quality	40-44	30-33	20-22	Fresh cows, cows fresh less than 100 d and calves
Alfalfa, 1st cutting Earlybloom to Midbloom Good Quality	48-54	35-40	17-19	Cows 100 to 250 DIM and bred heifers
Alfalfa, 1st cutting Mid - Late bloom Fair Quality	56-59	42-46	< 17	Cows 250+ DIM and bred heifers
Grass-legume mix Excellent Quality	49-55	38-42	17-19	Cows 100 to 250 DIM, and young heifers
Grass-legume mix Fair Quality	56-65	43+	< 16	Cows 250+ DIM and bred heifers
Corn Silage Excellent Quality	< 45	< 25	6-8	All cows and heifers
Corn Silage Average Quality	45-52	25-30	6-8	All cows and heifers
Corn Silage Fair Quality	52-58	30-35	6-8	Cows 100+ DIM and bred heifers
Grass Haylage or Grass Hay	55-60	30-38	16+	Cows 100 to 250 DIM
Grass Haylage Grass Hay	60-70	38-45	< 15	Bred heifers and dry cows

Table 5-8. Water Requirement of Dairy Cows

Stage of Lactation	Milk Yield lb/day	Season	Water Intake ¹ gal/cow/day
Dry cows	0	Winter	11 - 13
		Summer	15 - 16
Late Lactation	40	Winter	19 - 21
		Summer	22 - 24
Mid Lactation	60	Winter	22 - 24
		Summer	25 - 27
Early Lactation	80	Winter	25 - 27
		Summer	27 - 29
Peak Lactation	100	Winter	28 - 30
		Summer	30 - 32
Peak Lactation	120	Winter	31 - 34
		Summer	33 - 35

¹adapted from Beede, D.K. 1992. Water for dairy cattle. pp. 260-271. In: Large Dairy Herd Management, H.H. Van Horn and C.J. Wilcox, eds. American Dairy Science Assoc., Champaign, IL

16 16 16

Flow rate per water trough = 3 gallons per minute

Time required for tanks to completely refill = 300/3 = 100 minutes

Number of times tanks must refill/day = 2160/600 = 3.6

In this situation water intake would not be limited because the water troughs would not go dry during the day.

You need to determine if your current well can supply the water needs of the larger herd. You should have the well water tested for nitrates, sulfur, chlorine and calcium. These minerals in high concentrations can reduce water consumption and affect herd health. Cows will drink from 1 to 6 gallons of water per minute. Water consumption can be affected by flow rate. Flow rate is a function of pipe diameter and water pressure. A flow rate of 1 to 2 gallons per minute has been shown to reduce water intake when cows drink from water bowls. A flow rate of 3 to 5 gallons per minute should allow for rapid filling of the water tank.

Worksheet 5-4. Water Worksheet

A)	Number of cows per herd or group	
B)	Average milk production per herd or group	gal/cow
C)	Season of the year	
D)	Daily water needs per cow from table	gal/cow
E)	Water required by herd or group (D X A)	gal/day
F)	Number of water trough or tanks	
G)	Capacity of water trough or tanks	gal/tank
H)	Maximum available water (F X G)	gal
I)	Flow rate per tank or water bowl	gal/min

An inexpensive way to boost milk production is to make sure a lack of water is not limiting milk production. Maximum water consumption will occur following milking. So water should be available in the return lanes from the milking parlor. There needs to be enough water troughs so that cows do not back up at the tank. Water just like feed needs to be provided free choice; another words cows need access to water 24 hr/day. Don't assume cows get the water they need from pasture. If intake of pasture is 80 lb/cow, it will provide only 64 lb or 8 gallons of water.

Additional Reference:

Radostis, OM, Leslie, KE, and Fetrow, J. Herd Health. Food Animal Production Medicine, 2nd ed. Philadelphia, W.B. Sanders Co. 1994.

Church, T. Preventive medicine in the feedlot. Symposium on herd health management - cow-calf and feedlot. Vet Clint North Am (Large Animal pract), (5):29-30, 1983.

Lot feeding and beef production. Post Grad Comm Vet Sci Univ Sydney, 137:1 445, 1990.

Cornell Field Crops and Soil Handbook, Second Edition, New York State College of Agriculture and Life Science, Ithaca, NY

Cornell Field Crops and Soil Handbook, A Cornell Cooperative Extension Publication

1994 Cornell Recommends for Integrated Field Crop Management, A Cornell Cooperative Extension Publication, was prepared by J. H. Cherney, W.J. Cox, R.R. Hahn, S.D. Klausner, Atmospheric Science; E.J. Shields, Department of Entomology; W.D. Pardee, Department of Plant Breeding; G.C. Bergstorm, Department of Plant Pathology; and J.K. Waldron, IPM Support Group. A revision of the printed document completed annually.

Feeding Management: A Pro-DAIRY Management Focus Workshop for Dairy Farm Managers, Participant's Manual, Larry Chase, Gary Bigger, John Conway, Bill Menzi, Kurt Ruppel, Mary Beth Rymph, and Clint Young, October 1989.

Forage Production: A Pro-DAIRY Management Focus Workshop for Farm Managers, Facilitators' and Participants' Manual, December 1989, Nathan Leonard, Robert Milligan, William Pardee, W. Shaw Reid, Thomas Kilcer, Ronald Pitt, Dale Dewing, Darrell Emmick, Jeffrey Miller, R. Clinton Young, Judith Wright, J. Keith Waldron, and Philip Sutton

Pro-DAIRY Nutrient Management on Dairy Farms -- Management for Farm Profit and Environmental Protection. Contributions: Stu Klausner, Nathan Leonard, Stanley Telega, Les Lanyon, Stephen Hadcock, Alice Pell, and Bruce Tillapaugh, January 1993.

Silage Production -- From Seed to Animal, NRAES-67, Proceedings from the National Silage Production Conference, Syracuse, NY, February 23-25, 1993.

Chapter 6. Managing Risks Related To Herd Size Expansion

There are many sources of risk in agricultural production. The intent of this section is to discuss some of the risks that are specific to increases in the size of the dairy herd on your farm and to make some suggestions about reducing or managing those risks.

Actually, you should think about your dairy farm expansion in the context of uncertainty. There are many things about the future that you don't know for sure, and uncertainty includes some good things that could happen as well as the bad things. For example, neither you nor anyone else knows for sure what milk prices will be in the future. It is possible that they will be higher than most of us believe, as well as being lower. However, the managers of dairy farms, particularly those who are considering major expansions, usually are more concerned about the bad things that could happen than about the good things. Therefore, this section is written in the context of risk rather than uncertainty.

Sources of Risk

A number of years ago, a group of farm management extension workers described the major sources of risk in agriculture to be:

1. **Production and Yield Risk.** This includes items such as crop yields and milk production per cow.
2. **Market and Price Risk.** This includes lower-than-expected milk prices as well as higher-than-expected prices for inputs.
3. **Business and Financial Risk.** Examples are unanticipated increases in interest rates or changes in lender policies.
4. **Technology and Obsolescence.** An example is rapidly changing milking parlor designs which may make your

new milking parlor out of date long before it's worn out.

5. **Casualty Loss Risk.** This category is largely made up of risks against which you can buy insurance, which sets it apart from all the other sources of risk discussed here. For example, you can purchase fire and wind insurance on your new barn.
6. **Social and Legal Risk.** This category is much more important than it used to be and includes items like new environmental regulations and lawsuits from neighbors who believe you have damaged the environment.
7. **Government Policy Risk.** It is possible that changes in government dairy policy, agricultural conservation policy or other policies that affect agriculture could change substantially after you expand your herd size. While such changes would affect your operation even if you don't expand, the impact could be much greater if you substantially expand your herd.
8. **Human Risk.** This includes health and accident problems that could happen to you, your family, or your valued employees that would jeopardize the future of your business. It could also include a key employee who quits abruptly at a crucial time.

These risks exist as you operate your current farm business, but they will become more important as you make a major expansion in your business.

Your Attitude Toward Risk

While you are considering the expansion decision, you should consider your own attitude toward risk. Some farmers seem to enjoy taking risks while others become very frustrated by the same kinds of risks. As a starting point, you may want to think about your reaction to risky situations you have encountered in the past. You may want to take the "risk quiz" at the end of this section.

You should keep in mind the attitudes of your spouse and other family members toward taking risks. For example, if you like to take risks but your spouse doesn't, a major expansion of your dairy farm might lead to an unhappy situation. You may even need to consider the attitudes of your key employees toward risk.

Dairy Expansion Risks

The remainder of this section discusses some of the risks involved in a major dairy herd expansion. It does not cover all possible risks. It is based largely on observations of farms that have made major increases in herd size. The risks discussed are categorized according to the seven sources of risk discussed earlier.

Production and Yield Risk

Low production per cow with a larger herd size.

While there is no good reason for a larger herd (in the long run) to have lower milk sold per cow than a smaller herd, it is quite likely to happen during a transition period. For example, if the added cows are first-calf heifers, average milk sold per cow on the entire herd almost certainly will drop. Even if the added cows are more evenly distributed age-wise, they still may not produce as well as those from your own herd. There is always the risk of bringing in disease with purchased animals that may affect the entire herd.

There are two actions that you can take. One is to minimize the drop in production by carefully selecting the expansion animals and carefully managing the feeding, breeding and herd health programs. The second is to recognize that there may be a drop in production per cow during a transition period of several years and allow for it in your cash flow planning.

Can you keep the barn full?

A common problem in herd expansions has been the debt and payments on facilities that are not kept running at capacity. This occurs for a variety of reasons.

1. The desire to expand the herd without purchasing animals. There is a tendency to underestimate the number of additional animals that will be required because of failure to recognize the culling rate. Sometimes this leads to keeping cows that normally would be culled, and average production per cow suffers.
2. Reluctance of the lender to provide enough money to allow the barn to be filled with cows. Typically, this is because the total debt is just too great in relation to the assets for the lender to provide more credit.

Lower crop yields and quality

A larger herd size probably means that you will have a larger acreage of crops to manage. In addition, the added land is likely to be farther from the home base and may be less productive than the land you now operate. All these factors could lead to lower crop yields and quality unless you are prepared to properly manage the cropping program.

Here are some suggestions that may help maintain and improve the cropping program. If your farm business is large enough to justify it,

you may want to put one of your trusted employees in charge of the "crop operation" so that you have less to directly manage yourself. If the added land will be far from the home base or is not highly productive land, you may want to consider purchasing a higher proportion of your feed rather than growing it.

Costs of producing milk may get out of control

With a larger farm and more employees to manage, it is possible that your costs may be higher than you planned. For example, labor efficiency may not be as good as in your plan. Feed production costs could be higher than you expected because of longer distances to fields and costs of rehabilitating added land. Perhaps your best defense is to be aware that these things have happened to others and try your best to insure they don't happen to you.

Market and Price Risk

Milk price variations

Substantial lowering of milk price supports in the late 1980s has put the dairy industry in a situation where the price is not just resting on the support but is also determined in the market place. This has resulted in more widely fluctuating prices, and it is difficult to know the level of prices in the future. Each person considering expansion will need to make his or her own best estimate of likely future milk prices when doing profitability and cash flow planning. After doing this for your projections, you should repeat your calculations using a lower milk price level to see whether there is likely to be enough cash flow to meet your debt payment and family living needs.

Input price levels and variations

This includes the effects of inflation as well as fluctuations in input prices. There is little doubt that we will continue to have inflation and that prices of inputs such as equipment,

energy and labor will continue to increase. History suggests that milk prices will not necessarily increase at the same rate as input prices and that you will need to continue to increase efficiency to meet the cost/price squeeze.

Fluctuations in prices of inputs such as feed and replacement cattle may be more difficult to deal with because they are largely unpredictable. You may want to deal with this by recomputing your cash flow projections using different levels of, for example, feed prices. Of course, what we are really dealing with is the relationship between levels of input and product prices.

The impact of the introduction of bST on future milk prices

This is perhaps one of the largest unknowns in the dairy industry. As this is written, bST has been approved for commercial use in the United States. If it is for only a few months and widely adopted, milk prices could fall rather dramatically. You will have to decide whether to adopt bST to remain competitive. Of course, you will have to make this decision even if you do not expand, but the financial implications will be greater with a larger herd size. The larger debt and perhaps tighter cash flow with a larger herd size makes the implication of bST more important.

Business and Financial Risk

Interest rate increases

One of the big concerns here is the level of interest rates. As this is written in mid-1993, interest rates are the lowest they have been in years. You should be cautious about committing to a set of payments that you can barely meet at today's interest rates. Even a 1 percent increase in the rate could make it impossible for you to meet your cash flow requirements. In a time of relatively low rates, locking in a fixed rate would be a good idea if it is possible to do so.

Inability to meet cash flow commitments

There is a tendency for farmers in major expansions to commit themselves to a set of debt payments that will be difficult to meet even under rather favorable production and price conditions. Often there is little or no margin for adverse conditions of any kind. A safer strategy would be to plan debt payments that leave a comfortable margin within cash flow projections, so that if price and production conditions are less favorable than planned, debt payments can be made without restructuring the debt.

Insufficient cash available for machinery replacement

As pointed out just above, there is a tendency to commit to payments that will use all available cash flow. With level-payment amortized loans, the principal payment on machinery debt in the early years of the loan typically is not large enough to provide debt reduction sufficient to cover machinery replacement through refinancing without increasing the payments. Therefore, either a cash reserve for machinery replacement should be set aside or enough cash flow margin provided to allow increased payments when machinery needs to be replaced.

Loss of net worth due to "lost capital"

It has been observed for years that construction of major dairy facilities rarely adds as much to the value of the farm as was invested in the facilities. This is referred to as "lost capital." For example, a farm with a real estate value of \$300,000 that has a \$200,000 barn added to it rarely would sell for \$500,000 once the barn was completed. The lost capital could be perhaps 25 to 75 percent of the cost of the barn, and this lost capital reduces the owner's net worth, sometimes very dramatically.

It is difficult to completely avoid lost capital, but there are actions that can be taken to minimize it. If you will have a sufficient

amount of productive land to support the cattle (grow the feed) for the expanded herd, there will be less lost capital than if you build a large, fancy barn but have a small amount of rather unproductive land to go with it.

Cost overruns

Lenders have stated that cost overruns on construction of facilities are a common and serious problem. Overruns can have many causes, but two common ones are (1) lack of a fixed-price contract for exactly what is needed for the planned expansion, and (2) on-the-spot decisions to add items during construction that weren't in the original plan or contract. To avoid cost overruns, you should decide exactly what is needed in the facility, get a fixed-price contract, and stick to it.

Construction delays

This source of risk has at least two parts. One is the possibility of added costs due to things like bad weather. The other is the delay in receiving added income from milk sales because you cannot put cows in a barn that isn't finished. While construction delays probably never will be completely eliminated, here are some ideas that will help. Don't start a major four-month building project in late summer when you are likely to run into bad weather before it is finished. If you need a lot of grading and fill, get it done the year before you will actually construct the building. You might want to consider a penalty clause in the contract for not finishing on time.

Technology and Obsolescence Risk

Purchase of facilities which soon become obsolete.

There are several aspects to consider. One is the definition of obsolete. Assuming that the facility (say, a milking parlor) works as it was supposed to, it is not useless just because a year

or two later one is available that will milk the cows 20 percent faster for the same investment. You may be sorry that you purchased the one you did, but that doesn't mean you should tear it out and replace it with the newer model. It does, however, mean that those who buy the more efficient one will have a cost advantage over you. There is little you can do to protect yourself against more efficient facilities that will be produced some time in the future.

Perhaps a bigger danger is investing in facilities that are already outmoded at the time you build them. This writer believes that a lot of this has occurred in the dairy industry in past years. Probably the best you can do about obsolescence is not to invest in something that is already obviously out of date when you purchase it.

Casualty Loss Risk

As stated earlier, these largely are the type of losses against which you can purchase insurance. Farmers should have appropriate fire and liability insurance on their assets and activities. This is true for your current business as well as for your expanded business.

You should be sure that as you acquire additional assets for your expanded business they are properly insured. For example, fire or wind could destroy your new barn while it is under construction. You should be sure that either you or your contractor has the building insured during the construction phase.

Workmen's compensation to cover the workers during construction is a must. Make sure that your contractor has coverage. If you are your own contractor and the workers are your employees, you are responsible for the workers' compensation insurance. Don't overlook the possibility that even though most of the construction is done by your contractor, there may be some work done by people who really are employed by you.

Social and Legal Risk

Possible environmental damage or lawsuits

There have been a number of cases where farmers have been fined or sued because of actual or perceived environmental damage. The state has the power to fine farmers for water pollution that causes fish kills, and farmers have been fined. Contamination of ground or surface water with nutrients and complaints of odor problems from neighbors are more nebulous, but you are not immune from complaints and lawsuits. Larger herd size does not necessarily mean that you are likely to cause more environmental problems, but it does mean that you have more manure to handle and more of it concentrated in one place. It also may mean that you are a more obvious target for those who wish to complain.

You should recognize that with a larger herd your responsibility for proper manure handling will increase. You should avoid manure spills on the highway as well as the possibility of contaminating ground and surface water by manure spills or heavy applications. You should also avoid overuse of nutrients and practice appropriate use of pesticides to avoid environmental damage.

New environmental regulations after you have expanded your herd

It is possible that laws and regulations will be implemented after you have expanded your dairy herd that will cause you to retrofit your operation. Many states have more regulation of livestock operations than does New York, and it could happen here. No one knows what these regulations will be, but don't put your head in the sand and assume that such regulations will never affect your dairy operation.

Changes in labor laws and regulations

These changes could take many forms, such as higher minimum wages, overtime pay, or requirements to provide health insurance to all your employees (or pay a substantial health tax instead). In addition to the aggravation that you may feel, such regulations are likely to increase your costs. The best strategy may be to leave some room in your cash flow plan for increased costs.

Human Risk

We have divided this source of risk into three subcategories: (1) Human resource management risk; (2) Managerial risk, and (3) Quality of life risk.

Human Resource Management Risk

Human resource management risk deals with the lack of skills to manage a larger number of employees and the lack of desire to acquire the skills needed to manage more employees. Our observations have indicated that many farm operators are not at all prepared to deal with a significantly larger number of employees, which they may have with a large expansion. Inadequate personnel management can be devastating to a large expansion.

The section on Personnel and Organizational Structure provides an opportunity for you to think about human resource management issues relative to your prepared expansion.

Managerial Risk

Managerial risk deals with loss of managerial capacity to operate the expanded business. This involves the owner-managers of the business as well as key employees or "middle managers." With a larger business, you are likely to be more dependent on key people who manage parts of the business, such as the dairy herd or the cropping program.

One strategy to deal with loss of key employees is to have well-trained employees who are able to take on increased responsibilities if one of your key employees is unable to carry out his or her duties.

A larger business makes your role as the owner and manager more important, particularly if you are the sole owner/manager. If you should become partially or totally disabled or die, the effects could be devastating to the business. The chances that these things will happen to you are perhaps rather small but certainly not nonexistent. Before expanding, you, your spouse and perhaps other family members should think about how the business would be operated if you became unable to manage it. Perhaps you should consider additional life insurance or disability insurance.

Quality of Life Risk

Quality of life risk deals with the increased work load and stress that may be placed on you and your family due to the expanded business. Some families thrive on the excitement but others are somewhat overcome by the stress. Financial success with an expansion does not always completely compensate for the added stress.

There is a possibility that if the dairy expansion does not go as well as planned that you, as family leader, will be blamed by your spouse and other family members (including those not involved in the business) for everything that goes wrong. There is no way to completely avoid such situations, but there are actions that can be taken to minimize such problems.

All those family members that are directly involved in the business as employees or owners should have a part in the decision to expand. If some of those involved are not willing participants in the expansion proposal, perhaps the expansion should not be made. Unless the project is something that all directly involved

members of the family want to do, perhaps it should not be done.

The voice of family members not so directly involved, such as younger people and the older children who not part of the business, is more difficult to deal with. Expansion will affect younger family members as they grow older. A profitable, happy expansion is likely to be good for them, but an unprofitable one may adversely affect them. Off-farm heirs may resent an expansion that reduces their inheritance.

Additional References:

Nelson, A.G., G. L. Casler, and O. L. Walker, "Making Farm Decisions in a Risky World: A Guidebook". Oregon State University Extension Service, July 1978.

Worksheet 6-1. Willingness to take risks with a dairy expansion

Scoring System:*Strongly disagree* = 1 *Disagree* = 2 *Neutral* = 3
Agree = 4 *Strongly agree* = 5

My Score _____

- 1. I like to take risks if there is a good chance to make a profit _____
- 2. I am willing to risk a lot of our net worth for the chance to expand the dairy operation _____
- 3. I am willing and eager to commit myself to the debt payments required to expand the dairy _____
- 4. If this expansion does not work out financially, I am willing to give up the farm if necessary _____
- 5. I am willing to put up with all the problems of managing a larger business for the chance of a higher net income _____

Total Score_____

If your total score is:

- 25 -- You seem willing to take the risk to expand your dairy operation.
- 20 to 24 -- You should be somewhat cautious about expansion.
- 15 to 20 -- Expansion may not be what you really want.
- 10 to 15 -- Expansion may make you unhappy.
- 5 to 10 -- You probably should not expand.

Chapter 7. Expansion Strategy

This section is intended to help you answer the question; "What is the best sequence of steps to move from my present size and system to the desired size and system I plan for housing, milking, and feeding the cattle?".

Lost Capital

The need to borrow capital for expansion investments and the subsequent need to make interest and principal payments effects cash flow. Investment in new buildings results in lost capital, which causes a immediate and hopefully temporary decrease in owner equity. For these and other reasons it is often necessary to expand the business in stages over two, three or more years, using a combination of both new and existing facilities during the transition period.

Cost Over-Run

Cost over-runs seem to be the rule rather than the exception even when planning is done well. Rapid increases in cost of materials, adverse weather during construction, difficulty in locating an adequate water supply and a host of others uncertainties can cause cost over-runs of up to 25 percent. Therefore, you should have more borrowing capacity than initial estimates indicate. Too little capital available for a key element of your plan could be disastrous.

Increases Cash Flow First

It is usually best to find some way to first increase the number of cows with a minimum of new investment capital. One possibility is to use the present facility to its maximum by milking two or more shifts in a confinement stall barn, with additional cows housed in a new barn, kept outside, or in a building intended for some other use (machinery shed, heifer bar, etc.). In this way more cash flows into the business from milk sales, with little extra flowing out for interest or principal payments. The operation may become

less labor efficient during this period of the transition, but once net worth and profitability improve, next steps can be made. Temporary methods of storing forages (silage stacks, custom filled silage bags, outside tarpaulin covered stacks of dry hay) may also be used during this transition phase. Another possibility for increasing cow numbers as a first step is to rent a barn nearby. This will work best in situations where more than one competent herd manager is available.

If new facilities are being constructed, the relative location of the existing and new facilities will have a great effect on expansion strategy. If new facilities will be too distant to move cows between the new and existing on a daily basis, it may be necessary to complete the new before using any part of it.

Build It Yourself

Some operations have successfully used farm labor, equipment and materials and/or provided the functions of a general contractor to lower the construction costs. Timber from farm woodlots may provide much of the lumber. Bulldozers, loaders, backhoes, and dump trucks already owned by the farm business may be used for site preparation. Farm gravel may provide needed fill. It is very important to carefully weigh the savings in construction costs against operating losses due to reduced management and labor devoted to the cattle or crops. Many operator's have experienced a high demand on their time just to work with a contractor to deal with incidentals that arise during construction.

Remember Replacements

Commonly there is a lag between increase in cow numbers and a increase in heifer numbers. This often results in the need to purchase part of the replacement animals for two or more years following a increase in the number of cows. Plans

are often made for culling rate to decrease as much as possible during this period of the transition, but if some cows do not adjust well to new facilities, culling rate may actually rise. It is important to be certain that cash flow projections include replacement costs. An alternative is to purchase additional heifers at the same time additional cows are purchased and grow enough replacements to meet your increased needs.

Bringing Added Cows On Line

Some expanding dairy operators attempt to lower the new investment in cows by buying yearling heifers approximately a year before expanded facilities are expected to be ready for use. This procedure can work well when there is plenty of forage, and enough housing and labor, but it depends on completion of the construction job on schedule. It may be safer to wait until a completion date is certain, and have one or more buyers ready to purchase needed cows on short notice.

Meeting Forage Needs

Additional forage may come from the existing land base by converting acres previously used for grain production or other crops to forage production. Some operators beginning increasing forage inventory before increasing cow numbers, in an attempt to reduce risk of a forage shortfall during the transitions period. Machinery trades to gear up for harvesting more forage can also be made prior a large change in tons needed.

Cash Reserves

Some operators accumulate cash reserves for a period of time prior to expansion. In this way they can use a combination of owner capital and borrowed capital for new investments. It may also provide more flexibility in buying some of the new assets needed.

Business Succession

Business succession planning should often be

done at the same time plans are made for expansion. There are several reasons why expansion and succession planning should be done together. A larger business may require an additional manager or perhaps the business is being expanded to provide a management opportunity for a member of the younger generation. Estate planning may be easier if junior members join the farm business when these more debt and share in the anticipated gain in not worth of the newly expanded business. This publication does not deal with business succession planning, but readers are encouraged to access other sources of information.

A solid business plan should address these strategy issues. A clearly planned strategy is the glue that holds the total business plan together.

Additional References:

Expansion Strategies for Dairy Farms copies available from Northeast Regional Agricultural Engineering Service, 152 Riley-Robb Hall, Cornell University, Ithaca, New York 14853.