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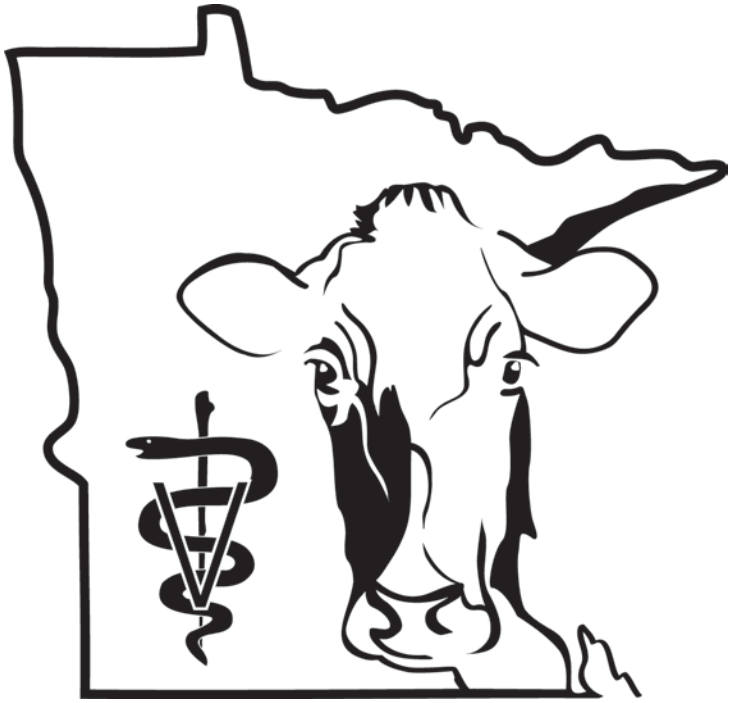

ST. PAUL, MINNESOTA
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Reduced Input Dairy Farming

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Minnesota had 11,497 dairy herds with 600,000 cows in 1995, down 4,000 herds in just 5 years. In 1935 184,065 herds contained 1,717,623 cows. Total milk production peaked in the mid-1960's, but the decline of total production has been moderated by large increases in cows per herd and production per cow. One herd remains for every 15 herds in 1940, the year I was born. If the present trend continued unabated Minnesota would have no dairy herds left a decade into the 21st century. That is unlikely. Most of us expect Minnesota to continue to be an important dairy state, but with a smaller number of herds which will be larger than today.

The upper midwest originally became a dairy belt because of it's climate and natural resources (Lotterman, 1995). It had moderate climate, adequate rain fall, and rolling prairie well-adapted to grazing. Rural electrification, mechanized crop production, artificial insemination, relatively inexpensive grain, and advances in nutrition and other sciences led to increased production per cow. However, these production technologies offset our natural advantage for grazing. Confinement technologies work on the dry deserts of the southwest as well as on the rolling grassland of the midwest. Thus the dairy industry has grown rapidly in other locations. Research in the 1950's demonstrated that rotational grazing systems increased the carrying capacity of pastures up to three fold (Brundage and Petersen, 1952), but was lost in the rapid adoption of higher input technologies.

Ninth Federal Reserve District economists suggest that two kinds of dairies are likely to persist in the upper midwest by 2010 (Lotterman, 1995). "The first group will consist of large operations in which 500 or more cows are milked by hired workers in very capital-intensive facilities. Such farm will be few - perhaps five percent of present dairy farm numbers - but will produce the bulk of milk output. The second group will superficially

resemble current dairy farms in that herd sizes will range from 50 to 150 cows and facilities will resemble those currently in use. But those operations will survive by cutting costs to the bone, and their operators will likely have off-farm employment. In some ways they will mark a return to century-old practices with heavy dependence on grazing, less feeding of concentrates and marked seasonality in milk production. This group will be more numerous than the first, but will deliver a smaller proportion of total output".

A 2-year study (Rust, *et al.*, 1995) at the North Central Experiment Station, Grand Rapids, compared milk production and profitability for confinement feeding versus rotational grazing. Guernsey and Guernsey x Holstein cows grazed perennial grass pastures from mid-May to October or were fed in confinement. Averaged over both years, confined cows produced 7% more milk; their milk was similar in fat concentration to that of grazing cows. Body weight changes and health of the two groups were similar. Net return per cow averaged 11% higher for rotational grazing than for confinement because of lower costs for feeding, facilities, equipment, and labor.

Efforts to develop a more sustainable agriculture may also provide an incentive to adopt lower input dairy farming. To be sustainable over the long term a farm must be profitable, environmentally friendly, and provide a high quality of life for the farmer and other members of the rural community. The appropriate management of a reduced input, sustainable farm is site specific in order to make the best use of the unique resources of that farm. Sustainable farming often replaces purchased technology and inputs with management. Thus, while a large conventional system in Minnesota may be very much like a large conventional system in Michigan, a sustainable farm at St. Cloud may be very different from another sustainable farm at Pine City.

Most reduced input dairy systems will include grazing, a return to the natural advantage of the region. Several kinds of input are reduced with a grazing system: 1) Forage harvesting and storage units are minimized ; 2) Manure storage and application is reduced; 3) Fewer total pieces of farm equipment are utilized; 4) Less costly animal housing may be used if the dairy is seasonal; and 5) land which is difficult to crop may still be excellent

grazing land. The difficulties of a grazing based dairy should not be minimized: 1) The dairy herd must be productive; and 2) A whole new set of intensive management skills must be mastered. Grazing management must be intensive.

Each reduced input dairy farm is a unique system. Reduced inputs may lead directly to severely reduced outputs which will threaten the sustainability of the dairy. The task of organizing a reduced input dairy farm will be easier if the farm itself may be selected based on attributes congenial to lowering inputs. Several elements must be worked into the organizational plan to achieve a profitable reduced input dairy farm:

Land. Few would dispute that very high yields of pasture forage will occur on the same lands that produce maximum yields of corn grain. However, those soils, typical in south central Minnesota, are costly with many potential users. Other lands in western, southeastern or northern Minnesota may have slightly lower yield potential, but have slopes or other local conditions which reduce competition from farmers who prefer to grow corn/soybeans. A quarter section of land which costs $500 per acre sells for $160,000 less than one which costs $1500 per acre. Some vulnerable lands presently enrolled in the Conservation Reserve Program are more appropriately placed in a grazing system then in a corn/soybean system.

Buildings. A farm with expensive and highly specialized buildings may be a poor choice for a reduced input dairy, especially if existing structures have a large debt service burden. Some dairy farmers plan to decrease depreciation of specialized structures by concentrating their use during the winter while grazing during the summer. Successful low input dairy farms may require no more buildings than provide a place to milk cows and store the milk if production is seasonal and natural features like trees and hills can be utilized to protect animals from severe weather. The suite of buildings must complement the other elements of the management system.

Equipment. The lowest equipment investment I have seen on a successful dairy in Minnesota has consisted of a flat parlor milking system in an old barn and a used tractor with loader and a manure spreader. Pasture renovation and hay harvest was accomplished with a combination of custom work and rented equipment. But, every aspect of the farm operation was extremely well planned and managed to function with little equipment. This farm had the right amount of equipment for it's management system.

Crop System. Corn production cost $298.31 per acre in southeastern Minnesota in 1995 (Richardson, 1996). Variable input costs were $128.62 and land/equipment ownership costs were $169.69. The extreme of a low input - highly productive grazing system must still provide secure fencing for pastures and lanes, a reliable water source, weed control, fertility, and timely harvest. Grazing management is a powerful tool for improving the productivity of pastures. The cost of generating productive pastures is extremely variable. Typical pasture management tends to be unprofitable: -$8.54 per acre on non-tillable land, where the value of product was $25.40, in southeastern Minnesota in 1995.

Seasonal Dairying. Seasonal dairying usually matches the production of milk to the production of forage. It is the standard system in New Zealand. Cows are calved in the spring, milked through the summer, supplemented with stored forage as fresh production of forage falls off, and cows are dried off when the milking and housing system is no longer appropriate to the season. Seasonal systems minimize inputs and maximize the need for excellent management and planning skills. Reproduction, a growing management challenge on all dairy farms, is confined to a short season. Pastures must be managed to maximize the length of the production season. Seasonal dairying offers great potential for improving profit, but only when linked with superior management.

Management Intensive Grazing (MIG). With MIG the farmer focuses on managing the pastures, with the cow serving as the tool for management. Long rest periods are followed by very short periods of high density grazing. Intervals between grazing periods range from 14-21 days in early spring, to 21-28 days during early summer, to 28-42 days in the

fall. Many dairy farmers will move cows to new paddocks between milkings. A grazing period on an specific paddock should not exceed 3-4 days. The focus is on harvesting at the end of a period of rapid growth (8-12 inches for many grass species) , with perhaps 30 % of mass left as residue. Animal density for grazing is often set at 50,000 lb per acre, with higher density under some conditions. High density - short period grazing reduces selective grazing and encourages more even distribution of manure and animal impact over the entire grazing area. Short grazing favors bluegrass/white clover combinations, while high grazing favors brome grass and similar plants. Farmers with well sequenced pastures may provide prime (Relative Feed Value >=150) pasture forage to cattle across the growing season.

Milking System. Graziers favor rapid milking systems. Rapid milking systems may be costly milking systems. Most graziers utilize existing tie stalls for milking and gradually move toward some automation of a flat milking parlor or installation of a New Zealand style swing-parlor. No clear consensus has developed, but the milking center clearly is a key component of any dairy farm.

Productivity. Profitability depends upon the amount of milk sold and the difference between selling price and input cost per unit sold. Conventional dairies usually allocate costs on a per cow basis because costs are directly related to the number of stalls that are constructed. Low input systems are more likely to relate costs and returns to land area, the most limiting resource in a grazing system. Either system must have a positive margin per unit sold and sell sufficient units to meet income goals. Reduced inputs frequently lead to reduced production. A recent modeling study (Frank, *et al.*, 1995) found pasture-based systems with decreased machinery investment had comparable returns to a confinement system with 10% reduction in production. Productions levels are important to success of conventional or reduced input dairy farms.

Nutrition. Nutrition in conventional systems is readily controlled by feeding total mixed rations with ingredients combined to meet tight nutritional specifications. Modern dairy

cows are very responsive to a consistent supply of a high quality diet. A reduced input grazing system requires the cow provide her own transportation to the feed, pasture and supplements are fed separately, and quality and supply are subject to seasonal variation. Extensive exercise walking to and from pasture increases the energy requirements of grazing cows (Garcia *et al.*, 1996). Research is needed to monitor nutrition of grazing animals, to set specifications for supplementary feeds, and to identify characteristics of animals well suited to a dairy grazing system.

Fences, Water and Lanes. Development of MIG has been facilitated by improved fencing and watering systems. Secure perimeter fences may be in place, but new installations often utilize 1-3 electrified high tensile wires which are also a strong physical barrier. Light weight fiber glass posts and a reel of "polywire" allow paddocks to be set up and taken down at slightly below a normal walking pace. Fences are powered with a low impedance charger. Portable water tanks may be fed from low cost water lines on fence boundaries to minimize traffic and maintain high animal density on paddocks. As traffic patterns are established lanes may be developed to handle maximum traffic with minimum mud and delay.

Reduced input dairy farming offers an alternative to high cost - high input conventional systems. Reduction of inputs must be selective and must be accompanied by good judgment and very strong management skill. A sustainable reduced input dairy farm is very site specific to insure maximize utilization of natural assets.

References Cited

Brundage, A.L., and W.E. Petersen. 1952. Comparison Between Daily Rotational Grazing and Continuous Grazing. Journal of Dairy Science 35:623.

Frank, Gary, Rick Klemme, Bimal RajBhandary, and Larry Tranel. 1995. Economics of Alternative Dairy Grazing Scenarios. Managing the Farm, Vol. 29, No. 1. Department of Agricultural Economics, University of Wisconsin, Madison.

Garcia, A.D., D.G. Johnson, J.G. Linn, W.G. Olson, and J.M. Akayeze. 1996. To be Presented at Annual Meeting of American Dairy Science Association, Corvallis, OR.

Lotterman, Edward, 1995. Ninth District Dairying Faces Dramatic Change. Fedgazette. January 1995.

Richardson, Val. 1996. Farm Business Management, 1995 Annual Report, Southeastern Minnesota. Minnesota Riverland Technical College, Austin Campus.

Rust, J.W., C.C. Sheaffer, V.R. Eidman, R.D. Moon, and R.D. Mathison. 1995. Intensive Rotational Grazing for Dairy Cattle. American Journal of Alternative Agriculture 10:147.

General References

Bump, Jeff. 1996. Pasture Talk (Newsletter) PO Box 620732, Middleton, WI 53562.

Fales, Steven L. 1994. Rethinking the Role of Pasture For Dairy Cows.
AFGC News 5:(3) 3.

Graze-L Internet grazing discussion group. To join send the message "subscribe graze-l" to <listserv@taranaki.ac.nz>.

Murphy, Bill. 1987. Greener Pastures on Your Side of The Fence. ISBN 0-9617807-0-3. Arriba Publishing, Colchester, VT.

Nation, Allan. 1996. The Stockman Grass Farmer. PO Box 9607, Jackson, MS 39286.

Savory, Allan. 1988. Holistic Resource Management. ISBN 0-933280-61-0. Island Press, Covelo, CA

Undersander, Dan, Beth Albert, Pamela Porter, Alan Crossley, and Neal Martin. 1993. A3529 Pastures For Profit: A Guide to Rotational Grazing . University of Wisconsin-Extension and Minnesota Extension Service.

Voisin, Andre. 1959. Grass Productivity. ISBN 0-933280-64-5. Island Press, Covelo, CA