



Dairy Extension
 Department of Animal Science
 101 Haecker Hall
 1364 Eckles Ave.
 St. Paul, Minnesota 55108
 (612) 624-4995



Dairy Update

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DAIRY MANURE MANAGEMENT

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R. D. Appleman
 Extension Animal Scientist, Dairy Management

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I. Introduction.*

There is no question that dairy manure impacts on the environment. Most of us as agriculturalists both see and smell this impact during the land application of dairy manure whatever time of the year it occurs. To us it is a natural part of animal agriculture which we accept as a way of doing business. Our urban, suburban neighbors see this relationship with the environment in a different way. First of all they are offended by the odors; secondly they become concerned about the nature of the runoff from agricultural lands. The better informed may be concerned with the nutrient movement to the groundwater. As urbanization encroaches on agricultural lands, there will be increasing pressure for the agriculturalist to modify behavior. Some of these pressures will be regulatory, while others will be more subtle and may well result in loss of prime agricultural lands to other uses.

A second observation is that manure is either a resource or a nuisance waste. Historically, the dairy enterprise has shown the advantage of nutrient utilization by land application of manure. With small herd sizes and abundant land, the use of manure as a supplemental nutrient directly applied to the land enhances crop production with minimum environmental impact. However, with reduced land availability and larger concentrations of animals in confinement, manure has become a resource more difficult to manage as a soil nutrient. As the dairy enterprise becomes larger and manure becomes more of a nuisance by-product, the search becomes more intense to convert the manure into other useful products such as biogas, compost and/or bedding. The success of these processes contribute to the profitability of the business and to favorable impacts on the environment.

* From G.R. Rehkgler, Chairman, Dept. of Ag. and Biological Engr., Cornell University in Dairy Manure Management, NRAES-31.

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A further major issue addressed is the relation of manure management to the profitability of the dairy enterprise. All of the preceding comments contribute to aspects of profitability of the enterprise. However, the efficient and effective utilization of technology is important to the profitability of the business. Manure handling and storage makes major contributions to the understanding of the technology necessary to minimize the costs of manure management which we would hope would increase the profitability of the business. Underlying all of the technology is the need for the dairy manager to understand the management skills necessary to utilize the procedures and technology of manure management. Effective dairy manure management will be enhanced by continuing education of the managers.

II. Manure Handling Equipment and Facilities in Minnesota.^b

Two types of manure handling predominated for Minnesota sample dairy farms in 1988. Daily haul to the field was used by 54 percent. Another 24.9 percent used long-term storage for cow manure (Table 1). There is very little short-term storage of manure, defined as for less than three months.

There appears to be a possible relationship between manure handling and size of dairy herd. Daily haul was used by 77.8 percent of herds with fewer than 30 cows, and 60.2 percent of the 30 to 49 cow herds. Only 20.6 percent of this combined fewer-than-50 group used long-term storage for cow manure. By contrast, for herds with more than 50 cows, use of daily hauls to the field ranged from a low 10.7 percent for herds of 100-124 cows, up to only 41.9 percent for herds of 75-99 cows.

Long term storage for manure is the most common technique used by operators with the larger herds. Obviously, as the herd size increases, manure handling becomes a much more difficult problem and some kind of storage program is needed to manage this function efficiently.

Several types of manure storage systems are used by dairy farmers. Lagoons were used by 31.4 percent of the 529 sample dairy farms that responded to the question on type of storage facility (Table 2). Next were simply storing in a pile (20 percent), and storage tanks (12.4 percent). Some tanks were above ground, some were below.

Although more than 50 percent of the dairy farms used daily haul as the *principal* method of manure handling, quite a large number also used some kind of storage of manure. This is reflected in the 23.8 percent that *only* used daily haul.

^b From The Minnesota Dairy Farm Sector, Summary of the 1988 University of Minnesota Dairy Farm Survey report authored by J.W. Hammond. Minnesota Ag. Exp. Sta. Report 216-1989.

Table 1 Distribution of Minnesota Dairy Farms By Manure Handling Practices and Milk Volume — 1988 University of Minnesota Dairy Farm Survey

Principle Method Used to Handle Dairy Manure	Number of Farms Reporting	Percent of Total Farms Reporting	Percent of Milk Volume
Daily haul to field	466	54.0	42.8
Short-term storage	42	4.9	5.9
Storage for 2-3 months	30	3.5	3.8
Long-term storage for cow manure	215	24.9	34.0
Long-term storage for all manure	81	9.4	10.5
Other	29	3.4	2.9
Total	863	100.0	100.0

Table 2 Distribution of Minnesota Dairy Farms By Type of Manure Storage Facility — 1988 University of Minnesota Dairy Farm Survey

Type of Manure Storage Facility	Number of Farms Reporting	Percent of Total Farms Reporting
Above ground tank	24	4.5
Below ground tank	42	7.9
Lagoon	166	31.4
Pile	106	20.0
Bunker	20	3.8
Daily haul	126	23.8
Other	40	7.6
Combination of above	5	.9
Total	529	100.0

III. Resource Personnel for Program Planning.

Until the Don Bates position in Agricultural Engineering is filled (a replacement is being sought), there is a definite void in University of Minnesota Extension Service leadership in manure management. Resource personnel with varying degrees of expertise on the subject of "managing dairy manures" available to assist in program planning include:

- 1) Larry Jacobson, Ag. Eng.
- 2) Phil Goodrich, Ag. Eng.
- 3) Bob Appleman, Animal Science
- 4) Selected Spec. Livestock Agents

IV. Resource Materials Available.

A. DAIRY MANURE MANAGEMENT

Papers from the Dairy Manure Management International Symposium, held in Syracuse, NY in February, 1989, are included in this 286-page book.

Agricultural engineers, animal scientists, agronomists, soil conservationists, industry representatives, and extension specialists have written about dairy manure and the environment, manure utilization and processing, and handling and storage. The economics of manure management and its effects on the environment are addressed. A two-part paper discusses both production and utilization of biogas and anaerobic digestion on dairy farms. Results from experimental farms using various methods of manure processing are presented. Papers are from the U.S., Canada, and The Netherlands.

286 pages NRAES-31

Available for loan from Jacobson and/or Appleman.

B. LIVESTOCK WASTE FACILITIES HANDBOOK

Almost all of the manure handling and management alternatives for livestock today are discussed in this handbook, including scrape systems, gravity drain gutters, gravity flow channels, and infiltration areas. Federal regulation is discussed.

112 pages MWPS-18

C. DAIRY HOUSING AND EQUIPMENT HANDBOOK

Includes 15 pages of written materials, tables and drawings, including gravity flow channels for dairy barns.

112 pages MWPS-7

D. PROCEEDINGS, BRITISH COLUMBIA 1989 DAIRY PRODUCERS' SHORT COURSE

Includes 26 pages of written materials, including articles entitled:

- 1) The European experience with manure;
- 2) Partner or policeman - it's your choice; and
- 3) Keeping manure out of our waters - engineering solutions to pollution.

Available for loan from Appleman.

E. RESEARCH RESULTS IN MANURE DIGESTION, RUNOFF, REFEEDING, ODORS

This review updates the technology of animal waste management. It includes anaerobic processes for stabilization and gas production, runoff control, and odor control.

35 pages MWPS-25 Available for loan from Jacobson.

F. ON-FARM BIOGAS PRODUCTION

Over the past decade, interest in generating biogas, a mixture of methane and carbon dioxide from animal manures, has revived. This manual includes current digester design and equipment selection for biogas production and use. Various digesters and many design details of each are discussed, with sections on manure inlets and outlets, heater and pipe sizing, insulation, and more.

38 pages NRAES-20 Available for loan from Jacobson.