Section I

General Information

1. **Project Number:** ENE96-27
   Grant Number:
   Funding Period: October 1, 1996 – September 30, 1997

2. **Project Title:**
   In-Service Training on Sustainable Animal Agriculture

3. **Project Coordinator:**
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4. **Type of Report:** Final

5. **Date of Report:** October 31, 1997

6. **Reporting Period:** From October 1, 1996 to October 31, 1997

7. **Major Participants:**
   As major participants, I would like to list the members of the conference planning committee. They are:
   Sheila Andrew, University of Connecticut Cooperative Extension
   Louise Calderwood, University of Vermont Extension System
   William Graves, University of Massachusetts Cooperative Extension
   Walter Gross, University of Rhode Island Cooperative Extension
   Neil Pelsue, University of Vermont Extension System
   John Porter, University of New Hampshire Cooperative Extension
   Allen Young, University of New Hampshire Cooperative Extension

8. **Cooperators:**
   For cooperators, I will list those individuals who made a presentation during the conference. They were:

Craig Altemose	UVM Extension System
Matt Williams	UMaine Cooperative Extension
Alan Gotlieb	UVM Dept. Plant & Soil Science
John Porter	UNH Cooperative Extension
Richard Verville	UMaine Cooperative Extension
William Graves	UMass Cooperative Extension

Christine Negra	UVM Extension System
Tom Buob	UNH Cooperative Extension
Robert Wellington	Agrimark, Inc, MA
Richard Brzozowski	UMaine Cooperative Extension
Rick LeVirtre	UVM Extension System
Drew Conroy	UNH, Thompson School
John Jemison	UMaine Cooperative Extension
Tim Griffin	UMaine Cooperative Extension
Sheila Andrew	UConn Cooperative Extension
Mary McNamara	McNamara Farms, NH

9. Project Status: Please check one of the following. The project is:

_____X_____New: received SARE Chapter 3 Professional Development Program funding for the first time.

_____Continuation: a previously approved project, following revision and competitive review.

10. Statement of Expenditures

Enclosed is a statement of expenditures from our fiscal officer (Appendix I). You'll notice that $749.38 of the SARE funds went unspent. That's because I used funds from the New England Green Pastures Committee (NEGPC) to cover an expense of nearly this amount for publication and distribution of the Conference Proceedings. Funds from NEGPC were also used to cover honoraria and travel expenses for conference speakers from outside Cooperative Extension. I am proceeding with our offices of Research and Sponsored Programs to get the unused funds returned.

Section II

Final Report

1. Objectives:

- Provide a training experience on technology transfer for New England Extension colleagues who routinely conduct educational programs with dairy and livestock producers.
- Share knowledge of sustainable animal production practices and projects happening around New England.
- Share experiences about innovative ways for learning to take place among dairy and livestock producers.
- Share information on assessing the educational impacts of Extension programs aimed at dairy and livestock producers.

2. Abstract:

The major focus of this project was to have an in-service training conference for Extension colleagues from around New England who conduct educational programs for dairy and livestock producers. This conference occurred on October 24-25, 1996 at The Lake Morey Inn, Fairlee, VT. A copy of the flyer sent out to publicize the conference is included as Appendix II.

The program for the conference consisted of 13 short presentations followed by four concurrent sessions. The presentations were about sustainable agriculture projects and practices going on in New England, with emphasis on those practices that relate to animals. Concurrent sessions were on whole farm analysis, assessing impacts of Extension programs, increasing access to Extension, and new program delivery methods. A proceedings summarizing each of the presentations as well as discussions in the concurrent sessions was published and distributed to participants.

There were 68 participants in this conference, exceeding the planning committee's goal of 50. At least 44 of the participants were Extension workers, 7 were from Natural Resources Conservation Service (NRCS) or Farm Service Agency (FSA), and 7 were producers. Extension workers from all six New England states participated in the conference. A majority of the Extension workers from New England who conduct educational programs with dairy and livestock producers attended this conference.

Four months after the conference, the participants were surveyed. They were asked to evaluate the conference and indicate ways the conference was making an impact on their programs with producers. Several newsletter articles and follow-up presentations using information from the conference had already occurred.

3. Specific Project Results

A. Accomplishments

An in-service training conference on sustainable animal agriculture practices was planned, publicized, and carried out. It was held on October 24-25, 1996 at the Lake Morey Inn in Fairlee, VT. The planning committee for the conference had been meeting as part of the New England Consortium Dairy Committee and decided such a conference was needed. The targeted audience for this conference was Extension colleagues from around New England who routinely conduct educational programs for dairy and livestock producers.

There were 68 participants at this conference, 44 of whom were Extension colleagues, representing all 6 New England states. The majority of Extension workers from new England who routinely conduct educational programs with dairy and livestock producers were in attendance. Others participating in the conference included dairy producers, representatives from NRCS and FSA plus staff from the UVM Center for Sustainable Agriculture.

The sharing of knowledge on sustainable animal production practices took place by means of 13 short presentations. Those presentations were on topics ranging from grain production in New England to the value of manure and management of biosolids, from composting and recycling to new technologies in animal handling, and from improving stream water quality with BMP's to direct marketing of milk in glass. The climax of the conference was the sharing of experiences from around New England in the following four areas:

a. How are we going to teach holistic farm analysis?
b. Innovative ideas for assessing impacts of Extension programs.
c. Ways for producers to increase access to Extension staff.
d. New program delivery methods—how are they working?

B. Publicity for Activities and Programs

The proceedings of the conference were published and sent to all participants. Summaries of the discussions from the four break-out sessions were included in the proceedings along with abstracts from the individual presentations. Also included were the addresses of most of the participants so that information sharing could continue after the conference had concluded. A copy of the proceedings is included as Appendix III.

4. Potential Contributions and Practical Applications of the Professional Development Program

A. Trainee Adoption and Direct Impact

In an attempt to measure the impact of this in-service training conference on the participants and the programs they conduct, a seven question survey was mailed to them. A copy of the survey is enclosed (Appendix IV). The survey was mailed to all

participants approximately four months after the conference. About twenty percent of the surveys were returned. A summary of their responses is enclosed as Appendix V.

As mentioned in the proceedings from the discussion group on assessing impacts of Extension programs, timing is critical since some impacts don't occur for months or even years later. For example, in my own programming efforts, I am still seeing the impact of some of the presentations from this conference. During the past year, I have used information from six of the thirteen presentations, either in newsletter articles, group presentations, or individual contacts. I drew information from the presentations on soybeans, barley, biosolids management, manure value, antibiotic alternatives, and direct marketing of milk. The summary of survey data from participants did not include impacts from my individual programs.

B. Potential Benefits or Impacts

The potential benefits of this conference are still being felt on Extension programs offered for dairy and livestock producers. Personally I have been better able to answer producer requests for information on soybean production, mycotoxins, and antibiotic alternatives. I also helped producers solve problems on biosolids management and water quality. So if all Extension colleagues who participated in the conference only experienced half as much impact on their programs as I have, the conference was a huge success. It was obvious from those who did respond to the survey that the participants wanted an activity like this conference repeated regularly, hopefully every year or two. They also wanted to hear presentations on cutting-edge information and technology.

C. Feedback from Farmers

There were only seven farmers who participated in this conference. I met two of them in June 1997 when there was a SARE-sponsored tour of their farm. Since they grow barley on their farm and had heard the presentation at this conference, they had several follow-up questions on processing and feeding barley. They were strongly considering adopting the tempering process that was described at the conference.

One of the responses from participants at the conference was to include more farmers in any follow-up training conferences. They serve as a source of excellent ideas for future programs and also serve as a sounding board.

5. Individuals Involved

There were 68 participants at the conference, of which 44 were from Cooperative Extension and 3 were from NRCS.

6. Future Recommendations and Areas Needing Additional Professional Development Efforts

It was obvious from the responses to the evaluation survey and from personal responses from conference particpants that there is a strong need for a similar conference on a regular basis, maybe every year or two. As the number of Extension workers in New England who regularly conduct educational programs for dairy and livestock workers continues to decline, the need for cooperation among those of us who are left increases.

7. Slides

I was unaware of this need for slides prior to the conference. If so, I would have made arrangements to have some taken during the conference. Because that didn't happen, I have included three informational slides about the conference.

Appendix III
ENE 96-27

Financial support from

USDA SARE-Northeast Region

and New England

Green Pastures Committee

proceedings
FROM THE

new england

IN-SERVICE TRAINING

sustainable
ANIMAL AGRICULTURE

October 24 & 25, 1996

Lake Morey Inn

Fairlee, Vermont

This in-service training workshop was funded by the Northeast SARE (Sustainable Agriculture Research and Education) Program and the New England Green Pastures Committee. Its purpose was for New England Extension colleagues to share knowledge and projects happening around New England. Information on innovative ways for learning to take place among dairy and livestock producers, as well as methods to assess the educational impact of Extension programs, was shared.

The planning committee for this conference is the New England Consortium Dairy Subcommittee. Feel free to contact any member of the planning committee with questions about the conference.

Committee members are:

Sheila Andrew - Connecticut
Louise Calderwood - Vermont
William Graves - Massachusetts
Walter Gross - Rhode Island
Neil Pelsue - Vermont
John Porter - New Hampshire
Cal Walker - Maine
Allen Young - New Hampshire

Proceedings Editor - Sheila Andrew - University of Connecticut

Growing Soybeans in Northern Climates

Craig Altemose
UVM Extension Regional Specialist, Agronomy

Soybean production in Vermont is something being considered by growers for both non-organic and organic production. It's primary purpose is to serve as a high quality feed for livestock. Whole soybeans are an excellent source of protein, energy, and unsaturated fat fed to cows at a rate of 6-8 lbs/day. In a presentation made by Stew Gibson at the Vermont Soybean Conference in Essex Junction, VT on December 15, 1995, he made several references to the quality of different soybean feeds harvested as grain and also harvested for forage at different stages of development (see Tables 1 and 2). Just to highlight a few things in the tables: Raw soybeans are 42% Crude Protein (CP) on a dry matter (DM) basis, 25% Undegradable Intake Protein (UIP), 75% Degradable Intake Protein (DIP), .96 Mcal/lb Net Energy for Lactation (NEL), 91%Total Digestible Nutrients (TDN), 19% Fat, and 15% NDF. While Roasted soybeans (on a DM basis) are: 42% CP, 50% UIP, 50% DIP, .99 Mcal/lb NEL, 94% TDN, 19% Fat, and 15% NDF. The increase in UIP is due to roasting, which increases the amount of amino acids available for utilization by the animal in the small intestine. Roasting also breaks the seed coat making the soybean more digestible and destroys lipase, making the storage life of the bean longer. Soybeans harvested for forage should be harvested at the R 7 stage (one pod on main stem that has reached it's mature color) for best overall quality and quantity: yield of 3.3 ton/acre and CP of 19.2%, NDF of 40.7%, and ADF of 29.3% of DM harvested at 34% DM. This is a good feed but it does not match the percentage of CP and NEL in the Raw and Roasted soybeans. Most forage soybeans would be used to increase the protein content in a TMR with corn silage. As you can see, soybeans are an excellent addition to feeds especially with the price of protein and energy being as high as it has been this past year, reaching over $9.00/bu. in the market place.

Soybean production in Vermont at present is 2,000 to 3,000 acres; however, we have the soils and climate conditions to produce much more. Soybeans are an annual legume that is an excellent fit in some of our corn, grain, and hay rotations. I think we are capable of producing 50,000 to 100,000 acres here in Vermont. That would really increase our market penetration along with the 400,000 to 500,000 acres being produced in New York and Quebec. It would open up markets for our growers in both food and feed grade soybeans. At present, we lack processing facilities here in Vermont and New England. I know of only 3 roasters in the state. Many processing facilities do exist and are not that far away. There is interest among our growers in Vermont and processors from high soybean producing areas in Quebec and New York. Together we can build a soybean and grain market in the Northeast. The value added markets, as a result of a strong soybean and grain markets here in the Northeast, especially at the local level, would be something to also consider, for example, soybean straw is an excellent bulking agent and carbon source for making dairy compost. Here in Vermont, most of the growers I work with produce yields of 44-45 bu./A of soybeans at 13% moisture. This compares very well to production in the south (30 bu./A average) and Midwest (40 bu./A average). I think it's because of our climate conditions, fertile soils, use of crop rotations, and ultimate lack of disease problems, as referenced in an article on Pest management, in "What's Cropping Up" by J. Keith Waldron, IPM Coordinator, Dairy and Feed Crops at Cornell University. In fact, in research trials on several varieties completed at Chazy

and Canton, NY in 1993, 1994, and 1995 by Cornell University (Cox, Wright, Bergstrom, 1995), the average yields for Group 00, 0, and I Soybeans for all three years, in both locations, ranged from 49.7 bu. to 63.2 bu./A. These locations match our climate conditions and varieties that fall in these maturity groupings of around 2,000 to 2,200 GDD are the ones that seem to do best with local growers.

Some specifics about growing soybeans are: soil preparation is the most important factor in producing beans for high yields. Smooth and level fields are easier to harvest. Last year, a grower planted soybeans in 30" rows and never packed his field after planting; he left small ridges that made it difficult to combine and he was unable to get all his beans. We estimated that he left at least 5 bu./A in the field. That accounts for a $35.00/A loss. Soil drainage is also important. A moderate to well-drained soil is preferred for soybeans to produce high yields, good nodulation, and limited disease problems like Phytophtora Root Rot (common in poorly drained soils on legumes). Soil pH should be between 6.5 and 7.0 (Agronomy Facts 1-Penn State). Soil temperature for best germination is 60 degrees F. Optimum planting depth is 1.5". This can be done using a grain drill for planting. A corn planter can be used but the seed depth is normally 2". Optimum planting rates vary from 175,000 seeds/A to 225,000 seeds/A, depending on row spacing. Soybeans need to have at least 1,000 live Rhizobia Japonicum bacteria available near the roots to get good nodulation. This should provide for enough nitrogen fixation to provide all the N needs of the crop. For first time soybeans, 3 times the normal rate of inoculum is recommended especially when it is added to the seed (Agronomy Facts 11-Penn State). If you want to increase efficiency of the inoculum add a sticker like Molasses as a 1:10 dilution. I normally recommend 1.25 to 1.75 lbs. of inoculum/A. When it comes to fertility, a 50 bu./A yield will remove 200 lbs.N, 40 lbs. P_2O_5, and 80 lbs. K_2O. A little N in a starter through the planter can be used (ex. 200 to 300 lbs/A of 6-24-24) to help fulfill these needs, depending on the soil fertility level. The balance of the fertility needed, if any, for P_2O_5 and K_2O would be covered by a broadcast fertilizer.

Weed control is extremely important for achieving good yields: a preemergence herbicide program, rotary hoe, and shading are techniques one might consider when planting in 7" rows. When planting in 30" rows, banding a herbicide over the row at planting with in season cultivation or broadcasting a preemergence herbicide with in season cultivation or the use of a post emergence herbicide if needed, might be considered.

Some harvesting hints: a combine with a flex head works the best, but I do have one grower that mows his beans with a cutter bar, puts them in a windrow, and then picks them up with a regular hay pickup head (rake) that he mounted on his combine. This also appears to work well. If you are going to get into soybeans, you need to have at least one grain bin for drying.

Looking at budgets for present market conditions, considering soil types and planting methods, we see a profit margin of $44.00/A to $58.00/A from budgets done in 1994 from the Penn State Agronomy Guide. In a budget prepared by Jeff Carter for last years Vermont Soybean Conference and updated by me for the present market, we see the possibility to realize a profit of between $132.00/A and $211.00/A depending on soil type. In an organic budget prepared by me for both raw and roasted beans, we see that there is the possibility of making a profit of $199.00 on raw soybeans and $272.00/A on roasted soybeans.

NEW ENGLAND IN-SERVICE TRAINING
SUSTAINABLE ANIMAL AGRICULTURE

October 24, 1996

Session 1. Louise Calderwood, Moderator

12:50 p.m. *Welcoming Remarks*
- Carol Giesecke, New England Consortium

1:00 p.m. *Growing soybeans in northern climates*
- Craig Altemose, VT

1:20 p.m. *Maximizing the use of home-grown barley*
- Matt Williams, ME

1:40 p.m. *Mycotoxins in grains and silages*
- Al Gotlieb, VT

2:00 p.m. *Animal handling*
- John Porter, NH

2:20 p.m. Panel of previous four speakers for questions

2:40 p.m. BREAK

Session 2. Allen Young, Moderator

3:00 p.m. *On-farm composting*
- Richard Verville, ME

3:20 p.m. *Composting of livestock carcasses*
- Bill Graves, MA

3:40 p.m. *Plastic film recycling*
- Glenn Rogers, VT

4:00 p.m. *S... happens, then what?*
- Tom Buob, NH

4:20 p.m. *Update on milk marketing*
- Bob Wellington, AgriMark

4:40 p.m. Panel of previous five speakers for questions

6:30 p.m. DINNER

7:30-9:30 p.m. Sustainable agriculture around the world
- *Ireland* - Dick Brzozowski, ME
- *Russia* - Rick LeVitre, VT
- *Africa* - Drew Conroy, NH

October 25, 1996

Session 3, Walt Gross, Moderator

8:00 a.m.	*Improving stream water quality with BMP's* - John Jemison, ME
8:20 a.m.	*When is cow manure a value-added product?* - Tim Griffin, ME
8:40 a.m.	*Alternatives to antibiotics* - Sheila Andrew, CT
9:00 a.m.	*Adding value to milk by marketing directly to consumers in glass* - Mary McNamara, Plainfield, NH
9:20 a.m.	Panel of previous four speakers for questions
9:40 a.m.	BREAK
10:00 a.m.	*Introduction to concurrent sessions* - Nancy Bull, CT
10:15 a.m.	**Concurrent Sessions** *(A) New program delivery methods--how are they working?* *(For example: interactive television, satellite programming, study circles, interest groups?)* *(B) Ways for producers to increase access to Extension Staff.* *(C) Innovative ideas for assessing impacts of Extension programs.* *(D) How are we going to teach whole farm analysis (holistic management)?*
11:15 a.m.	Report back from groups
11:45 a.m.	LUNCH

References:

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Agronomy Facts (11) - Inoculation of Forage and Grain Legumes, The Pennsylvania State University, University Park, PA.

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Feeding Soybeans:
Whole Raw or Heat-Treated Beans

Stew Gibson
Soybean Silage
UVM Extension Dairy Specialist

Table 1. Composition of soybeans and soybean by-products.

	C P % of DM	UIP* % of CP	DIP % of CP	NE/L Mcals/lb of DM	TDN % of DM	Fat % of DM	NDF % of DM
Soybeans, raw	42	25	75	0.96	91	19	15
Soybeans, roasted	42	50	50	0.99	94	19	15
Soybean meal (48%)	55	35	65	0.91	87	1.5	8
Soybean hulls	12	30	70	0.80	77	3	67

CP = Crude Protein, UIP = Undegradable Intake Protein, DIP = Degradable Intake Protein, NE/L = Net Energy for Lactation, TDN = Total Digestible Nutrients, NDF = Neutral Detergent Fiber.

*The UIP fraction in roasted beans varies greatly depending on roasting temperature and time, and post-roasting steeping. The range is from 40 to 65% of CP dry matter.

Table 2. Yield and quality of soybean forage as affected by harvest maturity. Arlington, WI. 1987 and 1989.

Maturity	Yield Tons/Acre	DM %	C P	NDF	ADF	ADFL	EE
			% of DM				
R 1	1.1	18.9	20.1	38.7	28.2	5.9	--
R 3	1.7	19.3	18.1	43.1	31.9	6.6	--
R 5	2.5	20.3	18.2	45.7	33.7	7.1	0.9
R 7	3.3	34.2	19.2	40.7	29.3	6.2	10.5

ADFL = acid detergent lignin, EE = ether extract (fat)

R 1 One open flower on the main stem.
R 3 One pod 3/16 inch long at one of the four top nodes.
R 5 A seed 1/8 inch long in a pod at one of the top four nodes.
R 7 One pod on the main stem that has reached its mature color.

☐ Soybeans

Soybean, also soy and soya bean, common name for an annual leguminous (see Legume) plant and its seeds. The soybean probably originated in eastern China and is widely cultivated as a farm crop. It is an erect, hairy plant from 0.6 to 1.5 m (2 to 5 ft) in height, with large trifoliate leaves, small white or purple flowers, and short pods with one to four seeds. On maturity, which is reached from 100 to 150 days after planting, depending on variety, location, and weather, the leaves turn yellow and drop, and the pods rapidly become brown and dry. The seeds, which are almost spherical in shape, are usually light yellow, but some rare varieties are black, brown, or green. They have a black, brown, or yellow hilum (seed scar) and contain about 20 percent oil and 40 percent protein. In the United States, soybeans are grown as a row crop, planted in May or June, and harvested with a grain combine in the fall.

The soybean, an ancient food crop in China, Japan, and Korea, was introduced int o the United States in the early 1800's and was grown as a minor forage crop for many years. The development of a soybean-processing industry in the early 1920's gave soybean cultivation a great impetus, and today the soybean is a leading crop in the United States, ranking only behind corn and wheat. The United States produces about 60 percent of the world's soybeans, compared to 14 percent produced by Brazil, 10 percent by China, and lesser percentages by Argentina, Taiwan, Canada, and India. Production in the United States is located chiefly in the Midwest and the lower Mississippi Valley; more than 30 percent of the United States production is exported.

The two basic products of the soybean are protein meal and oil. In the United States, more than 90 percent of the oil is consumed as margarine, shortening, mayonnaise, salad oils, and other edible products; the rest is used in industrial products such as paint, varnish, linoleum, and rubber fabrics. Soybean meal is the major source of the protein supplement used in livestock feeds, which utilize 98 percent of the total meal produced ed. In the protein-short areas of the world and elsewhere, soybean meal is finding increasing use in human food products.

Scientific classification: The soybean belongs to the family Leguminosae. It is classified as Glycine max.

Contributed by:
Richard L. Bernard

Further Reading

Value Adding Feeds on the Farm.

Matt Williams
Extension Educator, University of Maine

The reliance of off farm purchased feeds represents a challenge to Dairy Farm Sustainability in the Northeast. Not only does this require considerable economic resources, it also is the source of increasing nutrients that overload the ecosystem of the farm. The increase of nutrients, primarily N, P & K contribute to such varied problems such as non point pollution and reproduction inefficiency. On farm processing of the major commodities that comprise the majority of these purchased feeds offer the potential to both reduce cost and increase efficiency. *Sustainability* will be increased by either the increased income over expense or the reduced input of nutrients or both.

Milk production demands high energy and high protein rations. Balancing of the energy and protein needs with the forage base of the farm has been the focus of modern dairy nutrition. The result of this focus has been that the potential for farm profitability has in large measure been reduced to the forage enterprise (cost and quality of the forage) and the reproduction enterprise (milk production efficiency, and marketable genetics) for on-farm management. Variability in these enterprises have increased costly off-farm purchases, such as bypass fat products to increase ration energy density and anionic salts in the rations to correct excessive cations (usually K) in the forage base of some farms. Availability of commodities and short land base has given rise to the dominate corn, soybean, and corn silage based system of today. The corn , soybeans and other grain components are imported from other area's and usually processed prior to delivery to the farm.

Two important components of purchased feeds are their nutritional profile (energy, protein, solubility, etc.), and their form. An example of the difference can be seen by comparing two energy feeds; barley and corn.

Barley and corn grain differ nutritionally in several ways and these differences allow for *either* commodity to enhance milk production *depending on the forage base*. Barley has more soluble carbohydrate than corn. High-quality forages, like early cut grass or legume haylage and rotational pasture, are high in soluble nitrogen. When solubility is balanced, rumen function is enhanced; when it is out of balance, rumen function is reduced. These solubility factors are also related to how feeds are processed, since this can effect particle size and rate of passage. Corn has higher energy values than barley (0.91 vs 0.88 Mcal NEL/lb), but barley has higher protein (14.0 for barley vs. 9.1% for corn), dry matter solubility (43.1 vs. 17.3% for barley and corn, respectively) and phosphorus content. These values are fully realized only when rations are balanced with these components in mind. In addition, how they are presented to the animal is also important. Slug feeding, for example, reduces any benefits of matching solubility.

The processing of barley or corn also influences digestibility of different feed fractions. One option of processing is 'tempering.' Tempering is simply adding water to

barley grain for a period of 24 hrs before feeding, allowing the germination process to begin. During the germination process, the composition of both carbohydrates and proteins in the grain are changed, and digestibility increases with tempering. Below are digestibility values for different fractions for dry rolled barley and tempered rolled barley, derived from research at the University of Maine (Dr. Mark Hill):

Feed Fraction	Dry Rolled Barley	Tempered Rolled Barley
	% Digestibility	
Dry Matter	72.0	76.3
Crude Protein	61.7	67.2
NDF	60.7	69.2
ADF	43.9	48.2
Starch	90.4	93.4

Corn would be similar, but shows a smaller response to tempering. This trial increased milk production by 5%. When factored with other forage quality components, like solubility, dairy producers have realized milk increases of 11%.

A key to increased sustainability is to find ways to increase the rewards for on-farm management. On-farm processing of the grains returns the value added effect to the farm which is necessary when feeding grains on the farm. In addition, feeding commodities that are purchased whole, allow for better buyer and seller arraignments, since quality factors like test weight can be measured and prices adjusted. Time sensitive processing like tempering then can become an option. Most importantly, commodities can be selected to maximize the value of the forage. Rations must be balanced with factors like solubility in mind. Newer balancing tools like the Cornell Net Carbohydrate and Protein System, (CNCPS) are powerful models that do this. In addition the CNCPS balances for effective neutral detergent fiber (NDF) rather than the more commonly used, acid detergent fiber (ADF), which gives a more realistic rumen activity prediction for commodities like barley. Increasing the efficiency of feeds not only lowers the cost of milk production, it also lowers the loading rate of nutrients purchased from off-farm for the farm's land base.

MOLDY FEED AND MYCOTOXINS

Alan R. Gotlieb
Plant & Soil Science Department, University of Vermont

MYCOTOXINS ARE PRODUCED BY MOLDS

All feeds contain molds (fungi) and the spores or seeds of these molds. Favorable conditions for mold growth are the presence of oxygen, temperature above freezing, and a minimum of 22% moisture in the feed. As these fungi grow, the nutritive value of the feed is depleted, sometimes reducing feed value by 10% without serious signs of discoloration or rotting. Where feed is obviously molded there is a much greater loss of nutritive value. Most molds only reduce the nutritive value of the feed or make it unpalatable. However, several fungi have the ability, under certain conditions, to produce toxic chemicals called mycotoxins.

MYCOTOXINS AND ANIMAL HEALTH

Mycotoxins can cause sickness or death of farm animals if critical quantities are consumed. In the past, swine, horses, and poultry have been considered to be more susceptible to mycotoxins than cows and sheep (ruminant animals) which are assumed to have a greater ability to detoxify small amounts of toxins. However, a feed contaminated with a mycotoxin can cause reduced weight gains, declining milk production, reproductive failure, immunosuppression, general stress, and greater susceptibility to other diseases. Many mycotoxins such as the trichothecenes (vomitoxin and T-2 toxin) are protein synthesis inhibitors. Thus it is not unusual for a toxin to have the capacity to affect all the systems within an animal and for the symptoms to be a very general malaise. In Vermont, we have had many such cases where moldy or suspect feed has been implicated with symptoms such as diarrhea, fiber and grain coming through the manure, clear nasal discharge, decreased milk production, and decreased dry matter intake. Unfortunately, these symptoms are also typical of those caused by infection, deficiencies of some vitamins and minerals, or simply by imbalance in rations. It is common to notice the symptoms described above in a herd for a period of time and then have those symptoms disappear.

DO WE HAVE TOXINS IN VERMONT FEED?

We have recognized the severe effects of mycotoxins in Vermont animal feeds since 1974. These include the extremes of severe illness and death of cows. In one case an entire herd was lost. In later studies at The University of Vermont, eight different mycotoxins were found contaminating Vermont feeds including vomitoxin, ochratoxin A, patulin, penicilli acid, T-2 toxin, verrucarin A, zearalenone and kojic acid. These toxins were found to be present in haylage, corn silage, dry hay, grains, and all commodities. The amount of mycotoxin in contaminated silage samples increased as the ensilement method changed from airtight, upright silos to concrete capped and uncapped silos. The highest concentrations of toxins were found in horizontal storage methods such as bunker silos and feed piles which were left open to oxygen. In all cases where high amounts of toxins were found, poor management of the upright or bunker silo resulted in oxygen getting into the stored feed. Well managed bunker silos, covered with plastic, had no greater levels of toxin than well managed upright silos. In any fermentation storage system, temperature and the presence of moisture is sufficient for

toxin production. **But, oxygen will act as the switch which turns toxin production on or off during storage.**

WHAT IF I SEE MOLD?

Just as you would not eat moldy food, a good rule to follow is not to feed moldy hay, haylage, or corn silage to your animals. There is no way to distinguish between toxic and nontoxic fungi by their presence in the feed or the discoloration of the feed. The fungi which can produce toxins are present in all feeds since they are naturally occurring in the fields where the crops are grown. We can see the result of these fungi when hay is cut and does not dry quickly and rots in the field or in a wet bale. Fortunately, the presence of these fungi does not automatically mean toxins are present in the feed. However, the absence of visible molds does not guarantee that a feed is safe. Dangerous levels of mycotoxins may accumulate earlier in the storage period followed by the death of the fungus which produced it. In all cases, oxygen and moisture are required for increased toxin development in storage. Detection of toxins requires laboratory analysis.

MOLD AND FORAGE CROPS.

The fungi associated with corn ear rots and stalk rots can produce toxins prior to the corn harvest. Late harvested silage and ear corn are most commonly found to have significant levels of toxin. To prevent this, corn should be harvested on time and silage corn should not be allowed to frost and dry off in the field. Corn harvested late results in reduced moisture levels. A "dry" silage is difficult to pack resulting in too much oxygen in the silo which leads to poor fermentation and the possibility of increased mycotoxin production during storage. When corn silage is cut late and dry, you have the double possibility of toxin forming on rotted ears in the field as well as during fermentation and storage due to the presence of increased oxygen.

In 1995, some of our Vermont farmers experienced flood conditions in August with flood waters rising above the formed ears. In some cases, this resulted in high levels of toxin in the grain at harvest. This was probably due to the direct inoculation of ears with fungi as the contaminating field and river silt washed into the ears. This year, 1996, we experienced a very wet and cold growing season. This has resulted in increased ear mold. Many farmers will harvest corn 3 to 4 weeks after frost resulting in further potential for increased toxin in ears and stalks. Dry silage harvested late after frost will result in poor packing with increased oxygen in the silo and the potential outcome of increased toxin production.

Aflatoxin is known as a serious carcinogen and has been found in high levels in peanuts, corn, cotton seed, and grain. Aflatoxin can pass through the cow and contaminate milk. Although this toxin is a serious problem for human and animal health, it has not been found in Vermont grown corn or other forages or grains. Aflatoxin requires warm (85° F) and wet fall conditions. Such conditions are more common in the south and central states. Aflatoxin can occur in grain shipped in from out of state. Government and private industry have testing programs to control the entry of this toxin into the feed and food systems. Always be wary of special deals from unknown out of state suppliers and ask about their mycotoxin testing procedures.

FEED TESTS FOR MYCOTOXINS.

If your animals are showing production problems or unexplainable disease symptoms which are puzzling to you, your nutritionist, or your veterinarian, a mycotoxin could be involved. Laboratory tests can be requested through the Agriculture Testing Service, University of Vermont, Burlington, VT 05405. Telephone: (802) 656-3030. In the past, the screening test using wet chemistry for mycotoxins of concern in Vermont cost $125 for each sample. We have now introduced a lower cost serological test for three toxins we commonly find in Vermont feeds (T-2, Vomitoxin (DON), Zearalenone). A single test for each toxin is currently $15.

I recommend the use of the vomitoxin test for the routine checking of management practices as it is currently the most prevalent toxin found in Vermont grown feeds. The exact toxicity of vomitoxin to dairy cows is not known. However, vomitoxin is suspected of affecting herd health and has been associated with herd health problems in North Carolina and Vermont. This association may be due to the presence of other not yet identified toxins which may be produced **at the same time** as vomitoxin. A positive test for vomitoxin, above 1 ppm, is an indication that conditions for toxin development were prevalent some time in the past. These conditions could occur in the field, during harvest, during storage, or in the feed bunk.

When toxic symptoms are observed, reproduction problems occur, or you suspect a reduction in milk production or feed intake, it is suggested that all three toxins be tested. To sample a bunker silo, take 10 samples from across the face and mix together thoroughly in a clean plastic pail. Place approximately one pound of the mix in a **plastic bag**. Force out as much air as possible and bring immediately to the testing lab. One of the best ways to sample is directly from the feed ration. Gather a large handful of feed sample every 10 to 15 feet as you walk down the feed bunker and place in the pail. The more sampling points the better. Samples can be stored for a short period of time in a refrigerator or kept on ice until it is brought to the lab. If this is not possible, the sample can be air dried at room temperature over night by placing it ½ inch deep in a shallow cookie pan. Do not heat the sample in a stove or microwave oven. Be sure the sample is thoroughly air dried before placing in a **paper bag**.

DETOXIFYING CONTAMINATED FEEDS.

Presently there are no economical means to detoxify contaminated feeds. However, a steady number of dairy consultants and farmers in Vermont continue to report that the use of sodium bentonite, added to feed suspected to be contaminated with mycotoxin, has resulted in benefits in milk production, feed intake, and reduced reproductive problems. Sodium bentonite is a clay-like material commonly used as a flow agent to reduce caking in feeds. This ingredient has been reported to reduce the harmful affects of aflatoxins in pigs and vomitoxin in rats by binding to the mycotoxin and making it less available for absorption in the digestive tract. However, there can be no claims made as to the use of sodium bentonite or similar additives since there is not enough scientific information and there is no EPA approval for this specific use for animals.

THINGS YOU CAN DO.

1. Use corn varieties resistant to foliar, ear rot, and stalk rot diseases.
2. Harvest corn and haylage at the recommended maturity and moisture level for your storage system.
3. Be sure chopper knives are sharp and cutting at the correct length.
4. Harvest forages as quickly as possible and pack tightly.
5. Be sure the silo is sealed to exclude oxygen. Use a plastic cover secured by touching tires on bunkers.
6. Patch any holes in plastic bags or wrapped bales.
7. Discard obviously spoiled feed or layers of feed.
8. Clean out left over feed from feed bunks.
9. Consider the use of a silage inoculant or acid additive (HMC) to enhance fermentation and storageability.
10. Match the rate of feed removal from the silo face to the size of the herd. Bunker silo face should be removed at 4 to 6 inches and upright silo face at 3 to 4 inches per day. Use the higher rate during the warm season.
11. When confronted with a toxicity problem, stop feeding the contaminated feed or dilute with a clean feed.
12. With your veterinarian or nutritionist, consider the use of a toxin adsorbent to be mixed with the feed such as sodium bentonite or a similar material.

ANIMAL HANDLING

John C. Porter
Dairy Specialist, UNH Cooperative Extension

As dairy farms get larger and cows are handled more as groups than individuals, animal handling facilities need to become an integral part of faculty layout and design. In the days of a thirty-cow herd being housed in a stanchion barn, a lot of the veterinarian work could be done in the stall and maternity and other needs were easy handled with one or two box stalls.

The advent of free-stall barns and milking parlors added some new challenges for animal handling. The milking parlor was the one place that every cow was constrained every day and it often became the site for health work or catch pens were set up off to the side of the return alleys. Then we learned that adding other activities to the parlor reduced the milker's efficiency and when cows related an unpleasant health treatment to the parlor area, they were bothered about entering for milking. Locking headgates soon became popular and many of the routine veterinary practices were able to be done out in the barn and cows could easily be restrained at the feed area; however, there is still the necessity for segregating the special needs cow that is sick or near calving.

The philosophy of most agricultural engineers today is to keep all practices and procedures out of the parlor except milking and to avoid restraint areas that will interrupt animal flow or restrict cross-flow ventilation. This creates a challenge for facility design because the parlor area is often the most convenient place to gain control of an animal and it contains many of the needed accessories such as running water, electrical outlets and herd records.

There have been some creative ways to address animal handling in the freestall barns:

Return lane holding chute - This is a lane parallel to the return alley that cows can be diverted to for direct treatment or to be held in groups that are later removed to a treatment area (Fig. 1).

Special needs group beside the holding area - If the building containing the holding area is wide and tall enough, a special handling group can be located beside it without hindering animal flow or ventilation. It also keeps the animals in close proximity to the parlor for milk-out and special handling (Fig. 2).

Restraining pen behind the holding area - If the parlor is located parallel to the free-stall barn in what is called the "H" configuration, there can be free-stall barns on both sides of the parlor which are connected by access alleys. A special treatment area can be located off the side of the connector alley which makes it useable from either barn (Fig. 3).

Regardless of the type of restraining area used, an effort should be made to design it for group housing which can be mechanically fed and cleaned. A group pen with a bed pack and fence line feeder is much less labor intensive than a cluster of 12 x 12 pens. To provide for individual cow care, box stalls can be available at the back of the bed pack, but only used for short periods of time when individual restraint is needed (Fig. 4).

COMPUTER SORT GATES*

Many new parlors are being built with electronic milk meters and automatic cow identification. Dairymen with this technology say that inclusion of computer-controlled electronic sort gates has lowered labor costs significantly. Furthermore, they feel that these gates are the most important benefit of automated cow identification, although admittedly, there are no formal scientific data to support such a claim.

These sort gates are also called cut gates or exit gates (see Fig. 5). Typically, these gates are placed in the return alley from the parlor to the free stalls. They can identify and divert cows into a treatment area (or an associated holding pen) instead of letting them back to the free-stalls. This saves much of the labor involved in sorting and finding cows once they are mingled in the free stalls. A second advantage is that treatments can be done in the treatment area, so that equipment and supplies are stationary. The cows are brought to a treatment area rather than move equipment, supplies, and personnel to the cows. Labor savings increase as herds grow larger. In addition, because treatments and sorting are no longer completed in the free-stall, some dairies have built their free-stalls without lock-ups at the feed manager.

Current Uses of Computerized Sort Gates:

The use of sort gates serves three purposes: to save labor finding cows, to save labor moving equipment/supplies/personnel, and to minimize the need for lock-ups. There are many reasons that cows would need to be cut. A few examples are as follows:

1. Normal management - dry, move, cull.
2. Treatments - breeding, BST, prostaglandin, vaccination, foot trim, antibiotics.
3. Examinations - reproductive palpations, lameness, drug residues, etc.
4. Electronic reasons - slow milker, wrong pen, not identified, low yield, conductivity, too few steps, too many steps, excessive heat mounts, other future applications.

Some of these cut/no-cut decisions can be made ahead of time by a policy implemented by the on-farm computer system; some cows will be chosen individually on a cow-by-cow basis, and some cows will be flagged in "real time" by the parlor controller.

The second advantage of cut gates is that it facilitates the organization of the treatment area. The area can be well lit, fully powered, close to the drug supplies and semen tank, and

most importantly, the veterinarian will not need to walk as far to examine the cows. Many dairies have elected to trim cows' feet on a routine basis. Placing the foot table in the sort gate area greatly simplifies this task. An entire shift in thinking may occur: bringing the cows to the person who is working on them allows the use of relatively immobile equipment, such as ultrasound, etc.

The third advantage of cut gates/treatment area is that the need for lock-ups decreases. Although these are often considered essential by most dairies, and every veterinarian, they are expensive, noisy, require maintenance, and restrict human movement. Although objective data do not exist, anecdotal reports suggest that cows may have greater dry matter intake without the impediment of head-locks.

Operational Details:

Operation of electronic sort gates requires an automatic cow identification system. The automatic cow identification is usually already installed as part of the system. The automatic cow identification is usually already installed as part of the electronic milk metering system, so the gates can be viewed as an additional benefit to these systems. Automatic cow identification currently means that each cow wears a transponder on her neck or her leg that transmits a signal to an antenna system to identify her. As each cow exits the parlor, and starts to return to the free-stall, she can be re-identified in the exit alley. The antenna system is connected to a computer which decides whether that cow needs to be "cut," or allowed to return. If the cow is to be cut, a signal is sent to a hydraulic gate system that opens for only that cow, so she is cut, but the preceding and following cows are not.

The components of a cut gate system include the air-powered gate (or gates), the antenna, a controller, and a farm management computer. The gate controller is almost always the same as the parlor controller that identifies cows. These controllers are actually computers. In certain cases, the farm management software and the parlor controller are in the same computer. The controller needs to operate in real time: it needs to decide and open the gate within a second after the cow passes the antenna. Thus, the controller must be operational during milking. Sometimes, the farm management computer has multiple uses: rations, payroll, communication, etc. Thus, that computer may not always be active during milking. However, routine exchange of data is necessary. Typically, the computer and the controller exchange data between every milking. Data such as milk weight, stalls, time, duration, pen, conductivity, and steps walked are sent from the controller to the computer for analysis, presentation, and storage. Data entry occurs in the management computer: transponders, cow identification, freshenings, breeding, treatments, location, etc. This information sent from the computer to the controller varies by manufacturer, but most computer systems send cow identification changes, transponder number, pen, status, and cut flag. Certain systems allow the computer to set the cutoff for milk weights, pedometer steps, etc. so that the controller will automatically cut those cows that fail to meet minimums, or exceed maximums.

* Taken from a paper written by Steven W. Eicker, DVM; Department of Clinical Sciences, School of Veterinary Medicine, Cornell University. It was presented at the "Designing a Modern Milking Center Conference," NRAES, Rochester, New York, 1995.

Resources:

Large Dairy Herd Management, edited by H. H. Van Horn, C. J. Wilcox, American Dairy Science Association, Champaign, Illinois, 1992.

"Restraint and Treatment Facilities for Dairy Animals," Special Circular 289, Pennsylvania State University; Dr. Robert Graves.

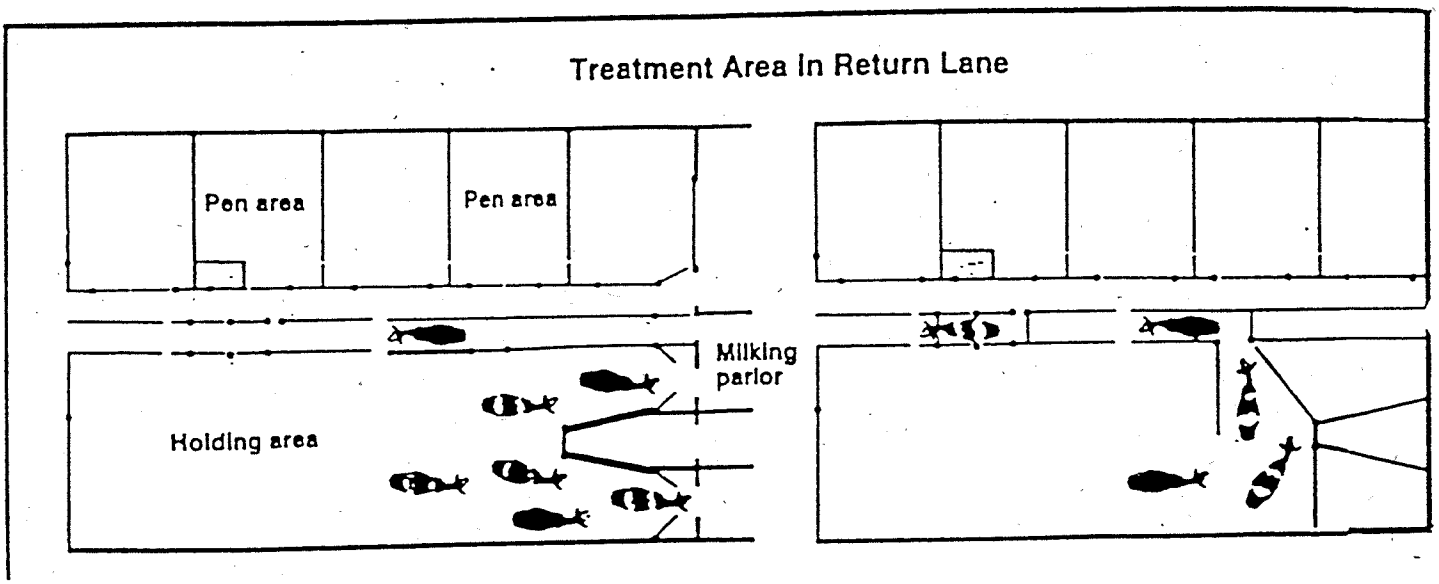
Treatment Area in Return Lane
Pen area
Pen area
Milking parlor
Holding area

Fig. 1

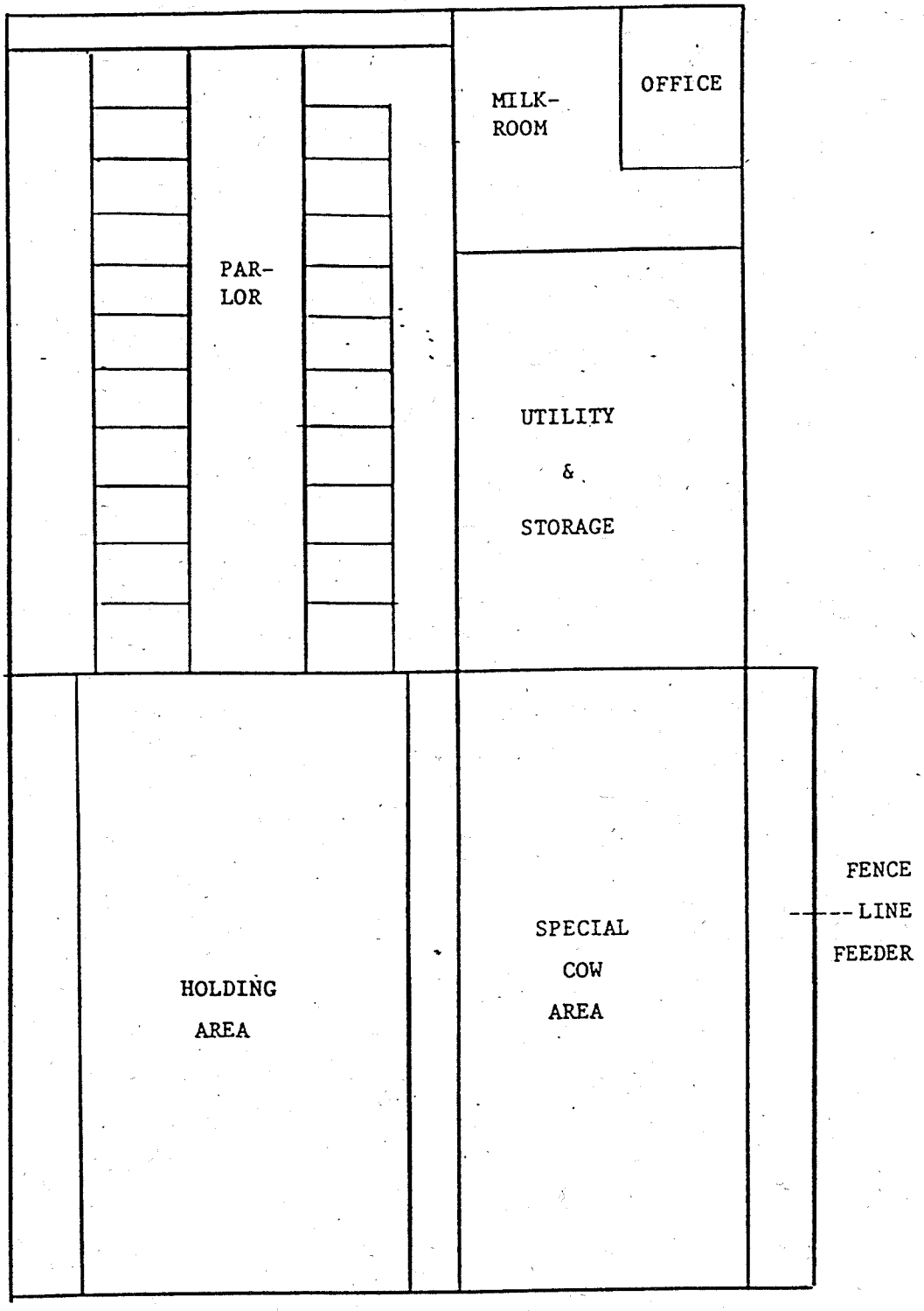
MILK-
ROOM
OFFICE
PAR-
LOR
UTILITY
&
STORAGE
HOLDING
AREA
SPECIAL
COW
AREA
FENCE
LINE
FEEDER

Fig. 2

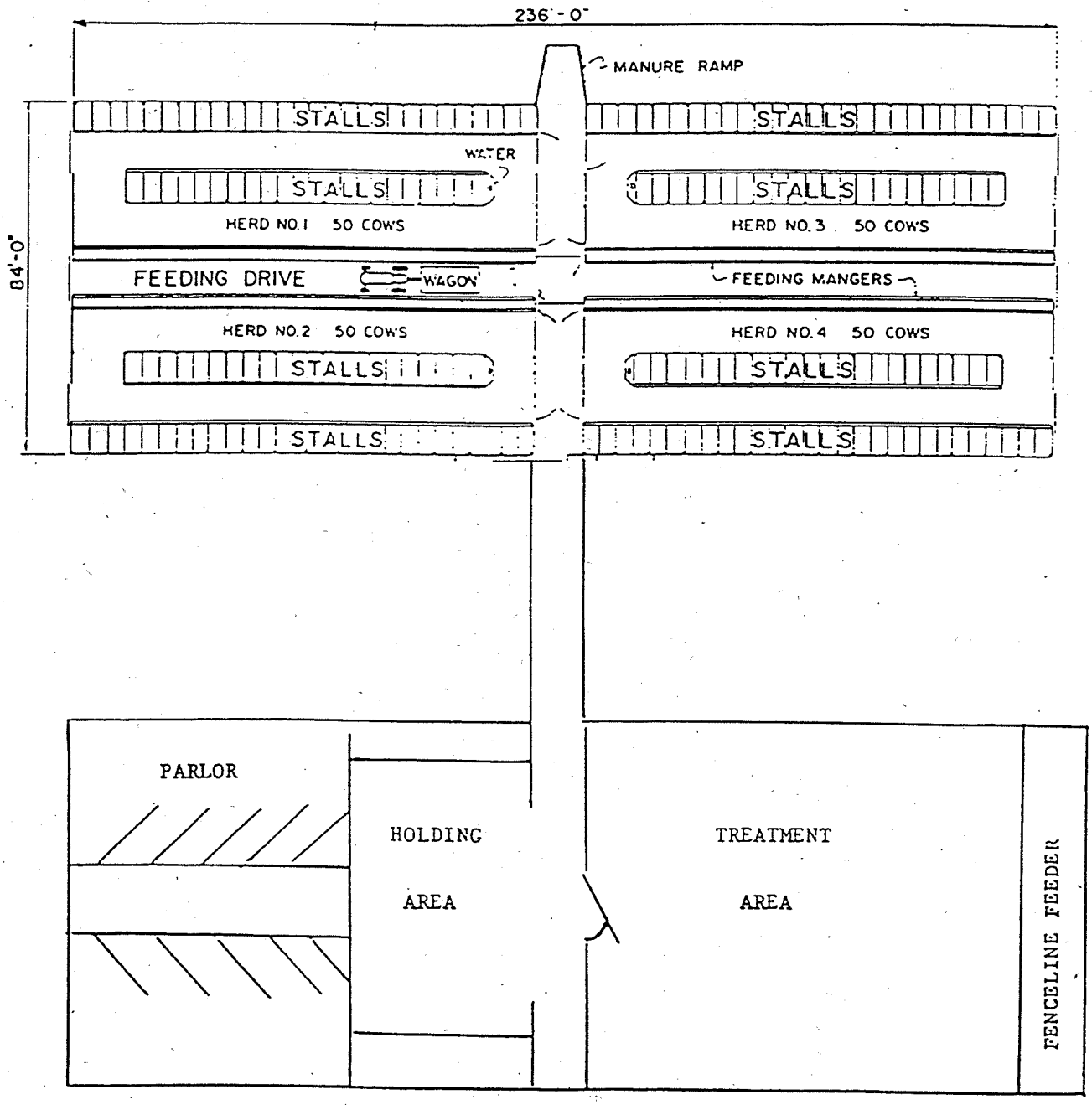
236'-0"
MANURE RAMP
STALLS
STALLS
WATER
STALLS
STALLS
HERD NO.1 50 COWS
HERD NO.3 50 COWS
84'-0"
FEEDING DRIVE
WAGON
FEEDING MANGERS
HERD NO.2 50 COWS
HERD NO.4 50 COWS
STALLS
STALLS
STALLS
STALLS
PARLOR
HOLDING
AREA
TREATMENT
AREA
FENCELINE FEEDER

Fig. 3

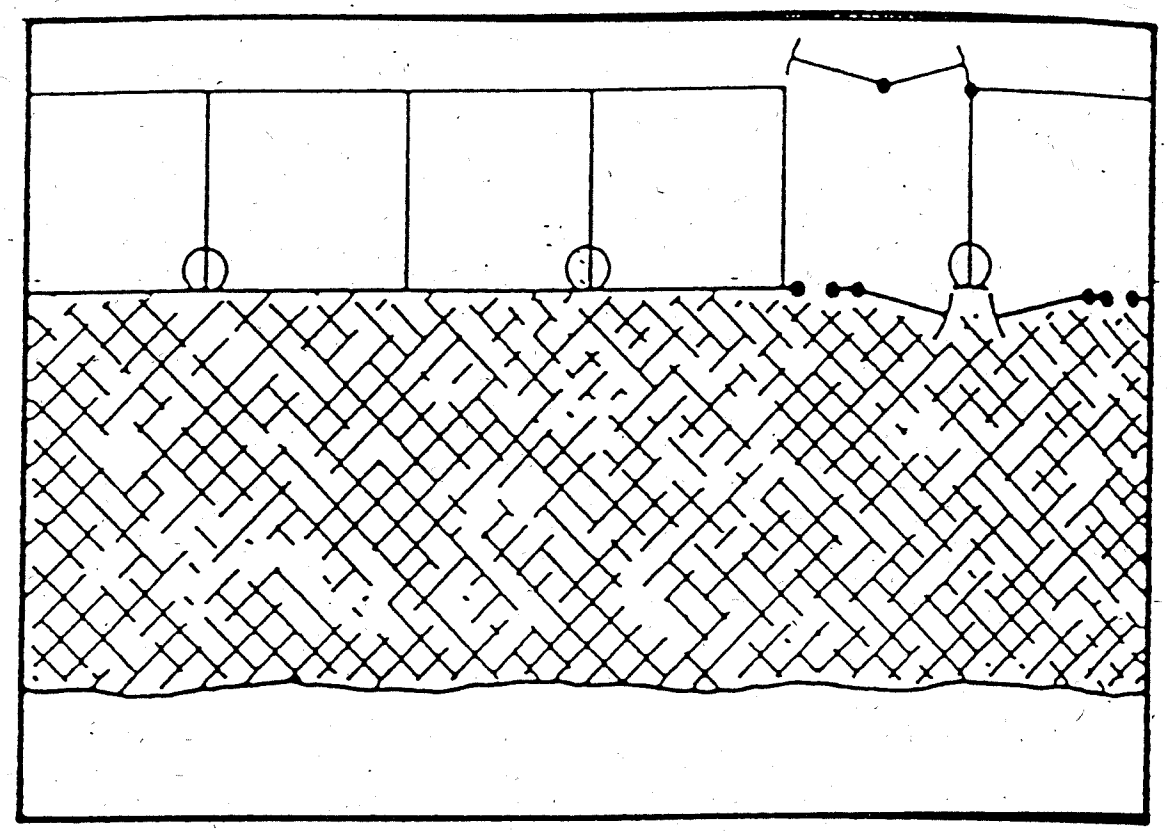

Fig. 4

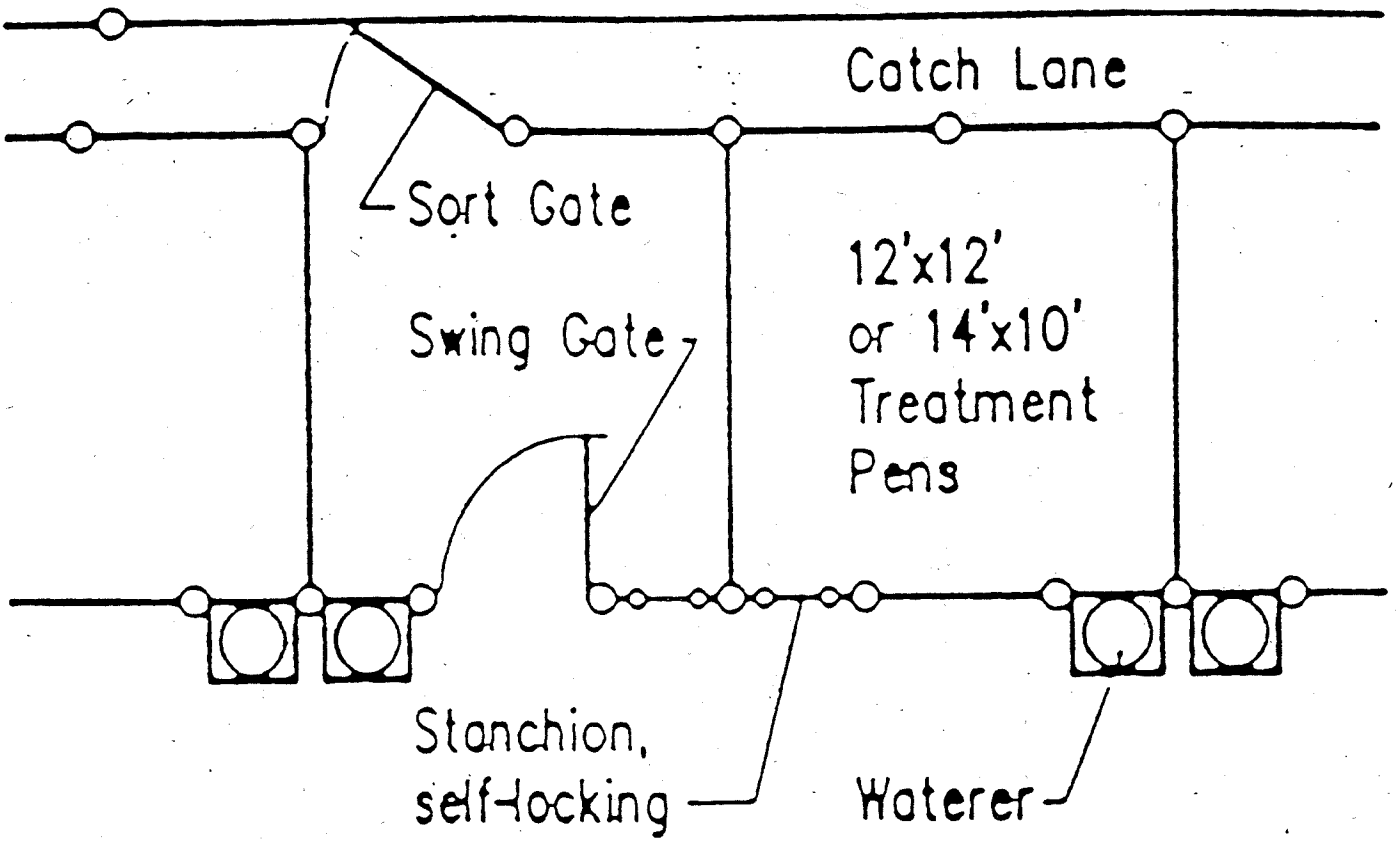
Catch Lane
Sort Gate
Swing Gate
12'x12'
or 14'x10'
Treatment
Pens
Stanchion,
self-locking
Waterer

Fig. 5

ON-FARM COMPOSTING

Richard Verville
University of Maine Cooperative Extension

Farming operations almost always generate organic waste materials such as manures from livestock or residues from harvested crops. These materials represent a valuable source of nutrients that can be recycled back into the farm. However, there are many opportunities for loss of these nutrients. When left unmanaged, the natural decay process of these organic materials often leads to nutrient losses to the farm. Nitrate nitrogen can be leached into ground water or ammonia nitrogen lost to the air as a gas. Nutrients such as phosphorus and potassium may also be lost.

One successful way of converting these farm wastes (and other organic wastes) to nutrient-conserving, humified organic matter is through the process of composting. Composting, a natural process that relies on microbial activity, is a technology of controlled, aerobic decomposition. A properly made compost is free of weed seeds and pathogens. When applied to soils, compost increases organic matter, improves soil tilth, and provides slow release nutrients.

Not every farmer should be composting. For some farmers, however, on-farm composting has proven to be an economically viable means of nutrient recycling, fertility enhancement, and waste management. In some cases, farmers have been able to market their compost, thereby generating additional farm income. While there is much in favor of composting, it is important to stress that each farmer must decide whether or not composting fits into his/her operation. Careful consideration of time, methods, equipment, and materials necessary for the operation will help avoid costly mistakes.

A video documenting a case study of a farmer in Nobelboro was shown to the group to illustrate how composting can be of value to a farmer's recycling of organics in a whole farm situation.

On-Farm Methods
For Composting Livestock Carcasses[a]

William E. Graves
Extension Professor
Department of Veterinary and Animal Sciences
University of Massachusetts at Amherst

Even with the best management of herds and flocks, animal mortalities do occur, and low-impact disposal of these carcasses often provides a challenge to the producer. The challenge of disposal involves burial sites, water table, frozen ground and odor. In addition, the proximity of neighbors and the prevalence of scavengers such as coyotes and dogs ofttimes places a strain on the relationship of a farm and its neighbors. The odors of stored manure and silages will often result in complaints to local officials as will odors resulting from rotting carcasses when above-ground disposal has occurred.

In the poultry industry where large numbers of birds may be involved, there has been a need for methods to dispose of daily mortalities as well as catastrophic losses. Some of these methods have been developed and refined by Dr. Lewis Carr at the University of Maryland, Eastern Shore. With broiler-sized chickens (4-8#) Carr has worked out a bin construction in which dead birds are composted in a tidy and simple way. The resultant compost can be land-applied, thus assisting in fertilizing crops. With larger livestock body masses represented by cows, horses, swine, and sheep, producers generally are faced with two choices for carcass disposal. When possible, most producers choose to bury an animal in some remote location. On many farms, terrain, rocky soil, or hard-pan layers often mean time consuming and often incomplete method of disposal. In winter months when the ground is frozen, carcasses are often left on the surface of the soil. With either choice, coyotes, dogs and other scavengers will often move body parts around and with fluctuations in ambient temperatures, odors are often generated. In some locations with high water tables, there is a potential for contamination of ground water by fluids from rotting carcasses.

COMPOSTING - A Definition

Composting is a process whereby bacteria reduce the volume of organic matter by degrading plant or animal tissues into common elements with the production of heat, CO_2, and water.

THE PROJECT - Theory

When animals are buried, they become isolated in an oxygen-free environment. The bacteria that can survive in the absence of oxygen do decompose carcasses very slowly, often with generation of volatile compounds that can be quite smelly. This process without oxygen is commonly called rotting!

[a] This research was supported by a grant from the Massachusetts Department of Food & Agriculture.

With composting, carcasses are no different than any other organic material (leaves, manure, etc.) except that the nitrogen (N) level is higher, and for successful composting there must be a few essential elements for the bacteria to function:

(a) water (not too much nor too little - squeeze test)

(b) food (Carbon to Nitrogen ratio is important; i.e., a balanced diet)

© Oxygen

When carcasses or manure (high N) are composted, particular attention must be paid to get enough carbon © in the form of straw, sawdust, shavings, or hay such that about a 25:1 (C:N) ratio exists and that moisture levels are in the 40-60% range.

THE PROJECT - Objectives

Our objectives for this project were to test the ideas surrounding an above ground method that farmers could adapt to their livestock operations. We reasoned that any procedures we might devise should require minimal investment, utilize readily available on-farm equipment and materials, and finally be simple enough in its application that farmers would continue to use it.

THE PROJECT - Methods

With the above-mentioned understanding of what conditions should be ideal for composting, we set out to examine methods for on-farm composting of carcasses. Since most of the Maryland work with poultry mortalities had been done with constructed bins, we wanted to determine if a windrow method could be devised such that all livestock mortalities (including chickens) could use the same method. In addition, we set out to see if by the use of perforated 4 inch drainage pipe situated beneath the carcasses would allow more infiltration of air (oxygen) and thus speed up decomposition. We monitored the progress of the degradation process by measuring the temperatures of the windrow in the vicinity of the body mass.

A windrow of typical horse stable bedding and manure 60 feet long, 4 feet deep and 10 feet wide was placed in an enclosure at the UMass Dairy Farm in South Deerfield, Massachusetts. As with most horse stable residue it was volumetrically 90 percent sawdust, 1-2 percent hay, and 8-9 percent actual horse manure. The carcass(es) of the species in question was/were placed atop the pile, and an equivalent depth of horse bedding was used to cover the

carcass(es). No turning of the pile was done. The following species and carcass weights were evaluated:

A.	60 - 8# chickens (aerated)	5-09-95
B.	1 - 85# stillborn calf (aerated)	5-12-95
C.	1 - 300# pig (aerated)	5-21-95
D.	300 - 9# chickens (aerated)	5-23-95
E.	1 - 100# newborn calf	5-26-95
F.	2 - 400# sows	5-31-95
G.	1 - 40# lamb	6-20-95
H.	1 - 1200# cow (aerated)	7-9-95
I.	1 - 1300# cow	7-16-95

Results

Since the summer and fall of 1995 were hot and dry (7 inches of rain over 4 months), the bedding used to cover the carcasses often became dry. There was a risk of having too dry a medium and thus instead of a slow "cooking" process a mummification instead. During the course of the trial (November, 1995) we examined the calf carcass (B, above) and found that only bones and a small amount of hide remained, thus indicating that, at the level of the carcass, adequate moisture was being retained to ensure the composting process.

Temperature Measurements

Generally a week to ten days elapses following placement of the carcass before surrounding temperatures elevate dramatically. Since the new material being added to cover the process is freshly aerated, there is a slight temperature spurt within 2 days that stabilizes at or near 110 degrees F. Since the pile was never turned for fresh oxygenation, we measured what was happening as the tissue degradation supplied nutrients to compost bacteria.

The following table shows temperatures at the level of the carcass after 2 weeks and 4 weeks.

Temperature (degree F) at Carcass Site at
Various Times During Composting

	Species	2 Weeks	4 Weeks
A	60 Chickens*	153.1	157.9
B	1 Calf*	135.0	109.1
C	1 Pig*	142.1	143.5
D	300 Chickens*	158.9	151.2
E	1 Calf	135.9	137.9
F	2 Pigs	163.5	150.8
G	1 Lamb	128.2	120.3
H	1 Cow*	146.6	141.7
I	1 Cow	142.9	139.2

* = Passive aeration

With these limited data, it does appear that aerating the pile allows for higher temperatures to be achieved. With the perforated tile in place, flies were observed going in and out of the tile and odors could be detected in the area of the tile ends. Following the observation of the flies, we placed a screen over the tile and observed flies try to enter. We could also see that fly larvae began to try to escape the heat by crawling to the surface or into the tiles. Many birds learned that this could provide much food and would perch around the enclosure and await the appearance of the larvae.

Temperature and Disease

The nature of the process does involve thermophilic (heat loving) bacteria and certainly the temperatures generated (140 - 160 degrees F) over a period of 4 weeks should kill off most pathogens in those carcasses where passive aeration was provided. In the remaining portions of the pile where temperatures did not get up to 140 degrees, there would be a risk of not removing all disease organisms. In the Maryland trials and in some additional trials done at Delaware, when the temperature of the compost dropped to the 120-130 range, a bucket loader

was used to turn the pile of dead chickens, thus providing a fresh supply of oxygen. Pile temperatures did return to the 140-150 degree F range.

Odor

Many people have been skeptical concerning the composting of large animal carcasses. Although the process is not free of odors, we were pleasantly surprised to find that none of our workers or visitors even noticed any change in the odor level about the farm. The control of odor is the result of two things: (a) adequate oxygen to provide for a "cooking" rather than anaerobic "rotting", and (b) the bedding material used both beneath and above the carcass was sufficiently absorbent to prevent the fluids generated from reaching the surface.

Predators in the area of the farm include coyotes, dogs, raccoons, and skunks. It was observed on two occasions that coyotes were attempting to locate the source of occasional odors from the pile, but they never were able to do that. Skunks, however, seemed to be able to locate the carcasses and would burrow into the pile and retrieve small bones. On one occasion, a dog was able to dig into the pile and retrieve a bone with some flesh on it. However, it did not carry it away.

Bones

One drawback in the process of composting adult whole large animal carcasses is the fact that the major limb bones and skulls will not be significantly degraded by composting. The bones from younger animals which were growing seem to have been made more brittle by composting and would probably be fragmented by going through a manure spreader. Since bones are various salts such as calcium carbonate and calcium sulfate, deposited around a protein matrix, in time they will probably disintegrate. In the 1920's and 1930's, farmers were encouraged to pulverize the bones from dead animals and apply the resulting material to their fields. There would not be an easy way to do this, and at least the major bones could be placed back in a compost medium after separation from the pile.

Recommendations

A. Following our trials with composting various livestock species, we feel that most producers can make the process a successful method on their farms. This process (1) eliminates the need for burial areas; (2) is a natural biological process; (3) produces a material that is relatively inoffensive; (4) creates a product that can be applied to the land; (5) reduces the possibility of runoff contamination and ground water contamination; and (6) is relatively easy to maintain.

B. We would suggest that each farmer who desires to try this method have the following materials on hand for the process:

1. a front end loader for turning the pile and moving materials,

2. a 36-inch long compact-type thermometer (stainless steel),

3. and dry bedding or manure pack that is not caked, or horse stable waste with sawdust and straw.

C. We suggest that a pile (windrow) be created such that there will always be space to add new carcasses and that a stockpile of similar material be maintained for covering carcasses.

D. We suggest that the thermometer be left in the pile adjacent to the carcass and monitored weekly. When temperatures drop below 125-130 degrees F, a front end loader should be used to move the remaining carcass a few feet to either side to be covered again. This will reactivate the cooking process and mix the material. NOTE: You will generate some odor for a few minutes until covering has re-occurred. Monitor temperatures again and turn 2 or 3 more times.

E. After turning the material and seeing no remaining soft animal parts, the material can be left in place or spread on the land as needed. As bones appear, they can be all placed in one part of the pile or can be ground, smashed or pulverized for land application.

F. Based on our experience, there will be some freezing and thawing of the surface during the winter. This can slow the composting process and care should be taken to provide for at least 2-3 feet of cover to help insulate. In addition, as you choose a site for the windrow, orient the length of the windrow with North and South such that only the end of the windrow is facing a cold exposure.

G. The windrow should be oriented lengthwise with the slope of the land so that water from rainfall and snow will not puddle against the pile. If possible select a site where the slope is no more than 3 or 4 percent and on an area where tractors can maneuver under all weather conditions.

Good luck with your new carcass disposal method and call on us if you need assistance.

Vermont's Agricultural Plastics Recycling Program

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6 Valley Crossroads
St. Albans, VT 05478

Program History

In 1995, the UVM Extension System, in cooperation with the Vermont Department of Agriculture, Food, and Markets and the Vermont Department of Environmental Conservation, received a grant from the U.S. Department of Agriculture to investigate and implement recycling options for agricultural plastics and to develop educational initiatives that promote farmers' voluntary participation in recycling. UVM Extension has received two additional grants to design and implement a survey of Vermont dairy farmers and to collaborate with Extension faculty in New Hampshire and Connecticut to investigate the feasibility of recycling agricultural films.

An advisory board was formed to assist with program direction and information-gathering. The Vermont Department of Environmental Conservation, the Vermont Department of Agriculture, Food and Markets, Vermont Republic Industries, the St. Albans Co-op, the Vermont Fertilizer Group, and the American Plastics Council are represented on the advisory board. The Vermont Department of Agriculture, Food and Markets has taken leadership in promoting and implementing the pesticide container recycling program and provided important contact information and technical assistance. The Vermont Department of Environmental Conservation and the American Plastics Council have assisted in developing markets and working with solid waste districts.

Program Goals

UVM Extension's primary objective is to initiate agricultural plastic recycling in Vermont and New England through information-gathering about options for recycling, coordination within the agricultural and recycling communities, and communication with farmers regarding recycling opportunities and responsibilities. Should agricultural plastics recycling prove to be cost-effective, our long-term vision is for the private or non-profit sector to take over our program's activities.

Program Planning and Information-Gathering

An initial planning meeting in November 1995 revealed that advisory board members felt that the top program priorities should be: (1) conducting a survey to determine quantities and types of agricultural plastics used in Vermont, current disposal methods, and farmers' interest in participating in recycling, and (2) implementing pilot collection programs for rigid high density polyethylene (HDPE) containers that contained sanitizers, cleansers and bactericides. Preliminary survey findings revealed that agricultural films were a larger disposal problem than containers. Accordingly, program efforts have been directed toward pilot collections and market development for agricultural film.

Other information-gathering efforts have included: (1) investigating current collection options for HDPE containers provided by waste haulers and solid waste districts; and (2) identifying environmental and regulatory concerns related to collection and recycling of agricultural plastics through contact with US EPA.

Dairy Farmer Survey

Working in conjunction with the Vermont Department of Agriculture, Food and Markets, the Vermont Agency of Natural Resources, agricultural plastics dealers, Vermont farmers, regional solid waste districts, and the American Plastics Council, the UVM Extension System began by assessing the scope of the problem through a survey of Vermont dairy farmers. Dairy farms were chosen because they are Vermont's largest agricultural sector. Livestock and greenhouse operations also use plastics, but a single survey population simplified the data-gathering effort.

This survey points to several important implications for agricultural plastics recycling:

* There are substantial quantities of low density polyethylene (LDPE) and HDPE plastic generated as waste by Vermont dairy operations each year which could be recaptured by recycling processors.
* Vermont dairy farmers need expanded options for safe and affordable disposal of their waste agricultural plastics. Recycling can be a cost-effective alternative if the value of recaptured plastics outweighs the costs of collection and processing.
* Successful recycling programs for agricultural plastics will build on dairy farmers' willingness to take partial responsibility for recycling and minimize costs to dairy farmers for participation.
* High levels of participation may be achieved if collection programs build on current transportation patterns such as farmers' trips to farm supply dealers or landfills. (*Three-quarters of survey respondents indicated that they would transport their used agricultural plastics to a drop-off site.*)
* Education and technical assistance efforts should focus on: (1) encouraging dairy farmers to keep plastics as clean as possible and to store them in clean, dry locations, (2) informing them about the environmental impacts of some on-farm disposal methods, and (3) providing information about collection and recycling options.

Agricultural Film - Pilot Programs and Market Development

Traveling past Vermont farms and hayfields, you will invariably see a new feature in the landscape: plastic. Black plastic covered bunkers, white plastic-wrapped round bales, and long white plastic tubes stuffed with hay have appeared in every region of the state over the past ten years. Many Vermont farmers have decided that agricultural plastics are a flexible and cost-effective alternative to traditional feed storage, mirroring a national trend. Yet, as these farmers have made the transition to plastic, they have created a new solid waste management challenge.

Because there are currently only limited options for reusing plastic agricultural film on-farm and because the cost of bringing waste plastics to the landfill reduces the cost-effectiveness of their use, some Vermont farmers have resorted to burning or burying their used film on-site. This practice is not only illegal, it releases pollutants into air and water and

creates conflict with non-farming neighbors. Recognition of these problems prompted the U.S. Department of Agriculture to grant funds to the University of Vermont Extension System to help farmers find a low-cost disposal alternative for their used agricultural plastic through recycling.

Made of low-density polyethylene, plastic agricultural films can be difficult to recycle for several reasons. Mud and organic matter "contaminate" used plastic and require the plastic to be cleaned before it can be remanufactured. The low weight to volume ratio of plastic film makes compaction a critical step prior to transportation from agricultural areas to recycling processors. Globally, the cost of virgin low-density polyethylene is low, reducing demand for recycled LDPE.

The incentives for recycling agricultural plastic include keeping material out of Vermont landfills, converting "waste" plastic back into useful forms, and making a new innovation in agriculture more sustainable.

In the Spring and Summer of 1996, farmers in Addison, Lamoille, Orleans, Caledonia, and Essex counties were able to bring their used agricultural film to three pilot recycling programs, offered at no cost through three regional solid waste districts. Round bale silage wrap, silage bags, and bunker silo covers were accepted, but had to be kept clean and dry and separate from one another. The collected material -- over 5 tons -- was baled and sent to a variety of recycling processors as part of a market development effort. By evaluating the success and cost-effectiveness of these pilot projects, we can begin to determine the feasibility of developing long-term programs.

Already we've learned that there are a number of things that farmers can do to make their used agricultural film suitable for recycling. These include: (1) keeping plastic as clean and dry as possible by keeping it out of mud and water and off of the bare ground or barn floor; (2) when plastic film is dry, shaking it to remove dirt and debris; (3) minimizing contamination by other waste materials such as vegetation, paper, string, tape, or other items such as baling twine.

UVM Extension hopes to continue to work with regional solid waste districts to offer expanded recycling programs in the Spring of 1997, but this will depend of the availability of baling equipment and suitable markets. However, keeping plastic clean and dry is helpful even if no immediate collection program is available because plastic will be lighter in weight and therefore less expensive to bring to the landfill.

Milkhouse Containers - Future Efforts

In order to develop an infrastructure for collection and recycling of HDPE milkhouse containers, it is essential to build on existing collection programs and integrate agricultural products dealers and solid waste districts. Once complete information has been compiled regarding the types of HDPE containers that can be recycled through Vermont waste haulers and drop-off centers, regional gaps can be identified. Four tasks can then be addressed: (1) contact agricultural products dealers regarding quantity of materials being sold in Vermont and willingness to participate in recycling; (2) synthesize information regarding existing recycling options and distribute this information to farmers; (3) explore options for collecting and processing containers that currently have no available processor; and (4) identify markets for collected HDPE plastic.

Lessons Learned

This project has been successful in documenting the scope of the disposal problem resulting from the use of agricultural plastics in Vermont. Exploration of the possibilities for recycling plastic agricultural film may lead to a long-term low-cost disposal alternative for farmers. Pilot recycling programs in Vermont not only help Vermont farmers, they help farmers nation-wide by identifying collection and contamination challenges and building acceptance of agricultural plastics by recycling processors.

Future challenges related to agricultural plastics include: finding recycling opportunities for sanitizer and bactericide containers used by dairy farmers in the milkhouse; bringing agricultural plastics manufacturer into the recycling loop; tackling greenhouse film and other types of plastic; and achieving regional and national participation in agricultural plastics recycling.

Land Application of Biosolids
(S... Happens, Then What!!)

Tom Buob
Extension Educator, Ag Resources
UNH Cooperative Extension, Grafton County

There has been increasing interest in utilizing waste products as fertilizer substitutes. In the case of biosolids (treated waste products from water and wastewater treatment plants), there can be advantages for both the producers and the users. For municipalities, landspreading can be the least expensive method of waste disposal, and for land owners, applying biosolids can be an inexpensive way to obtain some of the needed nutrients for crop production.

When evaluating whether or not the use of biosolids will be advantageous to you there are various factors that need to be considered. Since the land application of any waste product can be controversial, one needs to be aware of the social and legal aspects, as well as the scientific. I will only be discussing some of the technical considerations when becoming involved in a biosolid land application program.

The first factor to consider is whether or not the product is of high quality. In the case of biosolids this pertains to the nutrient content, the physical characteristics of the material being applied and the level of heavy metals in the biosolids. Most of the biosolid materials available tend to be fairly high in nutrient content (except for potassium), but variability can be quite wide from one source to another, and will also depend on the treatment regime. The heavy metal contents also vary, and are somewhat dependent on the type of industry located in the municipality. The latest federal regulations (EPA 503 regs) have placed limits on heavy metals concentrations for biosolids for land applications (NH is considering lowering some of these numbers). Only materials which are below these levels can be land applied. In addition, waste materials must be treated to reduce pathogen levels prior to land application.

From a nutrient standpoint, biosolids tend to be high in nitrogen, phosphorus and calcium, but very low in potassium. Depending on what treatment process is used, the pH can vary from neutral (7.0) to very high (12.0). The high calcium and pH levels, for example are associated with the lime stabilization process to reduce pathogen levels. The nitrogen exists in the organic form which means that it releases slowly over time in relation to temperature and moisture conditions. This has advantages and disadvantages, depending on the situation.

Since only high quality (nutrient rich, low metal) biosolids should be used in a land application program, it is likely that the application rate will be limited by the nitrogen concentration and not heavy metal concentrations. This means that the amount of biosolids applied will depend on the crop considered. A corn crop would have a higher requirement than a grass sod crop, so the application rates would be quite different. As mentioned earlier, the slow release characteristics of the nitrogen fit quite well in the recommendations for many crops, but it is important to carefully estimate the nitrogen from other sources. If these other sources are not included in the determination of the application rate, the risk of nitrogen losses due to leaching can be increased. This may pose an increased risk to groundwater contamination.

The actual application of biosolids to land will depend on the physical characteristics of the material being used (solid or liquid) and the equipment available for spreading. It is very important that the material be spread evenly over the area to avoid pockets of nutrient concentrations above the recommended rates.

In agricultural operations, biosolids will be only one of a variety of nutrient sources. It is important that the nutrient characteristics of these sources be understood prior to use in order to balance the nutrients for the selected crop. For example, since there is very little potassium in most municipal biosolid sources, an effort has to be made to correctly supply this nutrient from another source. In addition, if the crop to be planted has a low or moderate pH requirement, it would be very important not to use a material which had been lime stabilized and had a very high pH. This can be the case especially in ornamental plantings where soil acidity can be a much more important factor in plant health as compared to a corn or forage crop.

Other areas of beneficial reuse through land application include forest spreading and reclamation sites such as gravel pits and landfill closures. Since gravel pits can be closely associated with aquifer recharge areas, careful considerations must be given to how these materials are used and what rates they are applied. With landfill closures, some of the same considerations must be made since there are only 2 or 3 feet of material on top of the plastic liner. (Once the nutrients reach the liner, they will move down the liner to an outlet or runoff area.) Forest application raises other issues such as site evaluation and access as well as nutrient requirements.

Monitoring does, and will continue to play an important role in any land application program. It has become critical, both from an environmental and profitability standpoint, to manage nutrients in a manner that allows for excellent growth but does not significantly increase the risk of groundwater contamination. Field work in progress at this time using biosolids with different characteristics will be used to improve nutrient management techniques. Soil testing will continue to be a very valuable tool in assessing the effects of nutrient additions to soils from many different sources. A better understanding of the nutrient properties and how they interact with the soil will provide valuable information for improving our ability to safely use them.

The lack of public acceptance to land application of biosolids may be a barrier to their use on any land. The range of concerns involve the real case of odors to the perception of diminished property values. Strong educational programs, involving research-based information, are needed to help assess the true risks. The proper use of high quality materials along with a strong monitoring program can reduce the risk of environmental contamination while recycling nutrients through a useful crop.

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Stream Water Quality Changes through the Use of BMPs

John Jemison
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University of Maine Cooperative Extension

You may be wondering what's the big deal about cows in streams. For years, dairy and beef cattle lazed away the hot summer days in streams, and people didn't make too much fuss over it. Now, particularly in coastal states, this is seriously frowned on. There are three problems with this: bacteria can close clam flats; erosion and nutrients can lead to poor water quality; and lastly, when your animals are lounging in the stream, they are not eating. When they don't eat, you are losing money.

We started a demonstration project in the summer of 1994, to determine if we could see some effects from keeping livestock out of a stream in Gray, Maine. The farm of interest had a 50 cow Jersey herd. For years, the animals used the stream for water. The heavy traffic to and from the stream caused soil erosion to become a significant problem. So, we approached the producer about working with us. Initially, he was not in favor of fencing the animals out of the stream, but he was interested in improving the grazing system. He had been grazing his animals in over 40 acres of pasture divided into four large paddocks. We suggested increasing the intensity of the rotation, and by the end of that summer, we set up a ram pump to bring water from the stream to each paddock. The producer was quite surprised to find that even when the paddocks were open, the animals did not go down to the stream for water. They ate more grass and made more milk.

Once we had the water system established, we suggested that he might now fence the animals out of the stream. The producer said if we could show him that the animals were causing a problem in the stream, he would agree to fence off the stream. So, in the fall of 1994, we started looking at the insect larva in the stream. These aquatic insects can be used as an indication of water quality. If specific pollution-intolerant insects are present, then the water quality should be good. If you find only a few pollution-tolerant insects, that would indicate a problem.

We placed three insect collection baskets above the farm, three directly below a heavily used area, and three below the farm. We gave the insects six weeks to inhabit the traps and together with the students from Yarmouth High School, we collected and identified the insects we trapped. Figure 1 shows that the total number of insects collected and the number of insect families above and below the farm were fairly similar in 1994, but the middle site near the pasture had very low numbers. During the time that the insects were moving into the baskets, the area had a great deal of rain. Eroded sediment nearly buried these baskets. We also subdivided the insects into five different feeding groups: predators; shredders; filterers; scrapers; and gatherers. We found lower numbers of all these feeding groups in the middle location. We also found more scraping and filtering/gathering insects below the farm (figure 2). One reason why there were more of those types of insects was because they were feeding on the fine organic matter and algae down stream. It is hard to say if this is necessarily good or bad. If trout or other high quality fish feed on these organisms, the effect could be

beneficial. On the other hand, the sediment could affect spawning grounds. Also, the potential bacterial pollution could cause problems in the shellfish beds downstream.

With this information, we were able to convince the farmer to fence off the stream. We also stabilized the eroding streambank by planting trees and shrubs and established buffers for manure spreading. In the fall of 1995, we repeated the insect sampling and found higher numbers of all insects, particularly in the middle location (Figure 3). There still seem to be more scrapers and filtering insects downstream, but the location may just be more favorable for those types of insects (Figure 4).

What has made this demonstration useful is in showing a win-win situation to producers in Southern Maine. The more we show benefit to both agricultural production and environmental quality, the more likely producers will try to implement BMPs on their operations.

List of Figures

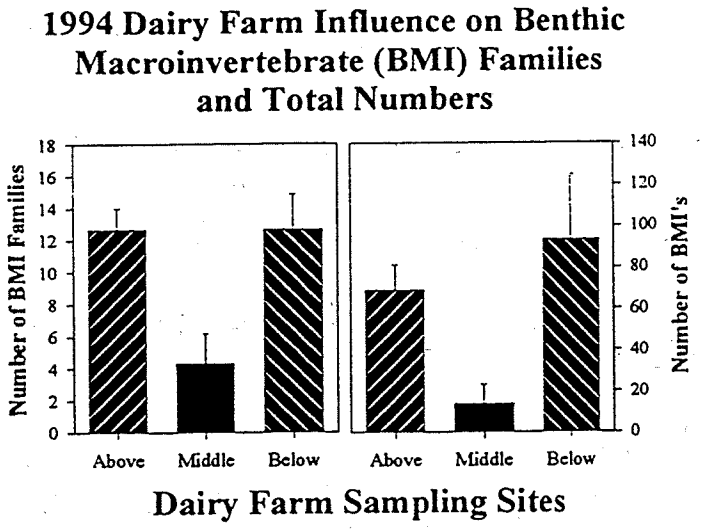

Figure 1. Dairy farm influence on benthic macroinvertebrate families and total numbers

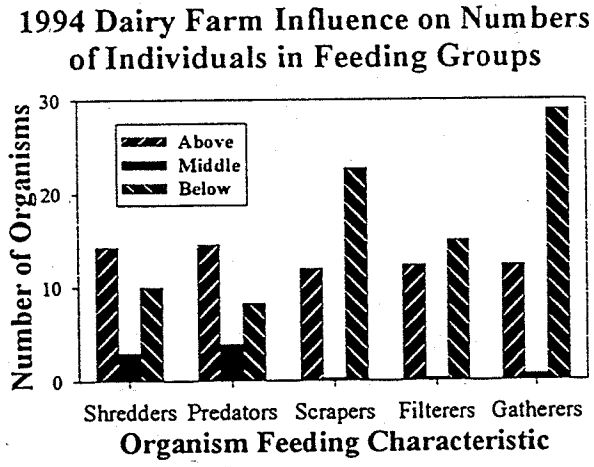

Figure 2. Dairy farm influence on numbers of individuals in feeding groups

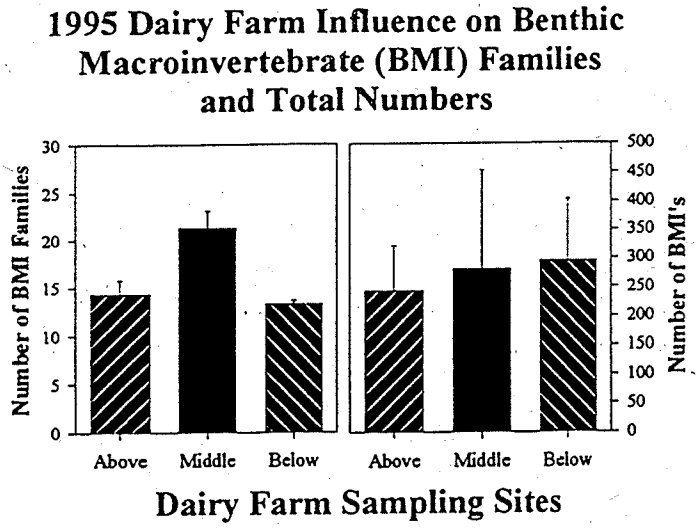

Figure 3. Year 2: Effect of BMPs on BMI families and total numbers

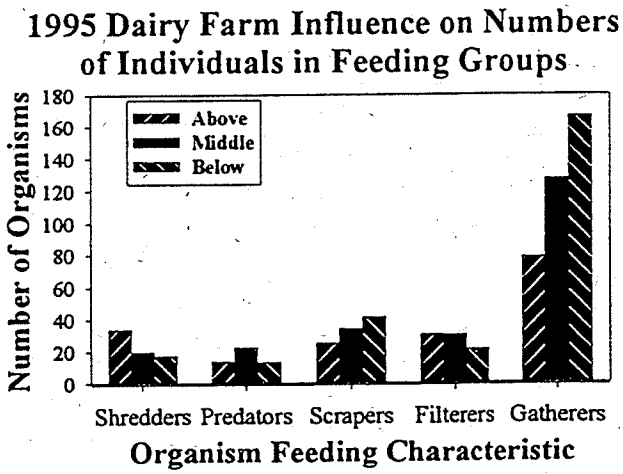

Figure 4. Year 2: Effect of BMPs on BMI feeding groups

Manure: Another Value-Adding Opportunity

Tim Griffin
University of Maine Cooperative Extension

There has been enough education over the last 20 years that nearly everyone understands that manure represents an important nutrient source on dairy farms. The basic goals of nutrient management, like maximizing the nutrient and economic value of manure and minimizing the movement of nutrients in the environment, are also widely understood. However, if we really want to meet the goals, we need to be more specific about what *value* manure has, and how this *value* can be recognized on a farm.

The simplest way to recognize value in manure (and other on farm nutrient sources) is simply to calculate the cost of replacing these same nutrients with purchased fertilizer forms. Say a solid manure contains 11 lb N, 6 lb P_2O_5, and 11 lb K_2O per ton of material. Using recent fertilizer prices, this ton of manure contains $6.71 worth of nutrients. This is a very general way of looking at *economic value*; we need to go further. We want to know the nutrient content of a specific manure. This can vary greatly for both liquid and solid manure handling systems. If we rely on "average" values, we can over- or under-estimate the value of the nutrients. For a $20 manure test, we know what we are dealing with, and at least what the potential value of the manure might be.

At this point, we are still looking at *potential value*. How does the availability of nutrients from manure compare to fertilizer? Phosphorous and potassium are similar between the two forms (plants don't distinguish between K from manure and K from fertilizer). The availability of nitrogen, however, is affected by many factors. Nitrogen is conserved if it is applied just prior to crop needs and is quickly incorporated to minimize volatile loss of ammonia. The same manure discussed above may have available nutrients such as: 5.8 lb N, 5.4 lb P_2O_5, and 9.9 lb K_2O per ton of material, with a potential value of $5.06 per ton. If four or five days pass before incorporation, only 1.8 lb N is available to the crop, and the value drops to $3.84 per ton. The moral of this little story: *we add value through our management.*

There are big differences in the value of manure depending on where it is used. Say you apply 20 tons of the same manure to a corn field where the soil test says you need 140 lb N, 60 lb P_2O_5, and 150 lb K_2O per acre. The value of manure is this situation is nearly $90 per acre. The same manure applied to a corn field that requires only 140 lb N (P and K are already very high from past applications) is worth on $43 per acre, just the value of the N. This may or may not cover the cost of application: spreading costs vary from $15-20 to $50-60 per acre. The difference (about $47 per acre) is value that is added or lost based on your decision of where to use the resource.

In some cases, manure has more value if it leaves the farm where it is produced. Here is an example. A dairy farm with high P and K levels has two choices: spread on their fields (and receive only an N benefit), or spread on a neighboring potato farm that needs N, P, and K. There is a net loss to the dairy farm (ie. the spreading cost), but a net gain to the potato farm that is near $70 per acre. How do we account for *value* in this situation?

The take-home lesson here is simple: to fully recognize the value of manure, you should be dealing with farm-specific information (on manure, soils, and crops). Your opportunities to "value-add" manure are based on *this* information.

Alternatives to Antibiotics - Are they appropriate for treating mastitis?

Sheila M. Andrew
Extension Dairy Specialist, University of Connecticut

The use of antibiotics to treat infections is a well established practice on dairy farms. Ideally, antibiotics are used under the guidance of the farm veterinarian, who is knowledgeable of the management practices on the farm. However, even under these conditions, antibiotic treatment may not effectively eliminate all infections. Because of these and other concerns, there has been renewed interest in utilizing alternatives to antibiotic therapies for treating infections.

It has been reported that the most common reason for antibiotic use on the dairy farm is to treat mastitis. In an Ohio study, the costs associated with treating mastitis were greater than for any other health disorder on dairy farms. These expenses include the cost of the drug treatment and the costs associated with discarded milk. In a New York study, it was estimated that mastitis results in a one-hundred million dollar loss to the New York dairy industry. Therefore, since mastitis is so costly to dairy producers, alternative treatments that can both decrease expenses and increase effectiveness of treatment are actively being investigated.

The most commonly used alternative treatment for clinical cases of mastitis is frequent milk-out and oxytocin administration to assure complete milk removal from the gland. Also, supportive therapies are used when the cow exhibits systemic effects (elevated body temperature, scours and dehydration). Supportive therapies include anti-inflammatory drugs, and fluid therapy. In more severe cases of clinical mastitis, hypertonic saline solutions are administered intravenously to promote water intake and alleviate dehydration. These therapies are used in an extra-label manner and should only be used under the guidance of a veterinarian. Unfortunately, there are very few well-controlled studies on the effectiveness of these treatment regimens.

A California study compared oxytocin administration to antibiotic therapy for the treatment of over 300 cases of mild, clinical mastitis. The clinical cure rate (return to normal appearance of milk) for oxytocin treatment was 66% and did not differ from the clinical cure rate for cows treated with an antibiotic. The bacterial cure rate (pathogen not present 21-days after treatment) was 49.1% for the oxytocin treatment and 43.9% and 55.0% for treatment with an amoxicillin and a cephapirin product, respectively. In this study, oxytocin was similar to antibiotic therapies for treating mild mastitis. However, these results also indicate that the cure rate for mastitis is low regardless of the treatment regimen.

Total farm application of alternative treatments for mastitis have been followed with case studies. A University of Michigan case study measured the success of using alternative therapies for treating clinical mastitis over a two-year period. Oxytocin was successful in treating many of the acute cases of mastitis in early lactation. Whereas, in later lactation (greater than 100 days in lactation) there was a trend towards an increase in persistency of infections and an increase in the number of clinical cases. This suggests that studies evaluating the effectiveness of alternative treatments should include stage of lactation as well as other factors associated with milk production.

Future possibilities for treatment or prevention of mastitis have exciting possibilities. Current investigations are ongoing evaluating the possibility of cytokines (proteins produced by the cow) that would aid the cow's immune system in eliminating mammary infections. Certain proteins isolated from micro-organisms that have antimicrobial activity may prevent the establishment of pathogens in the mammary gland. Vaccination for *Staph. aureus* shows promise in reducing the number of cases of clinical mastitis from *Staph. aureus* organisms. Proper nutrition is necessary for the prevention of disease. Supplementation of Vitamin E and selenium to recommended levels has been shown to reduce the number of clinical cases of mastitis. Also, Vitamin A and copper supplementation have been associated with a reduction in mastitis. Finally, new research has demonstrated that heifers can harbor pathogens in the mammary gland and, upon calving , heifers may be a source of pathogen transmission to the herd. It is hoped that new research can provide effective methods to reduce the incidence and severity of mastitis.

Prevention of mastitis is preferred over treatment for mastitis. Not only is prevention more cost effective; prevention can also result in increased milk production and qualifying for quality milk premiums. The mastitis control program should include; attention to the cleanliness of the environment, proper milking procedures, training for all milkers, maintaining milking equipment, utilizing effective dry cow treatment, isolation of new animals in the herd, and a targeted treatment plan for mastitis. The decision to treat mastitis should be based on economics, considering both the value of the cow and the costs of antibiotic treatment.

A targeted treatment plan for mastitis should begin with the identification and elimination of *Strep. ag.* In the herd. The control of *Staph. aureus* is next in order of importance. Finally, the decision to treat a clinical case of mastitis can be accomplished with a decision tree that is developed in consultation with the veterinarian to specifically target the needs on an individual farm. Accurate records are an essential component of this plan. An example of a decision tree for treating clinical mastitis is shown below:

Clinical Mastitis

Early lactation/Heifer	Late lactation/Relapse
1. Culture Quarter	1. Frequent milk-out
2. Treat affected quarter	2. Oxytocin administration
3. Supportive therapies	3. Supportive therapies
4. Test for residues	4.Dry-off cow
	5. Cull cow

The goal of the targeted treatment plan is to reduce the use of antibiotics and increase the effectiveness of treatment for mastitis.

While alternative to antibiotics may appear to be the answer to concerns associated with antibiotic use, successful control of this disease must include proper preventative management practices along with targeted antibiotic treatment plans. Presently, prevention of mastitis is our most successful alternative treatment for mastitis!

BACK TO BOTTLES
Adding Value to Milk By Marketing Directly to Consumers in Glass*

McNamara Farm
Plainfield, New Hampshire

It's the stuff of dairy farmers' dreams - sell direct to consumers and cut out middlemen who skim off profit. But the reality of producer/processors can be nightmarish if careful planning isn't your first step.

The McNamara family in Plainfield, New Hampshire, spent 15 months getting their 3-year-old processing business online. "We visited several plants and got advice from people who had years of experience in the processing business," says Patrick McNamara, who processes milk from the family's 80-cow herd. The farm includes Patrick's wife, Mary; his brother, Tom and wife Clair; and their parents, Bill and Hazel.

"We were a year building the processing plant," Patrick adds. "We cut our own lumber and did much of the construction."

To save money, the McNamaras bought used equipment from a number of sources, some as far away as western Pennsylvania and Massachusetts.

"It was important to buy only stainless steel, " McNamara says. "Some used equipment is made from a nickel alloy metal, used years ago but not approved today."

With equipment in hand, the family had to size all the pieces - pasteurizer, separator, bottler and the rest - to the gallons per hour of production the McNamaras expected to process.

Even with used equipment and on-farm labor, the McNamaras invested $230,000 in their processing business. No wonder McNamara says, "You have to be in good financial shape to start processing."

Some $30,000 of the cost went into the plant, including excavation. The McNamaras laid out an additional $20,000 for a trailer load of bottles, averaging 90 cents a piece.

The McNamaras' production costs also include two drivers for the two refrigeration trucks that deliver milk four days a week. A part-time employee was hired for barn work when Patrick is processing.

Even with those expenditures, the family is on schedule with its 4- to 5-year payback on its investment.

"At $1.50 a half-gallon, we gross close to $28 per hundredweight," explains Mary. "We also sell in 5-gallon bags to restaurants for $20, making a $25 average. The processing and delivery costs are $7 per hundredweight, leaving a $28 price for the milk."

To set the price of their product, the McNamaras looked at similar products on the market. "We're not trying to be competitive with plastic or paper," McNamara points out. "We want to be competitive with other glass processors. We have a large number of up-scale buyers in our area, willing to pay a premium for quality. In another area, it might be necessary to compete in a more price-conscious market."

* Paper presented by Mary McNamara of Plainfield, New Hampshire. Article written by Harold Waite and Eleanor Jacobs and printed with permission of the "American Agriculturalist."

UP AND RUNNING:

Today the McNamaras process 1,500 gallons twice a week. But in the very beginning they spent two weeks running water through the processing system under the watchful gaze of two experienced processors.

The farm regularly packages six different products: whole, skim, 2 percent and chocolate milk; half and half and heavy cream; and eggnog during the Christmas holiday.

Milk moves from the double-four parlor into the farm's 1,500-gallon bulk tank. It's piped at 38 degrees into the processing room to be pasteurized at 165 degrees. Milk is homogenized and returned to 38 degrees in two minutes. Then it's pumped into one of three tanks, depending on products being processed. A steady stream of distinctive bottles are conveyed into the processing room, filled, capped and dated.

Balancing supply and demand has been a learning process. "You'd be surprised at how uneven milk consumption is, "McNamara says. "It not only varies with the time of year but from the beginning of the month to the end."

They contact their big accounts right before bottling to get an estimate of their needs. Any excess milk is sold to Agri-Mark Cooperative at the III-A price of $8 per hundredweight, a price slightly better than dumping the extra, McNamara says.

GET THE WORD OUT:

Dairy farmers turned marketers can find selling tougher than battling wet fields. This was so for the McNamaras, who eventually developed this successful marketing strategy.

To make their milk stand out from the crowd, the family opted to use glass bottles. The farm's logo - Quality Products from Yesteryear - appears above an illustration of a horse-drawn milk cart and a man in a white hat carrying two milk bottles.

Even though the farm charges a dollar deposit and gets 85 percent return, it still buys 12,000 bottles every eight months.

The McNamaras capitalize on the image that a local product is fresher. "We sell 80 percent of our output within a 20-mile radius," McNamara says. "Mom and pop stores and restaurants are all good markets. Plus, we sell to half a dozen chain stores."

They were the toughest markets to crack. "You have to go right to the main office, but it's worth the effort because they have a big draw," McNamara notes. "And we don't cut price for them. Our milk, priced at $1.50 a half-gallon, is shelved next to their lower priced specials and sells well.

"Our milk is fresher, better tasting and local. Customers can come to the farm and see it produced and processed. These points make it easier to convince stores, especially chains, to give us shelf space."

Being local, the McNamaras can put a face with their product in several ways. Mary, Clair and sister-in-law Joyce do in-store demonstrations to hand out free product.

And the family welcomes people to the farm to see the product from start to finish. The farm is part of New Hampshire's Open Barn program to educate the public about farming. Between 3,000 and 4,000 people visit the farm during the event, McNamara says.

The farm's self-service sales room with an open cash register attracts even more customers and is good advertising. "Many visitors say, 'We always buy your milk and came to see where it was produced,' " McNamara relates.

Additional advertising is limited to local papers and a few radio spots.

Even with the start-up costs and sharp learning curve, processing has accomplished what the McNamaras hoped. It was an alternative to herd expansion to support three families in a location where additional land is scarce. The family eliminated the middlemen. And it carved out a means to stay in business.

"This has done what we hoped," McNamara says. "We made a large investment in the equipment and plant, but it's paying off. We've always farmed and intend to continue. There's another generation coming along, and we want to make it possible for them to have the same opportunity."

PROCESSING START-UP HOW-TO'S:

If you're thinking about the processing business, consider this advice from Patrick McNamara, who with his family processed 1,500 gallons of milk twice a week:

- Get a consultant. "Find someone who knows what's going on - someone in the milk industry - that can help, " McNamara says.

- Work with the state's health department from the beginning. "We showed them our plans, and they pointed out the necessary changes. It's much easier to make changes and move equipment on paper than after building a facility," McNamara says.

- Work with your lender from the beginning.

- Develop a marketing plan. Says McNamara, "You have to know how to sell your product.

Resource Materials:
"Starting a Farm Milk Jugging Operation," Sidney Barnard, Extension Dairy Specialist, Pennsylvania State University.

Resource People:
Jim Austin (former plant manager)
Daisy Hill Road
Lebanon, NH 03766
Tel. (603) 448-4342

Bottles, Cases & Caps:
StanPac
P.O. Box 584
Lewiston, NY 14092
Tel. (905) 957-3326

Winscot, Inc.
Box 1
Clarion, PA 16214
Tel. (814) 226-9208

Equipment:
Mico Equipment & Supply Corporation
RD 1, Box 9B
New Berlin, NY 13411

Oliver Dean
240 Barber Ave.
Worchester, MA 01606

Read-Desco, Limited
Dairy Engineers, Polar Works
Dean Road
Handforth, Wilmslow
Cheshire, England SK9 3AJ
Tel. 0625-522231
FAX: 0625-536341

Heritage Equip. Co.
9000 Heritage Dr.
Plain City, OH 43064
Tel. (800) 282-7961

Rowland Sales
P.O. Box 552
Hazelton, PA 18201

Bruns Bro. Processing Equip.
175 Portland Rd.
P.O. Box
Gray, ME 04039

T. L. Green
P.O. Box 39
Milford, NH 03055
Tel. (800) 572-0045

Chemicals:
Sul Tec
14 Rockridge Rd.
Natick, MA 01760

Reusable handles & Caps:
Sun Industries
P.O. Box 16039
Cleveland, OH 44116
Tel. (216) 331-3600

Daters:
Algene Mark Equip.
P.O. Box 410
Garfield, NJ 07026

Publications:
"Dairy Foods"
Cahners Publishing Co.
1350 East Touhy Ave.
Box 5080
Des Plaines, IL 60017-5080
Tel. (708) 635-8800

"Dairy Processor Newsletter"
Department of Food Science
8F Borland Lab
Penn State University
University Park, PA 16802
Tel. (814) 863-3915

INTRODUCTION TO CONCURRENT SESSIONS

Introduction to New and Inventive Ways for Dealing With Change

Nancy H. Bull
Associate Dean, Outreach and Public Service
Associate Director, Cooperative Extension System, University of Connecticut

- How do people, including Extension faculty and staff, deal with change and the resulting transitions? What will best meet the needs of our institutions, of our customers, of our stakeholders?

- M. Scott Peck in his book, The Road Less Traveled, started the test with the sentence, "Life is difficult." Peck went on to say that once we realize that life is difficult then life becomes easier.

- If we use that same logic with change, we could say that change is difficult. From my perspective, based on the work of William Bridges, change is the event which has happened and transition is the emotional and intellectual adjustment to the event.

- We need to remember that as we change the educational process by which we convey information, those changes are being added on top of other changes being experienced on the farm.

- It is not so much the actual change that is made but the transition process for that change that is important.

- As we consider new program delivery methods, new ways of producers to access Extension staff, new innovative ways to assess impacts, and how to teach holistic management, we need to also consider what other changes producers are experiencing and what will be the impact of just one more change?

- As a new associate director I visited a former dairy producer. This farm had gone out in the herd buyout program in the late 1980's. The woman had retired from her job and Extension had experienced downsizing-- all within the same few years. The dairy/livestock educator had heard from CES administration that farm visits were not to be made any longer. Guess what I heard on my visit? Extension was going down the tubes.

- I am asking that you consider the total context in which you are making the changes.

- Life is difficult. And, yet, it is challenging and rewarding. We need to constantly stretch our thinking to explore ways in which we can better meet the needs of producers and their families.

- We must be sure that producers perceive us as being accessible to them -- however, that is defined in the producers' minds.

- People are asking what we are doing with our resources. We must be able to say, in very concise terms, that what we do is save dairy producers 50% of the cost of feed by the early identification of cut worm, reduce cost of inputs by assessing value of manure, identify alternatives to using antibiotics.

- The Cooperative Extension System started life as a holistic organization -- we provided education for the producer, for the spouse through the Extension Homemaker organization and for the children through 4-H.

- I would close with the story of the Three Little Pigs. This version, however, is the True Story of the Three Little Pigs as written by Alfred T. Wolf, or A. Wolf for short. I share this story with you to challenge you to think about perception. What is your perception of new and innovative means and what will be the perception of your customers?

CONCURRENT SESSIONS
Notes from Group A
"New Program Delivery Methods -- How are they Working?"

What are the challenges?

1. State-level coordination.
2. Time to devote to delivery methods may be lacking.
3. Planning to achieve high quality programming.
4. Encouraging farmer participation and expertise.
5. producer access to delivery sites (especially university sites).
6. Problems with size of facility for conducting the program.
7. Scheduling the program from the source, such as ITV (Interactive TV).
8. Lack of interaction using ITV, due to preconceived ideas.
9. Producers may be less than forgiving of problems/delivery with ITV.
10. Using these methods are different than what farmers are used to or expect.

What methods can be used?

1. Use Internet, but separate out extraneous materials. Help farmers to utilize this technology.
2. Improve the quality of newsletters.
3. Utilize satellite programming.
4. First, define the message, then use a variety of tools to get the message across.
5. Use a team approach.
6. Work with and train support service personnel to get message out. These may include veterinarians, agricultural salespeople, vo-ag teachers, etc.
7. Create networks.
8. Provide demonstration studies.
9. Multi-state programs.
10. Use teleconferences to up-date extension personnel on "hot" topics. Possibly once or twice per year.
11. Must maintain the human element in the delivery of programs. This may include discussion groups.
12. Consider down-loading threads of discussion from the e-mail discussion lists (DAIRY-L, GRAZE-L) and incorporating them into newsletters.
13. Tour dairy facilities and utilize worksheets to discuss management aspects.
14. Conduct short-courses, multi-day or multi-month workshops, and measure impact of these courses.
15. Develop a program similar to the "Master Gardener" program to help disseminate information.

Summary:

Providing effective program delivery is a continual challenge with many diverse possibilities for providing the information. New technology, such as the Internet, will need to be explained and demonstrated. Remember that the technology used to deliver the program is the tool, not the message. The most successful methods will incorporate a team approach that includes support services and dairy producers. Active involvement of producers in the delivery will improve the quality and effectiveness of programs. Finally, a variety of tools to provide education programs will the most effective means of communication.

CONCURRENT SESSIONS
Notes from Group B
"Ways for producers to increase access to Extension staff"

Discussion centered on four major topics, namely:

a. 800 numbers
b. Cellular phones (and pagers)
c. FAX machines
d. Internet, bulletin boards & WWW

A. 800 Numbers:

Many Extension offices now have them. For Maine, they are only for in-state calls. Some producers are more likely to call if they can use an 800 number. But as one producer in the group mentioned, a phone bill does not bother him if he ends up getting the information he is looking for.

Producers do not like to call during working hours and still get an answering machine. Also, if it is not a short message and a return call is requested, much time can be lost in playing "phone tag". For 800 numbers and Fax machines, perhaps we should have a central clearinghouse where Extension workers take turns staffing the line so that there is prompt action on calls or fax messages.

B. Cellular Phones:

Some Extension workers either use or have used cellular phones or pagers. Excessive use of cellular phones can be quite expensive, but they do seem to be an effective and more responsive means of communication, especially for Extension workers who spend a lot of their time on the road.

C. FAX Machines:

All Extension offices seem to have them. Many producers are getting them. Perhaps other producers could go together and lease one.

Very efficient way to transfer some information. Works well for one-on-one interactions. Especially useful for sending fact sheets or a few pages of information to individual producers in answer to individual questions.

D. Internet:

Not too many producers are likely to take the time to get on the net. Producers may go to Extension offices or dealers to hook-up or have questions posed or literature searches done. Internet has the advantage of tapping into expertise anywhere in the country or world.

A weekly dairy newsletter over the Internet would be cool. All the better if it includes lots of local information, such as marketing data.

A local dairy producer computer bulletin board used in Maine for the past 2-3 years was demonstrated. The possibility of having it on a New England basis was discussed.

SUMMARY

The producers time schedule needs to be taken into account when it comes to discussions of increasing communication between producers and Extension workers. A popular time of day for producers to be asking questions is 5:00-6:00 a.m. Therefore, an answering machine (voice mail) left on when the office isn't open is one method for producers to leave questions or information requests with Extension workers in the early morning hours. FAX machines and computer bulletin boards could also serve this function. These same techniques could also facilitate getting some of the information from Extension workers back to producers especially, as producers gain access to FAX machines and the Internet.

CONCURRENT SESSIONS
Notes from Group C
"Innovative ideas for assessing impacts of Extension programs"

The following problems and ideas/suggestions were developed in this breakout session.

Identify Problems:

1. There is generally a significant time delay to see the impact of an extension program on a dairy farm. This makes it difficult to report success. For example, on dairy farms you may not see an impact for 6 months, and in some cases, perhaps not for 5-6 years.

2. Many different factors affect change for any given client. How much of the change was the actual contribution of any specific agency or individual?

3. How do you measure a synergistic impact? Change is often the result of multiple cooperating groups working together on one farm.

4. In program evaluation, Washington wants to see a cause and effect of a program. However, the impact usually cannot be measured in this way.

5. How do we determine the economic value of an impact? There is difficulty measuring some types of impact, such as, the "Health of Industry is Better".

6. There is currently a devaluation of anecdotal information. These can be changes in attitudes and life changes. In the current system, the dollar is more important.

7. Specific economic criteria have been used for evaluating changes. This will affect whether funding for grants will come through or be denied.

8. How do we take appropriate credit for what has been done? There are cases of multiple organizations claiming credit for the same dollar changes. The example was given of four agencies working together with a net dollar change effect of $100,000. Each of the agencies claimed a $100,000 change in their report to Washington, for a total claim of $400,000 in change for a real $100,000 change.

9. In many cases agriculture is contracting and extension is making fewer in-person contacts, but the dollar value for a given change may be the same or greater than when there were more in-person contacts.

Identify Possible Solutions:

1. What works?? Sending out cards as a follow-up on a program can be done to determine the impact of a program, however, the return rate on responses are low (approximately 10%).

2. Phone calls for follow-up can be effective for determining the impact of a program. However, this is time-consuming and generates more paperwork.

3. We must be pro-active. We must define what will be the criteria used for evaluation. "Set yourself up to be successful".

4. We need to develop a regional approach to identify criteria for evaluation. Then we can communicate this to Washington.

5. We must do a better job of promoting our programs. We must make use of the media.

6. We must promote the impact of programs.

7. How do you fit impact evaluation into the work day or days per year? Plan of work should include evaluation time. Should it be done at one day per month or more frequently?

8. Who is the audience you are reporting to? Do they all want the same thing? There are different levels of assessment; Washington, State, County, Individual.

SUMMARY

1. There is a need to build in time during the day for:

(a) Developing program objectives.
(b) Recording results.
(c) Evaluations.

2. We must promote our programs with:

(a) Media.
(b) Audiences we report to.

3. How do we take appropriate credit for collaborative programs or ventures?

4. Extension personnel must define the criteria for assessment, and whether it is qualitative or quantitative.

5. We must do a better job of defining the audiences we report to; federal government/ program leaders/legislatures etc.

CONCURRENT SESSION
Notes from Group D
"How are we Going to Teach Holistic Farm Analysis (Holistic Management)"

What is the definition of the holistic approach?

- Uses all resources to the best advantage; which includes access to agencies and a willingness of the agencies to listen.
- Realizes that the decisions affect labor, family, and everyone on the farm.
- Involved in Setting goals, look towards the future in terms of lifestyle is another aspect of holistic management.
- The holistic approach considers both the farm and the community.

How to teach holistic approach?

- One-on-one type of interaction.
- Producers interact with one another with the assistance of extension.
- Definition needs to come from people involved.
- Look at the quality of life.
- Understand what help is needed.
- Appreciation of other points of view.
- Encourage beginning farmers, such as with FSA programs.
- Help with transitions that occur in farming.
- Incorporate holistic approach into youth education.
- Work with on-farm research group to assist in the direction of research.
- Effective communication is the key!

How does extension measure the effectiveness of holistic management?

- Show impact on family.
- Determine the extent of applying new management techniques on the farm.
- Recognition of value systems.
- The question is more important than the answer.
- Measures successes and failures and follow-up on the progress of producers.
- The most efficient means of measuring effectiveness takes considerable time; therefore, rearrangement of job responsibilities may be needed.
- Utilize a decision grid.

Summary:

The holistic approach to farm management encompasses all aspects of management, including the quality of life. There may be an image problem associated with the term "holistic". However, working with farmers to achieve the goals of a holistic farm management can result in improved economics, quality of life, and interaction among

farmers and among extension and support personnel. In the decision-making process involved in holistic farm management, all factors should be utilized not only the bottom-line economics of the operation. Including the individual values of the dairy producer can be just as important as the economics and should be considered in the decisions made on the farm.

Appendix IV

Evaluation of Sustainable Animal Agriculture Conference
October 24-25, 1996 at Lake Morey Inn

1. As a result of your attendance at this conference, did you (Check as many as apply)

   _____ a) make a new acquaintance
   _____ b) gain some new knowledge (information)
   _____ c) develop an idea for a new educational program
   _____ d) all of the above

2. Which presentations stuck in your mind as being well-done? (Please specify).

   _____

   _____

3. Which presentations were most informative to you? (Please specify).

   _____

   _____

4. If you gained new knowledge (information) at the conference, how have you passed it on to co-workers or clients in your state? (Please specify).

   _____

   _____

5. Are you developing plans for future educational programs that might include some of the information shared at the conference? (If so, please specify).

   _____

   _____

6. What, if anything, would you have changed about the conference?

   _____

   _____

7. How often would you like us to organize this type of workshop?

   _____

Appendix V

Evaluation of Sustainable Animal Agriculture Conference
October 24-25, 1996 at Lake Morey Inn

Summary

1. As a result of your attendance at this conference, did you (check as many as apply)?

   a (10) make new acquaintance
   b (12) gain some new knowledge (information)
   c (2) develop an idea for a new educational program
   d (3) all of the above

2. Which presentations stuck in your mind as being well-done? (Please specify).

   MA- composting (9)
   Moldy feed (3)
   Glass bottles (7)
   John Jemism - Maine water quality (3)
   Animal Handling-Motivated Speech (1)
   On-farm composting-Verville-good hand (1)
   All good
   Antibiotics (1)
   Wellington (1)
   Evening presentations (all) (1)
   Nancy Bull (1)
   Soy Beans

3. Which presentations were most informative to you? (Please specify).

   NH milking class (6)
   On-farm composting of carcasses (4)
   Milk marketing- Wellington (3)
   Mycotoxins (3)
   All of them (2)
   On-farm composition (2)
   Antibiotics (3)
   Soybeans (3)
   Nancy Bull (1)
   Christine Negra (recycling plastic) (2)
   Griffin (1)
   John Porter (1)
   John Jemism (1)

4. If you gained new knowledge (information) at the conference, how have you passed it on to co-workers or clients in your state? (Please specify).

Yes- composting (1)
Yes- moldy feed
Newsletter
Biosolids
Discussion w/ employees at state-wide meetings (2)
discussion w/ individuals
Article in Consortium Update
Phone conversations w/farmers in PA & NY about bottling
Client questions about soy beans
Milk marketing trends
Word of mouth and classes
Gave two presentations to farmers and one New England Newsletter
Radio show and Newspaper column proceedings are helpful

5. Are you developing plans for future educational programs that might include some of the information shared at the conference? (If so, please specify).

Newsletters on animal composition
Biosolids education
Volunteer stream projects (maybe)
No (2)
Have given my presentation and colleague presented it (Griffin)
workshop and provided summaries to 10
Use of discussion groups
Ag business classes
Use several speakers at other meetings

6. What, if anything, would you have changed about the conference?

It was well put together
More conferences around New England
Fantastic- high level of research quality
Probably would have more farmers present
One or two presenters need to pay attention to quality of slides
More on animal Mgt. practices
Add a New England agents meeting- it exists- due collections- need ads too
More presentation on cutting edge technology- not the same old line
More interaction, more creative use of media for visuals

7. How often would you like us to organize this type of workshop?

Yearly (6)
Yearly or every other year (2)
Every two years (3)