

Ensiling Poultry Manure as a Feedstuff for Ruminants

Charles N. Dobbins, Jr., D.V.M.
Associate Dean, College of Veterinary Medicine
Head, Extension Veterinary Department
University of Georgia

The nutritional value of poultry manure has been well documented by many researchers but Fontenot, et al., at Virginia Polytechnic Institute has done more in recent years to substantiate the nutritional value of poultry manure in ruminant feeding.

These researchers report the crude protein content of broiler litter and caged layer manure averages 28% or higher. The main non-protein nitrogen fraction of poultry manure is uric acid. Ammonia, urea, and creatine compose the remainder NPN. Broiler manure was shown to contain 2,440 K. Cal of digestible energy per kilogram and 59% total digestible nutrients on a dry matter basis. These values compare favorably with forages such as alfalfa hay.

Many researchers report that the performance of cattle rations supplemented with caged layer manure were similar to cattle fed soybean oil meal. Dehydrated poultry waste was fed to both beef and dairy cattle without affecting milk production or imparting undesirable flavors to meat or milk.

The practice of recycling poultry manure by feeding it to cattle is not sanctioned by the Food and Drug Administration for esthetic reasons, possible residues and possible pathogenic organisms. These fears have not proved to be a limiting factor based on years of research, so at least two states have approved the use of poultry manure as an animal feed ingredient. Generally drying, composting or ensiling adequately destroys pathogenic organisms. Chemical residues have not proved to be a problem. As far as esthetics are concerned, only the mental picture remains a problem since flavor is not affected.

It has been estimated that over 50 million tons of poultry wastes are produced each year in the United States. Broiler litter includes poultry manure, feathers, waste feed and bedding.

The Extension Veterinary Department at the University of Georgia has been conducting practical work concerning the improvement of the ensiling process. While ensiling of poultry manure can successfully be done in trench silos, considerable waste does result. A more efficient operation can be established, from a labor standpoint, by using an upright oxygen limiting silo with a bottom unloader.

When poultry litter is placed in an oxygen limiting silo at 35-45 percent moisture, it will ensile in 75-90 days. If we mix ground corn with the litter at the rate of 30 percent and 35-45 percent moisture, it will ensile in 14-21 days. On the other hand, with 30 percent

ground corn, 35-45 percent moisture plus a lactobacillus culture, the ensiling period can be reduced to 3-4 days.

The goal of the ensiling process is the formation of organic acids, especially lactic and acetic, producing a stable fermenting mass with a pH of 3.8-4.0. Pathogenic organisms are destroyed by mild heat treatment or a change in pH. Generally a pH of 4.5 or lower will destroy most bacteria and virus as well as bacterial spores.

By using a lactobacillus culture to speed the ensiling process, it is not necessary to store large volumes of feed. Capital investments can be kept to a minimum if feed can be made on a weekly basis rather than having to store huge quantities as in the past. For example, a 20x40 sealed silo can easily supply feed for over a thousand steers in a feedlot.

Since poultry litter is low in energy, the addition of ground corn to the litter improves the energy level and provides a carbohydrate source for rapid ensiling. The desired proportion of 30% corn and 70% litter provides this function and is adequate for a growing ration or brood herd ration. A ration of 60% corn, 40% litter provides a satisfactory fattening ration. The extra corn is added as the litter silage is augered from the silo.

We have been working with a commercial feedlot that feeds only litter silage and cracked corn. The basic mixture of 30% corn and 70% poultry litter is mixed and blown into a 20 x 60 concrete sealed silo (35-40% moisture). Approximately 700 steers are on feed most of the time.

Cattle that go into the lot weigh about 500 pounds and are fed hay free choice for one day. Ensiled broiler litter silage is then added until the cattle become accustomed to the ensiled feed. Additional corn is added to the basic litter silage mixture depending upon the amount of gain desired.

We have had some cattle gain 3.2 pounds per day for 60 days on a 60% corn-40% litter silage ration. We have fed cattle from 255 pounds up on a ration of 20% corn-80% litter to the 60-40 ratio.

The company reports that so far they have had no digestive problems or disease problems resulting from ensiled poultry litter. They report that the best part of the program is that the protein costs have dropped from a high of \$185 per ton of 32% crude protein, 16% digestible to \$5 per ton of the 28-32% crude, 18-22% digestible. They indicate that the feeding of broiler

litter silage is one thing that has enabled them to survive in the cattle business based on today's feed prices. Broiler litter, in their estimate, is worth approximately \$90 per ton.

We hope that this added flexibility of the ensiling process will make it possible for you to utilize cattle manure, poultry manure, or any other material of

plant or animal origin to solve disposal problems as well as provide new animal feed ingredients that will help reduce feeding costs.

Questions

1. Why speed up the ensiling process?
2. Where can I get the *Lactobacillus* culture?
3. What other products can be ensiled by this technique?

Panel Discussion

Dr. Marshall McCullough
Dr. O. E. Hundley
Dr. Wally Koers
Dr. W. B. Anthony
Dr. Charles Dobbins

Question—How do you store this manure before you've added the silage?

Answer—I assume this is cattle waste instead of poultry waste. The whole thing is that you don't store cattle waste over a long period of time. We've got to store animal wastes and have it available in the fall to make wastage out of it using pot residues. Therefore, we would have to stockpile it. Unless you go to rather extensive structure, the pH will go up to 7-7.5. We've found that we can't really use it for animal feeding purposes. So in all these I'm talking about, the animal waste is caught within about one-week intervals and fed. We may feed once or twice a week. So, let me caution you about taking manure out of a deep pit under a slotted floor. We have some problems there. The problem is, if it has bio-degraded it is not very useful for feeding purposes. The problem is how to store it so you can use it and we're working on that one.

Question—When you add pine shavings in with the manure, do you recycle it?

Answer—You can put one brood of broilers and clean out the house but you have more wood fiber than you have poultry litter and therefore it is lower in value. You have to be careful about how much you use because sawdust, with its roughage factor, has no nutritive value.

Question—How much inert waste did you have in animal wastes?

Answer—I would say about 10%.

Dr. Dobbins—On both your litters, it doesn't make as much difference as we first thought whether we have one group of broilers on this bedding or whether you have five. When you get into case laying where you have no fibers, you've got to add straw or hay to make up the fiber. But, we've been amazed at the results regardless of the amount of broilers that have been on that particular bedding. The more uric acid the better it is but it is not that critical.

Question—You said you had problems if you did not have enough fiber. How much do you need?

Answer—We're working with different materials.

With pine shavings you don't generally have a problem whether they are using it for bedding or floor litter. On cage laying manure it runs about 15% or so, but it depends a little bit on how the man operates. As you pick up a little experience, you'll know about what it takes. It varies a little bit on how soupy the material is and how carefully they are adding more.

Question—What are some ballpark figures on the crude protein content left in the manure after use and does it affect milk flavor?

Answer—From a poultry litter standpoint your crude protein is going to 28% or more depending upon the amount of manure there. As far as using this in dairy rations we have done very little of this. Virginia had done some research on odors but they have not shown it affects milk flavor but then the milk was being used for babies, and it being produced by manure fed cows had an esthetic effect and kept research down.

Question—What about the sodium content?

Answer—The sodium in the animal wastes is directly related to the sodium in the ration. It is always going to be higher. In beef cattle tests we're feeding them about 11% crude protein diet, then the animal wastes you collect from those cattle is going to be higher, somewhere around 16-18% crude protein on a dry matter basis.

Question—If you had manure coming from cattle on a real high concentrate ration, how would the ingredients vary?

Answer—As Dr. Dobbins said about the dilution in the poultry wastes, when you come right down to it, it doesn't make a whole lot of difference whether the manure is from concentrate-fed cattle or cattle on a pretty good growing ration. What I was talking about is cattle in feedlots fed for rapid performance; that manure we're most interested in collecting and blending, and we can blend it 40% with the basal diet and not go off the form.

Question—Dr. Anthony, a question about your slide where you had the basal 20-40-60, you quoted 1.2, 1.3, is that kilo?

Answer—Yes, kilograms; 2.71, 2.5 in pounds.