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Feeding Poultry Litter to Beef Cattle

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Beef producers searching for ways to lower feed costs should consider poultry litter as a nutrient source for wintering, growing, and finishing cattle. When fed in nutritionally balanced rations, poultry litter can be an economical source of crude protein, energy, and minerals for beef cattle.

Nutritional Characteristics of Litter

Litter contains bedding material, manure, wasted feed, and feathers. Litter may be accumulated from one or more flocks of birds, and as the number of flocks run between cleanouts increases, the nutritional value of the litter generally increases. Table 1 gives the average nutrient content of broiler litter.

Table 1. Nutrient Content of Broiler Litter

Nutrient	Litter Content (dry matter basis)	
	Range	Average
Moisture (%)	5 to 39	20
Dry matter (%)	61 to 95	80
Crude protein (%)	15 to 38	25
Crude fiber (%)	11 to 52	24
TDN (%)	36 to 64	50
Ash (%)	9 to 54	25
Minerals		
Calcium (%)	0.8 to 6.1	2.3
Phosphorus (%)	0.6 to 3.9	1.6
Potassium (%)	0.7 to 5.2	2.3
Magnesium (%)	0.2 to 0.9	0.5
Sulfur (%)	0.2 to 0.8	0.5
Copper (ppm)	25 to 1,003	473
Iron (ppm)	529 to 12,604	2,377
Manganese (ppm)	125 to 667	348
Zinc (ppm)	106 to 669	315

Note: Average of 106 samples from Alabama. Adapted from *Feeding Broiler Litter to Beef Cattle*, by B. G. Ruffin and T. A. McCaskey, Alabama Cooperative Extension Service, Circular No. ANR-557.

Including broiler litter in beef cattle rations at a level of about 20 percent of dry matter intake (about 2 to 4 pounds per day) generally meets the animal's needs for supplemental crude protein, calcium, phosphorus, and trace minerals. If litter is fed at higher levels, growing cattle cannot eat enough feed to meet their energy requirements, reducing weight gain. Because litter composition varies considerably, each batch of litter should be analyzed to obtain accurate estimates of moisture, crude protein, and minerals. Litter samples that analyze less than 15 percent crude protein (dry basis) should not be used in feeding programs if gains of 1.5 pound per day or higher are desired. Performance is reduced because the cattle cannot eat enough litter to meet their supplemental protein needs.

Turkey litter is generally lower in crude protein and minerals, and higher in fiber and ammonia nitrogen than broiler litter, so in general it is more useful as a fertilizer than as a feed for cattle. If the use of turkey litter for feed is desirable, the litter should be analyzed for nutrient content. Turkey litter that contains more than 15 percent crude protein should be processed and stacked following the general guidelines for broiler litter. Estimated nutrient composition for turkey litter is shown in Table 2. Because turkey litter has a higher level of total nitrogen from ammonia and a higher level of fiber, the use level should be lower than for broiler litter, with about 15 percent of dry matter as a suggested maximum. Because of the lower use level, an additional source of supplemental protein will usually be needed.

Available research suggests that turkey litter is similar in value to broiler litter in finishing diets with high levels of grain but not as valuable as broiler litter in silage-based rations or low-energy diets for growing cattle and brood cows. Because of the variability in feeding results, it is difficult to make general recommendations for feeding turkey litter. The following recommendations refer to broiler

Table 2. Normal Average Nutrient Content of Turkey Litter

Nutrient	Range	Litter Content (dry matter basis)	
		Normal Average	
		Growout House	Brooder House
Dry matter (%)	70 – 90	80	80
Crude protein (%)	11 – 24	20	14
Acid detergent fiber (%)	40 – 80	50	70
Calcium (%)	0.9 – 2.2	1.5	1.0
Phosphorus (%)	0.6 – 1.8	1.0	0.7
TDN (%)	20 – 55	45	30

Note: Values for turkey litter observed in North Carolina.

litter and may not be suitable for turkey litter. Producers interested in feeding turkey litter should consult their county Cooperative Extension agent and their nutritionist to develop an adequate feeding program.

Handling and Processing Poultry Litter

Poultry litter to be used for cattle feed should contain 65 to 85 percent dry matter. If litter contains less than 65 percent dry matter, wet spots and mold can be problems. Because litter may contain scrap metal, the material should be mixed or fed with equipment having a magnet to remove metal that may cause hardware disease. In addition, the material should be screened to remove foreign matter such as pieces of wood or glass. Common foreign materials in litter include broken light bulbs, broken thermometers, pieces of metal broken from equipment, and nails from construction or repairs. If a poultry producer plans to feed litter, problems with hardware can be reduced or eliminated by taking care not to discard these items on the floor of the house. If litter from only part of the house is needed for feed, the litter from around and under the feeders should be chosen as it has a higher feed value.

Stacked Broiler Litter

Broiler litter is usually deep stacked and then mixed with other feedstuffs at the time of feeding. Litter should be stacked 6 to 8 feet deep and allowed to heat for three weeks or more. It is extremely important to allow the litter to undergo the heating process as the heat destroys any pathogenic bacteria that may be present. More than three weeks of heating may be necessary during the cooler months. Because of the danger of spontaneous combustion, this material should be stacked in an open shed or outdoors on a well-drained site and covered with plastic.

The stack should be packed by running over it with a heavy vehicle as the layers are built up. Packing controls overheating. If packing is not possible or does not control overheating, a “charred” product results. If this is the case, cover the stack with 6-mil plastic to exclude oxygen, which will further control heating. Outdoor stacks should always be covered with plastic to reduce weather damage and nu-

trient leaching. Small stacks of litter less than 6 feet deep may not heat, resulting in a potentially hazardous product with poor palatability. If litter is dusty with moisture content of less than 20 percent, additional moisture should be added to ensure proper heating. This can be best accomplished by sprinkling the litter inside the house before cleanout. Litter at the proper moisture content should not be dusty, but it should not hold together in a ball when squeezed in your hand.

Brood cow maintenance, heifer development, and stocker wintering rations offer the greatest potential for the use of stacked broiler litter (Table 3). When a hay-based diet is used, results are best if cattle are fed mixtures of litter and ground corn or other palatable concentrate. Grain is mixed with the litter to ensure adequate consumption and to increase the energy content of the ration. Free-choice hay or other roughage should always be fed to aid rumen function, maintain intake, and prevent compaction.

Results of three North Carolina studies using stacked litter as a supplement to corn silage indicate that gains of approximately 2 pounds per day can be obtained with growing cattle. Although cattle supplemented with soybean meal gained faster, very acceptable and economical gains were obtained from litter-fed cattle. Results from these same studies indicated that providing 50 percent of the supplemental protein from litter and the remainder from soybean meal or blood meal would provide gains equivalent to those of cattle fed soybean meal as the only protein supplement.

Ensiling Broiler Litter with Corn Silage

Another good way to use broiler litter is to mix the material with corn silage at harvest. When litter is added at a level of 30 percent of the total silage dry matter, several advantages are realized: the ensiling process destroys harmful microorganisms carried in the litter; litter at this level will balance corn silage for crude protein, calcium, and phosphorus for most classes of beef cattle; and a palatable feed should be produced that is readily consumed by breeding, stocker, and finishing cattle.

The litter-silage mixture should contain 30 percent litter and 70 percent corn silage on a dry matter basis. Table 4 indicates the amount of litter required per ton of corn si-

Table 3. Feeding Recommendations for Stacked Broiler Litter

Stage	Option	Recommendation	
Dry, pregnant cows	A	Feed 15 pounds per day of a stacked litter-corn mixture (80 percent litter to 20 percent corn) plus low-quality hay or equivalent roughage free choice.	
	B	Feed 24 to 26 pounds per day of corn silage topdressed with or mixed with 10 to 12 pounds of stacked litter.	
Lactating cows average milking ability	A	Feed 15 pounds per day of a 70 percent litter, 30 percent corn mixture plus medium-quality hay free choice.	
	B	Feed 28 to 30 pounds of corn silage plus 12 to 13 pounds of stacked litter.	
	superior milking ability	A	Feed 20 pounds per day of a 70 percent litter, 30 percent corn mixture plus high-quality hay free choice. If body condition declines below an acceptable level, add 5 pounds per day of corn or other energy source.
		B	Feed 35 to 42 pounds of corn silage plus 15 pounds of stacked litter.
Growing calves (400 to 500 pounds, gaining 1.5 to 2.0 pounds per day) ^a	A	Feed 5 to 9 pounds of a 50 percent stacked litter, 50 percent corn mixture per day plus hay or pasture free choice. The mixture can be self-fed and 10 to 15 percent salt added to limit intake if necessary.	
	B	Feed 6 to 9 pounds of the litter-corn mix plus 10 pounds of corn silage per day.	
	C	Feed corn silage free choice, topdressed with 2 to 4 pounds of stacked litter.	
	(400 to 500 pounds, gaining 1 pound per day) ^b	A	Feed 20 pounds of corn silage plus 4 pounds of stacked litter per day.
		B	Feed 4 pounds of a 50 percent litter, 50 percent corn mixture plus medium quality hay free choice.

Note: Vitamin A should be included with all rations either by providing 25,000 IU per day from a salt-vitamin supplement, by injecting 500,000 to 2,000,000 IU before the feeding period, or by including 1,500 IU per pound of feed mix.

^a Select the most economical or practical option for a particular operation.

^b For stocker calves to gain 1 pound per day during wintering and intended to graze pastures during the following summer.

lage (fresh basis) when silage contains various levels of dry matter, assuming that the litter is 75 percent dry matter.

A practical method of combining these materials at ensiling is to spread litter over the top of a load of silage. During the unloading process, the litter and silage will normally mix adequately. Another option is to use alternating layers of corn silage and litter in the proper proportions when filling bunker silos. Finishing off the bunker with a 6- to 12-inch layer of litter will greatly reduce top spoilage.

Feeding Recommendations for Litter-Silage Mixtures

Corn silage treated with broiler litter at about 30 percent of the dry matter, depending on nutrient content, should provide adequate crude protein, calcium, and phosphorus for most beef cattle. Vitamin A should be provided either as a

supplement or by injection. A free-choice supplement containing 300,000 IU of Vitamin A per pound of plain salt may be used with the rations suggested in Table 5 for several classes of beef cattle.

Finishing Rations Containing Broiler Litter

Cattle can be finished on a mixture containing 70 percent corn and 30 percent litter plus at least 2 pounds of forage per day. Litter also can be fed to finishing cattle either as litter ensiled with corn silage as previously described plus 1 percent of body weight of corn or other concentrate, or by mixing deep-stacked litter with silage or other feeds at feeding time. When silage plus concentrate is fed, a daily ration of 30 to 35 pounds of corn silage, 4 to 5 pounds of broiler litter, and 8 pounds of corn will supply the needed energy and protein.

Finishing cattle (700 to 900 pounds) can also be fed a mixture of 26 percent broiler litter, 60 percent concentrates (corn, other grains, or by-product energy sources), and 14 percent ground hay, cottonseed hulls, or other roughage. Depending on the quality of the litter and concentrate, cattle will consume 24 to 26 pounds per day and gain 2.5 to 3 pounds per day. Some states have regulations regarding withdrawal of litter before slaughter. In general, litter should be removed from the ration at least two weeks before slaughter.

Table 4. Amount of Poultry Litter Required Per Ton of Fresh Corn Silage

Silage Dry Matter (percent)	Fresh Corn Silage (pounds)	Fresh Litter Required (pounds)
30	2,000	340
35	2,000	400
40	2,000	460

Table 5. Feeding Recommendations for Corn Silage Treated with Broiler Litter

Stage	Recommendation
Dry, pregnant cows	Feed 35 to 40 pounds of the litter-silage mixture per day.
Lactating beef cows (average milking ability, beef type)	Feed 45 to 50 pounds of litter-treated silage per day.
(superior milking ability, dairy fed for beef)	Feed 50 to 60 pounds of litter-treated silage per day. If cows do not consume this amount of feed, 2 to 5 pounds of corn may be fed with 45 to 50 pounds of litter-treated silage per day.
Stocker calves (1.25 to 2.0 pounds gain per day)	Full feed of the litter-treated corn silage. Gains will vary from 1.25 to 2.0 pounds per day depending on the energy content of the silage and litter. If the silage is low in energy, add 2 to 4 pounds of the cheapest energy source available to achieve the desired gain.

Management Factors

- One of the main reasons for ensiling or deep stacking litter is to destroy harmful microorganisms. If litter is stacked or ensiled with excessive moisture, the resulting moldy material may contain toxins and should not be fed to cattle. If the litter is too dry, it may not heat during stacking, and harmful organisms may not be killed. Therefore, strive to have about 20 to 25 percent moisture in litter that is to be deep stacked. Corn silage-litter mixtures should contain about 60 to 65 percent moisture for optimum fermentation. Recently, use of nipple drinkers in poultry houses has resulted in drier litter than previously experienced. If litter is dry and dusty, water can be added in the house before cleanout by sprinkling or by running foggers, or it can be sprayed on as the litter is stacked.
- Past research and field experience have shown that some rations containing poultry litter are unpalatable to cattle. Allow at least three weeks to start cattle on rations containing litter, and gradually increase the amount of litter in the ration up to the desired amount. Similarly, if cows are to be fed litter during lactation, start them on litter rations several weeks before calving to ensure that intake is sufficient to meet nutritional requirements. Some animals may refuse to eat an adequate amount of poultry litter rations. Such animals should be culled or grouped together and fed another ration.
- Rations containing litter should be supplemented with salt at 0.25 percent of the ration dry matter or fed free choice.
- Because broiler litter contains relatively high levels of trace minerals, especially copper and zinc, use white salt rather than trace-mineralized salt. Also, because of the high levels of copper, never feed litter to sheep.
- Turkey litter contains more of the nitrogen as ammonia, has higher fiber levels, and is coarser than broiler litter. Because of these factors, maximum acceptable levels that can be fed appear to be lower for turkey litter than for broiler litter.
- As with any other nutrition program, best results can be obtained if the nutrient content of feeds is known. The nutrient content of poultry litter varies widely and influences cattle performance. Therefore, it is advisable to have samples analyzed regularly.
- Litter-treated corn silage should be analyzed for nutrient content when it is wet. As with ammoniated silage, up to 25 percent of the nitrogen may be lost during oven drying of litter-silage mixtures. When submitting samples for analysis, state clearly that the silage contains litter and should not be oven dried before analysis.

Summary

Poultry litter can be a cost-effective feed for beef cattle rations and can be fed after being deep stacked for at least three weeks or after being ensiled with corn or sorghum forage. Broiler litter has been widely used as a feed with generally good results, whereas turkey litter appears to be of lower value as a feed for beef cattle.