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Poultry Patter

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USES OF POULTRY WASTE

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The disposal and use of poultry and livestock manure has received considerable attention in recent years. Regulatory and environmental protection groups have focused on pollution sources including animal manure. The poultry industry has many large operations which result in tons of manure in a limited space. Poultry operations have become very efficient employing economies of scale. This trend now appears to have hidden costs in finding solutions to potential pollution problems.

Many researchers have examined the possibility of recycling wastes through animals. Drying poultry manure and feeding it back to chickens or livestock is gaining attention. The chemical composition of dried poultry manure is compared with corn (table 1).

The water content is about equal for both corn and poultry manure so no dry matter adjustment is needed. Total protein is quite different. A large portion of the protein in poultry manure is composed of uric acid, only usable by ruminant animals (cattle and sheep). Thus, cage layer manure is similar to corn in true protein content. Cage layer manure is much higher than corn in fiber content (13.8 vs. 2). Fiber gives little energy since poultry cannot digest it. Cage layer manure contains approximately 8 percent calcium, reflecting the high levels of calcium (3.5 percent) in layer diets. A pullet developer diet with 10 percent cage layer manure included, results in 0.8 percent added calcium which is as much calcium as should be added to this diet. The calcium level may restrict use of cage layer manure in certain diets. The phosphorus content is a potentially valuable asset of poultry manure. Estimates say this phosphorus is half to two-thirds available. The salt content of poultry manure varies. If the salt content of rations is too high, wet droppings and possible management problems result. If too low, hens stop laying. The potassium level is of more concern for fertilizer value than in formulating rations. Potassium may, however, contribute to a problem of wet droppings. The energy content of poultry waste has been the subject of much speculation. Estimates range from the low value in the table to two or three times this level. The energy content is very important in terms of the economic value of poultry waste.

Drug residues must be considered in evaluating poultry waste. The manure from growing chickens fed coccidiostats and arsenicals may contain these residues. Feeding these drugs to laying hens is illegal and makes the manure useless for layer feeding.

Table 2 shows some results of feeding dried poultry manure (DPW) to laying hens. In this study 22.5 percent DPW was formulated into a corn-soy layer diet. Wheat bran, another low energy high fiber material, was used for comparison. The control diet was a corn-soy diet and the final diet was a straight substitution of DPW for corn. Diets 1 and 2 were calculated to contain 1200 kcal metabolizable energy (ME) and 13.9 percent protein. The control diet had 1300 kcal ME and 15.3 percent protein. Diet 4 contained only 1110 kcal ME and 15.4 percent protein. About 4 percent fat was added to diets 1 and 2 to get the 1200 kcal ME value. Egg production was the same on all diets. This would indicate that dried poultry waste can be successfully incorporated into layers' diets without adversely affecting egg production. Hens fed diets 1 and 2 consumed approximately 10 percent more feed and those on diet 4 approximately 15 percent more. This confirms that hens have a good ability to adjust feed consumption to the caloric value of the diet. All hens consumed approximately 300 kcal ME per day. The feed per dozen eggs was quite good for all treatments because of the high rate of lay. These conversions of course reflect the differences in feed consumption.

The amount of manure produced by the birds on the different treatments indicates the value of recycling. The data indicate that much more manure was produced by hens fed bran or poultry waste than those fed the control diet. The amount produced was greater on both an absolute (pounds) basis and on a percent of feed consumed basis. Rough calculations on this data would suggest that less than half of the poultry waste was digested and used by the hen. Data from other universities would suggest that close to 75 percent of poultry waste included in diets of chickens is returned in the manure. This 75 percent of unused material still poses a manure disposal problem. If drying the manure, the portion which is recycled through hens has to be dried more than once.

Considering potential recycling schemes, it is apparent that less than 25 percent of the manure can be disposed of using high levels in layer diets. So recycling through chickens does not appear to be the answer.

As we are all aware, this country has an "energy crisis." Current cost estimates on drying poultry manure may be as high as \$40-\$50 to produce a ton of 10 percent moisture material. This estimate includes a \$20-\$30 per ton energy cost. Drying poultry waste is expensive now and could become more so.

Currently, dried poultry waste is not listed as a feed ingredient and cannot be bought and sold in interstate commerce. The Food and Drug Administration is considering regulations, however, it may be some time before this use is permitted.

A number of studies have shown promising results in feeding DPW to beef or dairy cattle. DPW protein appears as least as good as urea and may be equivalent to soybean meal. The fiber in dried poultry waste is fairly digestible by ruminants. The total digestibility of poultry waste may exceed 50 percent.

The high levels of calcium and phosphorus may limit the use of poultry waste for ruminants, but more research is needed.

There is interest in recycling poultry waste by feeding it to beef cattle without the expensive costs of drying. Wet poultry manure alone may not make acceptable silage. It appears to need a dry carrier material mixed in to obtain proper moisture content. To get maximum value from poultry waste for cattle, it should be ensiled within a few days of its production. If this does not happen, substantial portions of the nitrogen may be lost as ammonia and thus the primary economic value is lost.

Of course, the most common method of disposal of poultry manure is spreading on land. Recent calculations, using 15 cents for N, 20 cents for P_2O_5, and 10 cents for K_2O, estimate the value of wet (63 percent water) poultry manure at $13 per wet ton or about $35 per dry ton. The nitrogen losses are great if the manure is not quickly incorporated into the soil. Land disposal currently is the method of choice where feasible, but objections to this are increasing.

Other methods have been suggested for the disposal of poultry manure. Examples are burning, production of methane by fermentation, and selling as a dry, bagged fertilizer material. All have limitations.

To summarize, drying and recycling of poultry waste through poultry feeding will not offer a long term feasible solution to waste disposal. Drying and feeding to ruminants may have merit. The best long term solutions will be found in methods not involving the energy costs of drying. Spreading manure on the land appears to be the best method of disposal where land areas are available.

Table 1. Composition of dried cage layer manure

	Manure	Corn
	— — — percent — — —	
Water	11.4	13.
Nx6.26 (total protein)	28.7	9.
True Protein	10.5	9.
Fat	1.76	3.9
Fiber	13.8	2.
Ash	26.5	–
Calcium	7.8	.02
Phosphorus	2.5	.3
Salt	2.0+	–
Potassium	1.37	.28
Metabolizable energy (kcal/lb.)	300	1530
Drugs	?	–

Table 2. Effect of dried poultry waste on layer performance (Cornell data)

Diet	Egg production percent	Feed/100 hens/day (lbs)	Feed/dz. eggs (lb)	Dry manure /100 hens/ day (lb)	Dry manure Percent of feed consumed
22.5% Poultry waste (PW)	91.7	25.2	3.34	8.7	37.7
19.8% Wheat bran	91.5	24.7	3.28	8.0	35.2
Control	92.5	22.9	2.99	5.9	28.4
Control—22.5% PW substitute for corn	89.0	26.0	3.56	10.0	42.0

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