Sticky Droppings: A Feed-Related Poultry Problem

MOUNT VERNON NORTHWEST WASHINGTON RESEARCH AND EXTENSION CENTER • FS002E

'Sticky droppings' describes an undesirable gummy consistency of poultry excreta (droppings) and are associated with secondary health problems. Sticky droppings pose a potential health risk to poultry, through respiratory stress from ammonia and potential increase of coccidiosis. Young birds (less than 3 weeks of age) are most susceptible to this feeding disorder while older birds (greater than 6 weeks of age) are the least susceptible. Cereal grains are widely known to cause sticky droppings as well as limited nutrient uptake and poor growth in poultry.

Barley, in particular, is unpopular as poultry feed because it can cause sticky droppings due to its high amounts of a non-starch polysaccharide (NSP) called mixed-linked β-glucan. Mixed-linked β-glucan and other NSPs are important components of endosperm cell walls and are common in cereal grains and other seed crops. In barley, 70% of the endosperm walls are made up of NSPs. Poultry are largely unable to digest these NSPs. The undigested NSPs bind with water in the intestinal tract, thus increasing the thickness of the intestinal contents. This results in gelatinous droppings, which cause fecal matter to stick to the bird's vent or cloaca (a symptom known as 'pasting'). As a result, eggs are overly dirty and skin infections can occur, particularly on birds' feet. Sticky droppings also impact litter moisture content, resulting in damp litter and causing increased disease incidence and reduced meat quality.

Sticky droppings (Figure 1) should not be confused with normal caecal excretions, which are dark brown, glutinous excreta from poultry intestinal caecal tubes. Healthy chickens will pass caecal excretions twice a day in addition to the regular brown droppings that have a characteristic white cap of uric acid (Figure 2) and which they pass 12–16 times each day. When chickens pass only sticky droppings, a dietary problem is likely.

Figure 1. Sticky droppings are brown and gelatinous.
(Photo courtesy of Tim Shatraw.)

Figure 2. Regular, healthy chicken droppings are brown with a white cap of uric acid.
(Photo courtesy of Hannelore Sudermann.)

Feed supplements

Several enzyme feed supplements are available that enable birds to break down the NSPs in feed. In addition, new barley varieties are being developed with low mixed-linked β-glucan content. However, the majority of current research efforts in barley breeding focus on maximizing β-glucan content for human health benefits. Poultry producers should be aware of the β-glucan content of any barley they are feeding to their birds.

Barley feed rations

Barley should be limited to no more than 20% in the ration for broilers and pullets younger than 3 weeks of age, and enzyme supplements must be included (Table 1). For birds 3–6 weeks of age, rations may contain up to 40% barley plus enzyme supplements. When broilers are 6 weeks or older, barley may be increased to 50% of the ration while pullets may receive up to 60% barley plus the enzyme supplement. Laying hens follow the same age and ration limitations, however birds do not generally benefit from the enzyme supplement until the ration contains more than 25% barley (Table 2). For yolk color, growers may add a pigmentation factor when more than 40% barley is used in the ration.

Table 1. Sample diets for broiler chickens based on bird age (Source: Harrold, 1999).

	0–21 Days	21–42 Days	42–56 Days
		% of Diet	
Ingredient			
Barley	20.0	25.0	30.0
Corn	32.6	35.15	36.55
Soy (48%)[1]	33.0	26.0	20.0
Menhaden meal	2.0	2.0	2.0
Alfalfa meal	3.0	3.0	3.0
Fat	6.0	6.0	6.0
Dical	1.5	1.0	0.65
Limestone[2]	1.1	1.2	1.2
Salt	0.35	0.35	0.35
Vitamin premix[3]	0.1	0.1	0.1
Trace minerals[3]	0.1	0.1	0.1
L-Lysine HCl	0	0	0
DL-Methionine	0.25	0.1	0.05
Beta-glucanase enzyme supplement	+	+	+
Total	**100.0**	**100.0**	**100.0**
Projected Analysis			
AMEn, kcal/kg	3101	3157	3203
CP	23.02	20.34	18.09
Lysine	1.26	1.08	0.92
Methionine[TRH1]	0.60	0.42	0.34
Total SAA[4]	0.97	0.75	0.64
Threonine	0.87	0.83	0.68
Tryptophan	0.32	0.27	0.24
Arginine	1.47	1.26	1.08
Calcium	1.00	0.91	0.82
Non-phytate phosphate	0.47	0.38	0.31

[1] From dehulled soybean meal having a crude protein content of 48%.
[2] Oyster shell or other ground seashells may be substituted for limestone on an equal weight basis.
[3] The amount of vitamin and trace mineral premixes included in each diet may need to be adjusted to reflect the concentration of individual nutrients in the premix.
[4] Total SAA (sulfur-containing amino acids) represents the sum of the calculated methionine plus the cystine content of the diet.

Table 2. Sample diets for laying hens producing white or brown eggs and for breeding hens producing white eggs (Source: Harrold, 1999).

	Leghorn-Type Hens Laying		Breeders Laying
	White Eggs	Brown Eggs	White Eggs
	% of Diet		
Ingredient			
Barley	40.0	30.0	35.0
Corn	26.05	29.0	29.05
Soy (44%)[1]	15.0	20.0	16.0
Meat meal	2.0	2.0	2.0
Alfalfa meal	3.0	3.0	3.0
Fat	5.0	6.0	6.0
Dical	0.3	0.3	0.3
Limestone[2]	8.0	9.0	8.0
Salt	0.35	0.35	0.35
Vitamin premix[3]	0.1	0.1	0.1
Trace minerals[3]	0.1	0.1	0.1
L-Lysine HCl	0	0	0
DL-Methionine	0.1	0.15	0.1
L-Threonine	0	0	0
L-Tryptophan	0	0	0
Total	**100.00**	**100.00**	**100.00**
Projected Analysis			
AMEn, kcal/kg	2898	2899	2956
CP	15.17	16.5	15.29
Lysine	0.69	0.82	0.73
Methionine	0.33	0.40	0.34
Total SAA[4]	0.60	0.68	0.60
Threonine	0.56	0.62	0.57
Tryptophan	0.21	0.23	0.21
Arginine	0.86	0.98	0.88
Calcium	3.38	3.77	3.38
Non-phytate phosphate	0.27	0.27	0.27

[1] From dehulled soybean meal having a crude protein content of 44%.
[2] Oyster shell or other ground seashells may be substituted for limestone on an equal weight basis.
[3] The amount of vitamin and trace mineral premixes included in each diet may need to be adjusted to reflect the concentration of individual nutrients in the premix.
[4] Total SAA (sulfur-containing amino acids) represents the sum of the calculated methionine plus the cystine content of the diet.

References

Francesch, M. and J. Brufau. 2004. Nutritional factors affecting excreta/litter moisture and quality. World's Poultry Science Journal, 60:64-75. doi:10.1079/WPS20035.

Harrold, Robert L. 1999. Feeding barley to swine and poultry. North Dakota State University Extension publication EB-73. http://www.ag.ndsu.edu/pubs/ansci/swine/eb73w.htm .

McNab, J.M. and R.R. Smithard. 1992. Barley β-Glucan: An Antinutritional Factor in Poultry Feeding. Nutrition Research Reviews, 5: 45-60 Cambridge University Press. doi:10.1079/NRR19920006.

Petersson, D. and P. Åman. 1989. Enzyme supplementation of a poultry diet containing rye and wheat. British Journal of Nutrition, 62:139-149. doi:10.1079/BJN19890014.

Ross Tech. 2006. Enteric health in broilers. Retrieved from <http://www.aviagen.com/docs/Enteric%20Health%20Low%20Res.pdf>.

Carol Miles and Sacha Johnson, Washington State University
Mount Vernon Northwestern Washington Research and Extension Center
http://vegetables.wsu.edu, milesc@wsu.edu

WASHINGTON STATE UNIVERSITY
EXTENSION

College of Agricultural, Human and Natural Resource Sciences

 Published October 2009.

FS002E