Regulating the water balance in poultry to prevent wet litter

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Wet litter is a serious issue in poultry production. The problem occurs when the rate of water deposited into the litter exceeds the rate of evaporation. It is costly, not only economically, but from a health, environment and welfare perspective as well. Solutions and treatments exist but preventing a problem before it occurs is far more beneficial.

Therefore, the scientists at Amlan International, Chicago, Illinois, have tackled this problem and have developed a solution which helps prevent wet litter in the first place. It is really quite simple. The idea is to regulate the water balance along the intestine so that the droppings are a firm, normal consistency before they are excreted.

While the line between what constitutes wet litter and dry litter is sometimes blurred, it is generally accepted that 40% moisture definitely constitutes wet litter, while arguably anything above 25% is a problem. According to The National Chicken Council Audit Guidelines (2012), litter which contains 35% or less moisture is considered acceptable.

There are several factors that may contribute to the condition such as changes in the season, or other environmental issues related to housing and equipment, nutrition, or toxins and disease. Poultry excreta is a major source of moisture in the litter.

Wet droppings may arise from nutrient imbalances and certain feed ingredients, as well as damage to the intestines caused by mycotoxins and/or disease. Stress and a lack of feed may also cause birds to consume excessive amounts of water, adding further moisture to the litter. Even changing from one dietary phase to the next can trigger wet droppings.

The end result is an increase in ammonia emissions, footpad dermatitis, breast blisters, bacterial and viral diseases, flies, dirty eggs and a decrease in the value of the litter as use for fertiliser.

Controlling wet droppings

While maintaining equipment, ensuring proper ventilation and having buildings that are properly insulated helps control moisture, it does not control wet droppings.

Poultry excreta contains moisture from both urine and faeces and naturally it adds more liquid to the litter. Reducing and controlling factors that contribute to wet droppings is important in regulating the moisture content of the litter.

Proper diet formulation and ingredient selection reduces the risk of wet droppings. Controlling sodium, potassium, chloride, magnesium and sulphate content in the diet and/or water prevents wet droppings that would arise from excessive amounts of these minerals. Diets deficient in calcium also contribute to wet droppings. Certain ingredients such as barley, rye, wheat and oats can increase viscosity and decrease passage rate when fed improperly (wrong stage of bird, amount in diet, no additional enzymes added for example) resulting in diarrhoea.

High levels of protein (especially from animal sources such as fishmeal) and soybean meal may also predispose birds to sticky droppings.

Mycotoxin contamination in feed ingredients can suppress the immune system and irritate the intestine. Controlling the negative effects from mycotoxins by utilising ingredients that bind the toxins before they can cause any damage is an important risk management strategy.

	Day 0	Day 4	Day 7
No MD-09	Normal (2.59)	Soft (1.38[b])	Soft (1.31[b])
With MD-09	Normal (2.57)	Normal (2.62[a])	Normal (2.43[a])

[a,b]Means within a row not followed by a common superscript are different (P<0.05).

Table 1. Faecal score of broilers fed high sodium diets with or without MD-09. Diets contained 0.45% salt and 1000 FTU/kg of phytase (Life Science Dynamics).

Managing diseases

Managing diseases such as necrotic enteritis and other bacterial infections that affect the intestine and cause diarrhoea is another important component in reducing wet droppings and therefore wet litter.

Pathogens such as coccidia, parasites and viruses can contribute to excessive moisture in the litter.

A strict health management and disease control program is therefore prudent. Even stress and poor welfare can suppress the immune system, making birds more susceptible to disease, and increased water consumption. For example, 35-day-old broilers consume approximately 250ml of water per day and excrete about 100ml of liquid per day.

Two tonnes of water/day can be deposited in the litter for a flock size of 20,000 birds! A minor increase of only 1% water intake/excretion daily results in 350kg extra of moisture over five weeks. That is a lot of water.

MD-09 moisture manager controls excess moisture in the droppings so that the excreta becomes firmer. Excreta scores are improved even under conditions that would normally cause wet litter. The mineral itself is not absorbed across the

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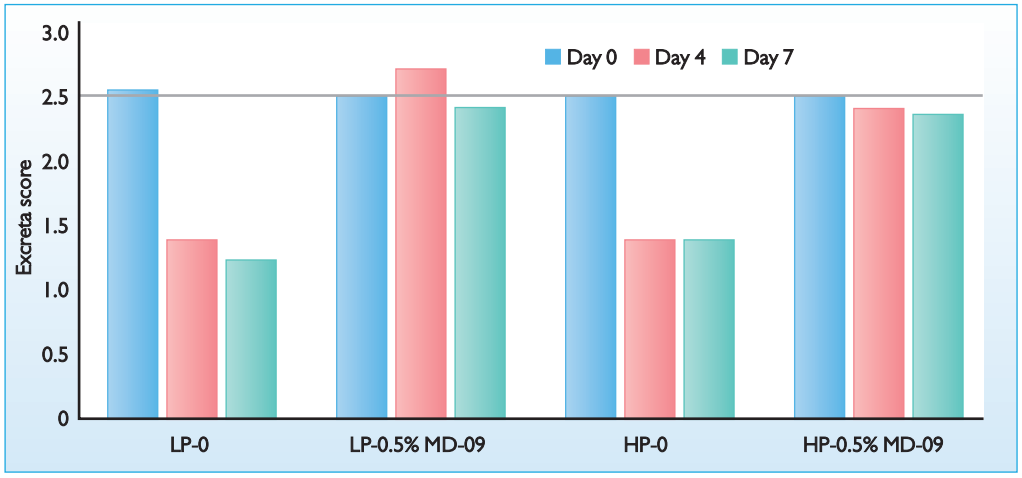
Fig. 1. Faecal score results: 0 (very soft) to 5 (very firm) with 2.5 (normal).



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intestinal barrier and therefore remains in the lumen and is excreted along with the droppings. It exchanges water and solubles between the lumen of the intestine and, with a relatively large particle size, has a high liquid holding capacity resulting in firmer droppings.

International studies

Several studies proving the efficacy of the product have been conducted internationally. Birds fed a corn/soybean meal diet high in sodium showed significant improvement in excreta score when MD-09 was included in the diets (Table 1).

Wet droppings were induced by an imbalanced electrolyte mixture in the diet.

Excreta were scored on a scale of 0-5, with 0 being very soft and 5 being very firm. A score of 2.5 is considered normal. Results can be seen in Fig. 1.

Field trials have also shown very clearly that the addition of MD-09 improves excreta integrity and litter conditions. Several commercial farms in the Philippines, Indonesia and Taiwan, places which have high temperatures and humidity, saw drastic improvements in excreta structure after only 48 hours of feeding MD-09.

In a field trial run on a commercial layer farm in Indonesia in 2013, the litter on which the birds were housed was wet, smelly and maggot infested. After three weeks of using MD-09 at 0.3% of the diet, the litter and excreta was dry, fresh and no longer contained maggots. The results are clear. When MD-09 is regularly included in the diet, wet litter and sticky droppings can be prevented even when conditions, be

Treatment	Rep	Dietary protein	MD-09 (%)	Faecal score Day 0	Day 4	Day 7
1	1	Lower	0	2.50	2.00	1.50
1	2	Lower	0	2.60	0.50	0.90
1	3	Lower	0	2.60	1.00	1.20
1	4	Lower	0	2.70	2.00	1.30
			Mean score	**2.60**	**1.38**	**1.23**
2	1	Lower	0.5	2.50	2.70	2.40
2	2	Lower	0.5	2.40	2.60	2.30
2	3	Lower	0.5	2.60	3.00	2.60
2	4	Lower	0.5	2.60	2.90	2.60
			Mean score	**2.53**	**2.80**	**2.48**
3	1	Higher	0	2.50	1.50	1.30
3	2	Higher	0	2.80	0.50	1.50
3	3	Higher	0	2.50	2.00	1.70
3	4	Higher	0	2.50	1.50	1.00
			Mean score	**2.58**	**1.38**	**1.38**
4	1	Higher	0.5	2.50	2.50	2.50
4	2	Higher	0.5	2.60	2.30	1.70
4	3	Higher	0.5	2.70	2.40	2.90
4	4	Higher	0.5	2.60	2.50	2.40
			Mean score	**2.60**	**2.43**	**2.38**

Table 2. Effect of Adding MD-09 on broiler faecal score. Wet droppings induced by electrolyte imbalance: Faecal score 0 (very soft) to 5 (very firm) with 2.5 (normal). Mixed gender 24-week old broilers in a 2 x 2 factorial fed a low or high protein diet, with or without MD-09.

they environmental, dietary or infectious, are present that promote the formation of wet litter (Table 2).

Preventing wet litter and sticky droppings from forming in the first place is an ingenious strategy.

Once the problem occurs, it can be very costly and complex to eliminate. Pathogens thrive in moist conditions, and the incidence of breast blisters and footpad dermatitis increase. Ammonia levels and flies increase. This is not only detrimental financially, but it severely impacts the health and welfare of the birds housed under such conditions. MD-09 enhances water sorption along the intestinal tract, has a high water holding capacity and improves faecal structure and litter conditions. It is incorporated into the diet at a rate of 2.5-5.0kg per ton depending on the severity of the conditions.

Additionally, integrating a broad-spectrum toxin binder such as Calibrin-Z alongside MD-09 in the diet provides further protection to the health and welfare of the birds.

Toxins can be inconspicuously present, exerting their damaging effects and perhaps masking themselves as other conditions.

Combining a powerful toxin binder such as the Calibrin product line with MD-09 is simply good management.

A strong program which prevents and controls the factors that contribute to wet litter, including mycotoxins, makes good sense.

MD-09 and the Calibrin line of toxin binders have proven results in this regard, both commercially and in the laboratory. ■

References are available from the authors on request