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CHAPTER 13
Management Practices to Prevent Abnormal Feather Loss in Broiler Breeders

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ABSTRACT

This chapter discusses management factors in broiler breeders that can trigger abnormal feathering and unwanted feather damage, such that the birds are unable to maintain good feather cover at all times. Management practices to ensure good feed access include the following.

- Birds have correct feeder and drinker space.
- Feed and water are available immediately the lights come on in the morning.
- Feed distribution time does not exceed 3 min, if necessary filling the system from several locations in order to achieve the correct distribution time.
- Feed is distributed in the dark, especially during the rearing period and just after moving to the laying house.
- Spin feeders during rearing help to reduce feather pecking.
- Because pelleted feed increases the risk of feather pecking unless using spin feeders, a coarse mash is preferred (with added benefits for intestinal health).
- Feeders and drinkers are correctly distributed in the house and feeders are available in the slatted area of the laying house.
- At the onset of production, feed quantity is increased sufficiently quickly to match the increase in egg output.
- Birds have sufficient access to water and have water in their crops 1 h before the lights are turned off.

In addition, house environmental factors are important to improve feather cover.

- Stocking densities higher than recommended will have a detrimental effect on feather quality and increase the risk of feather pecking.

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 Poultry Feathers and Skin: The Poultry Integument in Health and Welfare (eds O.A. Olukosi *et al.*)

- By 21 days of age the birds should have access to the whole rearing area of the house.
- Stimulate feather development by reducing house temperature to 20°C by 28 days of age.
- Ensure good litter quality for dust bathing to maintain feather condition through proper ventilation.
- Fluorescent lights at >100 lux will increase the risk of feather pecking, while incandescent lights reduce the risk.

Other key management factors to reduce abnormal feather loss are as follows.

- Do not place too many males in laying house. By 25 weeks there should be no more than 9% males.
- Ensure that the males and females are at the same level of sexual maturity when they are put together in the laying house to prevent the males damaging the feathers of the females.
- Coccidiosis or necrotic enteritis must be prevented and, if occurring, treated immediately.
- Ensure that birds are handled in a calm way during activities such as weighing and vaccination.
- Prevent mite and/or worm infections and, if found, treat promptly.

INTRODUCTION

All birds, including poultry species, lose and replace their feathers during their lifetime: this is called moulting. Broiler breeders typically moult their feathers twice during rearing and once during production, but different feather tracts and individual feathers moult at different times (Lucas and Stettenheim, 1972). This chapter will discuss factors that trigger abnormal feather loss in broiler breeders, i.e. those losses not caused by the normal moulting process. The chapter will focus on environmental and management factors that affect feathering, as other authors in this volume cover nutritional factors (Chapter 11) and feather pecking (Chapter 3).

As for most birds, feathers are important for broiler breeders as a protection barrier for the skin, thermal insulation and the recognition of flock mates and attraction towards the opposite sex. Feathers become damaged during rearing and production due to mechanical abrasion, feather pecking and mating activity. As a part of general flock management, the feather quality of broiler breeders should be checked regularly. Systems for scoring feather cover are available (Aviagen, 2014).

FIELD OBSERVATIONS

About 20 years ago, reports of poor feathering in broiler breeders started to appear in Europe, including the Netherlands, reaching a peak in 2005. At the

time, broiler breeders were still beak trimmed (non-beak-trimmed broiler breeders only became widespread after 2013). An investigation in the Netherlands into the reduction of feather quality seen at this time found several factors and changes that occurred in the same time period that appeared to be associated with the reduction in feather quality. These field observations provided clues as to the management factors that were important in determining good feather quality.

One factor was the breed of broiler: the onset of the problem coincided with a new broiler breed being used in the Netherlands. There was a much higher incidence of feathering problems in the new breed than the standard breed (Table 13.1), though it should be noted that the standard breed did also have some flocks with poor feathers.

At the same time there had been a change from traditional hand-collection nest boxes, using nesting materials such as straw, wood shavings, buckweed or oat hulls, to automated roll-away nest boxes with artificial mats instead of bedding material. There was a higher incidence of feathering problems in the automatic system, but this difference was not statistically significant (Table 13.2).

During the problem period, there was a clear difference between farms supplied by different feed mills. Farms supplied by one feed mill did not show any problems whereas farms supplied by other mills showed either minor (three mills) or severe feathering problems (two mills). The period also coincided with advice given to reduce crude protein levels in breeder diets to improve persistency of production. While the exact nutritional issue was not identified (at least by the author), the feed mills adjusted their specifications and over time the difference between mills disappeared.

There was an increased risk for flocks that had a feathering problem during rearing to have a feathering problem during production (Table 13.3).

It was also during the same period that producers stopped using antibiotic growth promoters and switched from controlling coccidiosis using chemical coccidiostats to coccidiosis vaccination, particularly during the rearing period. As a

Table 13.1. Effect of breed on incidence of feathering problems in Dutch broiler breeder flocks.

	Standard Breed	New Breed
Total flocks	102	49
Problem flocks (%)	9.8	40.8

Chi-squared test $p<0.0001$

Table 13.2. Effect of nest type on incidence of feathering problems in Dutch broiler breeder flocks.

	Traditional	Automatic
Total flocks	28	136
Problem flocks (%)	14.3	22.1

Chi-squared test not significant

Table 13.3. Number of Dutch broiler breeder flocks with problems during rear also having problems during lay.

		Laying	
		No Problem	Problem
Rearing	No problem	24	5
	Problem	5	5

Chi-squared test $p<0.05$

consequence there was an increase in intestinal disorders, resulting in wetter litter and poor feather cover.

The above investigation into the field issues shows that the problem of poor feather cover can be related to many different factors. The rest of this chapter discusses in more detail management factors that affect feather loss, primarily based on field experience. Most of the comments below are based on advice given by primary breeders (Aviagen, 2014, 2016a, b).

RISK FACTORS FOR ABNORMAL FEATHERING

Risk factors can be divided according to the different stages in the life of broiler breeders.

Incubation period

Very little research has been done on the effects of the incubation environment on subsequent feather condition. One study has shown that high incubation temperature will retard feather development both during incubation and during the rearing period (Merat and Cocquerelle, 1991).

Rearing period

Following good management practice as recommended by the primary breeders (e.g. Aviagen, 2018) is essential for good feather development. Particular attention should be paid to:

- correct brooding conditions;
- excessive stocking density, which can lead to feather sucking, feather pulling and eventually aggressive feather pecking;
- ensuring that birds are not confined to the brooding areas for too long and have access to the whole house by 21 days of age; and
- ensuring that house temperatures are reduced following the recommended programme after brooding, targeting 20°C by 28 days of age. Higher temperatures will delay feather development (Lai *et al.*, 2010).

Of key importance is the management of feeders and drinkers. Birds should have access to feed and water immediately after the lights come on in the morning. Broiler breeders are on a controlled feeding regime, which means that all the birds need to be able to feed at the same time. It is essential that recommended feeding space is provided so that all birds can access the feed and obtain the required nutrient intake and to prevent feather damage during feeding. Make sure that there is sufficient space around the feeders so that the birds can access the feed space. Reducing the feeder space by 10% has been found to have a detrimental effect on feather development and quality (Van Emous and Veldkamp, 2009).

Just as important as feeder space is proper feed distribution to ensure that all the feed space contains feed when the birds are feeding. Feed needs to be distributed to all the feeders within 3 min and the feeder hoppers filling the distribution system need to be positioned to achieve this, especially in houses longer than 80 m. If spin feeders are used, feed should be distributed when the lights are off as this will lead to a reduction in gentle feather pecking. As part of the management routine, the birds should regularly be watched feeding to make sure that they all have access to the feed and, if not, action should be taken to remedy the situation.

It is recommended that water is available continuously and controlling water access is not advised. If water access is controlled, it should never be done before 6 weeks of age and the birds' crops should be checked at regular intervals during the day to ensure that they contain some water up to 1 h before lights are off.

Dust bathing is an essential component of feather maintenance and this requires good, dry and friable litter (Pickett, 2008). Maintaining good litter quality at all times is therefore important and immediate action should be taken if the litter becomes caked or wet. In addition to causing feathering problems, wet litter will cause skin problems. Poor litter quality is normally caused by incorrect ventilation, water leaking from drinkers or gut health problems. Proper ventilation is also required to keep ammonia, carbon dioxide and dust levels in the air below recommended levels.

When penning up birds for weighing, grading or vaccination, care must be taken that they do not start to climb on top of each other, as this potentially causes immediate feather damage and any stress could have a long-term effect on feather quality (Zeinstra *et al.*, 2015). The results of stressful events can often be seen in the wing feathers as sections of feather that are not properly formed. Other potential stressors are subclinical coccidiosis or necrotic enteritis, which should be treated promptly. In the case of subclinical coccidiosis, the vaccination procedures should be reviewed and corrected as necessary. In situations of poor intestinal health, providing insoluble grit in the litter at 5, 10 and 15 weeks of age can help.

Good biosecurity on the farm is important to prevent infections such as parvovirus, reovirus and reticuloendotheliosis virus, as these can affect feather development (see also Chapter 7). Vaccination programmes should be designed to meet local disease challenges. Parasites such as red mite or intestinal worms can have an adverse effect on feather quality and if found should be treated immediately and the house thoroughly cleaned and treated before the next flock is placed in the farm (FeatherWel, 2013).

All the factors noted above are important to improve feather quality, but they all require good stockmanship on the farm to identify the issues. Critical signs to watch for during the rearing period are as follows.

- Absence of feathers in the litter from 8 to 10 weeks of age. This is an indicator that feathers are being eaten by the other birds as a source of protein. If this is seen, the nutrition should be reviewed.
- Abnormal screeching noise from the birds. This can be the first sign that feathers are being pulled from birds.
- Birds pecking or chasing each other and poor cover on the flanks. If pecking is before 12 weeks of age, light intensity can be reduced. The use of red instead of white light can also help, as can adding 1 g of salt to 1 l of drinking water for 5 days (Van Niekerk *et al.*, 2013).

Laying period

As in the rearing period, the primary breeder's recommendations for managing the birds should be followed. Many of the recommendations for the rearing period given above should also be followed during the laying period, paying particular attention to:

- feeder space and feed distribution;
- drinker space and water management;
- stocking density;
- litter quality; and
- farm biosecurity.

It is beneficial to use the same type of feeders, drinkers and lighting system on both the rearing and laying farm, as this will allow the birds to settle quickly after transfer and find food and water quickly (Defra, 2005). For the first 3–4 weeks after transfer it is important to distribute the feed to the feeders when the lights are off. Avoid high light intensities (>60 lux), especially with fluorescent lights, as it increases the risk of feather sucking, aggressive interactions and general nervousness in the flock.

During lay a major cause of feather damage is due to mating activity (Van Emous, 2009). When the males and females are moved into the laying house they must be at the same stage of sexual maturity to prevent the males becoming overly aggressive to the females at the start of production. Similarly, the correct number of males should be placed into the flock of females: if there are too many males the females will be mated too frequently, resulting in excessive feather damage, particularly on the back and thighs. If a female's feather cover is insufficient, it will hide away from the males and fertility of the flock will decline.

Feeding levels during production need to be carefully managed to ensure that adequate energy is provided to maintain egg production, body weight and feather cover. If the bird goes into a negative energy balance, it adversely affects both egg production and feather cover. Special care needs to be taken post peak egg production, when feed levels are normally reduced as egg mass output

declines. Poorly feathered flocks will also require a higher level of feed intake, due to the higher heat loss from reduced thermal insulation, typically about 3 g feed/day for every 1 point of feather score (Van Emous and Veldkamp, 2009). Higher feed intakes will increase the protein intake, which can have a negative impact on fertility and hatch and will increase feed cost.

If feathering deteriorates during production, consider: (i) reducing mating ratio; (ii) filling feeder systems in the dark; (iii) using feed distribution time of less than 3 min; (iv) raising the house temperature; (v) adjusting feed allocation; and (vi) checking the water supply.

SUMMARY

Ensuring that all birds have proper access to the correct quantity and quality of feed and sufficient clean drinking water in combination with the right environmental conditions, including good litter quality at all stages of life, are important factors to ensure good feather cover at all times. Observation of the birds under these conditions is an essential part of standard management procedures.

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