

Post-Brooding Management

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Summary

INTRODUCTION

Improvements in post-brooding management that produce even small gains in performance can be financially beneficial. Management strategies should allow deviations from 'normal' performance to be rapidly detected and corrected. Post-brooding, correct management of the environment, feeding and the catching process are key to profitable production.

ENVIRONMENTAL MANAGEMENT CONTROL

Natural ventilation does not allow the most control over in-house conditions and works best when outside conditions are close to the desired in-house conditions, and this requires constant management. Controlled environmental housing is more popular globally, giving better control over the environment and hence bird performance.

With a controlled environment system the important factors to consider are:

1. **Temperature:** Both the macro (temperature, humidity and airspeed) and the micro (bird heat expenditure, stocking density, and heat produced from litter) environments must be considered if the correct environmental temperature is to be maintained. Variations in in-house temperature must be minimized. An inconsistent environmental temperature leads to poorer uniformity, growth, FCR, litter and to higher heating costs.
2. **Ventilation:** Ventilation must be tailored and modified according to the external and internal environments and increases in biomass. The manager must not only have an understanding of the birds' needs at a given point in time under a given environment but also an understanding of the environmental management system and, just as importantly, how to operate and maintain it to achieve a desired environment.
3. **Lighting:** The provision of 4-6 hours of darkness is optimal for live weight performance, but the actual level of darkness given depends on the circumstances of a flock and the market requirement.

FEEDING

High levels of dietary fines reduce feed intake, increase feed spillage and result in a loss of vitamins and minerals. Appropriate management of the feeding system will help to minimize the level of fines in the diet. For example, minor improvements in the management of a chain feeding system have shown to lead to a reduction in the amount of fines in the diet, reduce feed wastage, improve FCR and reduce flock feed costs by an estimated €5307 (\$7,584). Pan feeding systems are generally easier to manage but can distribute diets of poor quality unevenly, affecting the uniformity of growth. With pans, management of feeder height and height of feed within the feeder is important.

CATCHING

Key to successful catching are:

- **Correct feed withdrawal time:** A period of 6-10 hours (depending on the requirements of the processor) is adequate. Feed withdrawal should compliment normal feeding patterns and water must be made available until the point of catching.
- **Environmental control:** In warmer climates and larger houses catching must be done at night. During catching, bird migration and temperature must be monitored and ventilation requirements must be modified appropriately.
- **Bird handling:** Noise must be kept to a minimum, sudden increases in light intensity and inappropriate bird handling avoided and bird behavior monitored.

CONCLUSION

Broiler management post-brooding is about building on the good start achieved during brooding. The management strategies employed should allow profitability to be increased by maximizing liveability and ensuring least cost per kilogram. To do this management must be proactive, problems must be identified quickly and the knowledge must exist to allow these problems to be rectified as rapidly as possible.

The remainder of this article provides more detail on the points summarized on page one.

INTRODUCTION

Profitable broiler production depends upon the implementation of efficient and optimum management practices. Improvements in management which lead to even small gains in broiler performance (growth, FCR and mortality - particularly late mortality) can bring important financial benefits to the farmer.

This document discusses some of the post-brooding management techniques and requirements that can be put in place to maximize growth and optimize production costs when growing broilers.

IMPORTANCE OF GOOD BROODING MANAGEMENT

Management during the post-brooding period will be made a lot more difficult if birds do not get a good start during brooding (the first 10 days). An increase in 7-day body weight of 5 grams can, under optimal management conditions, lead to a 30-40 gram improvement in live weight at processing. A good start during the brooding period (achievement of target body weights) also provides the building blocks necessary for achieving good skeletal formation, gut health and resistance to disease, so it is important to ensure that good brooding management practices are in place.

POST-BROODING MANAGEMENT

The growth cycle of the broiler is relatively short and if environmental and management conditions are not favorable during this time losses in production and increases in mortality can occur. Therefore, broiler flock management needs to be proactive, with management strategies that ensure any deficiencies or deviations from the normal expected performance are rapidly identified and remedial actions implemented immediately.

A good management strategy is one that consists of regular routines and standardized operational procedures. Critical to these are observations of bird behavior and consumption (feed and water). These provide an understanding of current development so that any deviations from 'normal' can be detected and corrected. Some key management factors are:

- Bird behavior checks.
- Daily mortality collection and disposal.
- Daily monitoring of feed and water intakes.
- Adjustment of feeders and drinkers.
- Feed stock checks and appropriate ordering of feed.
- Maintaining biosecurity status.
- Monitoring body-weight gain.

- Litter quality and consistency of droppings.
- System checks (ventilation systems and calibration).
- Light level and bird behavioral responses to day length.
- Production records.

Environmental Management Control

Natural Ventilation/Open-Sided Housing

Natural ventilation as a system does not allow for a great deal of control over in-house conditions. It relies on lowering or raising sidewall curtains, flaps or doors correctly to allow outside air and inside convection currents to move air into and through the house. Management of naturally ventilated housing needs to be continuous and pro-active responding to the ambient climatic conditions as they change throughout the day. The key points for natural ventilation are:

- Natural ventilation only works well when outside conditions are close to the desired in-house conditions.
- Natural ventilation requires constant, 24-hour management.
- Air exchange rate depends on outside winds. In cold weather, cold outside air is likely to drop directly onto the birds.
- Circulating or stirring fans can help improve the in-house conditions.

Controlled environment housing tends to be more popular and globally widespread than natural ventilation because it gives better control over the environment and hence bird performance. For this reason, natural ventilation will not be discussed further in this article. For more information on natural ventilation, please see the [Ross Broiler Management Manual](#).

Controlled Environment Housing

Temperature

Environmental temperature should be managed to keep the bird within the thermo-neutral zone of comfort (the temperature zone within which birds are able to keep their body temperature constant with minimal effort). If the environmental temperature falls below the zone of comfort, feed intake will be increased to provide extra energy for warmth. If the environmental temperature increases above the zone of comfort, feed intake will be reduced in an attempt to reduce metabolic heat output. These thermo-regulatory responses will have a negative impact on bird performance (FCR and growth). It is important that variations in in-house temperature are minimized, maintaining a consistent environmental temperature will allow the birds to achieve a consistent and improved level of performance.

When considering the correct environmental conditions it is not just the macro environment (temperature, humidity and airspeed) that is important, the micro environment at bird level must also be effectively managed. Heat expenditure from the bird, proximity of birds to one another (stocking density), and litter conditions (heat production from decomposition of litter material or cold bedding due to inappropriate ventilation) must all be managed effectively if the environmental temperature within the house is to be maintained at the correct level.

Ventilation

Ventilation provides fresh air, removes waste gases and helps maintain the correct environmental temperature.

While it is important that the basic principles of ventilation are understood (see below), it is not the purpose of this article to provide detailed information on the specific ventilation requirements of the broiler house. Further details on the topic can be found in the booklet "Environmental Management in the Broiler House", written by Professor James Donald, Auburn University, (2009) and available for download at www.aviagen.com.

There are three main stages of ventilation:

1. Minimum ventilation: This is timer controlled, not temperature controlled. It provides fresh air and ensures basic air quality standards are met (removal of waste gases and excess moisture), while maintaining the required in-house air temperature. Some form of minimum ventilation is required regardless of the outside temperature.
2. Transitional ventilation: This is a temperature driven process based on the age of the birds and outside temperature, when heat removal is needed, but without putting cold air onto birds. This type of ventilation runs at a higher level than minimum ventilation and is used to deal with increasing levels of heat production as the birds grow.
3. Tunnel ventilation: This achieves maximum cooling by the wind-chill effects of high velocity airflow and is used to keep birds cool when outside temperatures are warm to hot, or where large birds are grown. The high velocity airflow of the tunnel setup makes it well suited to adding evaporative cooling, where appropriate, by the addition of evaporative cooling pads placed outside the air inlets; as when water evaporates, whatever it is in contact with gets cooler. With tunnel ventilation the installation of migration fences should be considered (**Figure 1**). This will prevent birds from moving towards the air inlet end affecting feeding and drinking space, and ultimately bird performance. Solid migration fences should be avoided as they will restrict airflow.

Figure 1: A tunnel ventilated house with migration fences installed.



Ventilation should be tailored and modified in accordance with changes in the external and internal environment, and increases in biomass. In order to maintain the desired environment within the broiler house the manager must not only have a good understanding of the birds' needs but also an understanding of the environmental management system and how to operate it to achieve the appropriate environmental conditions within the house. To do this, the instruction parameters that the system works on must be appropriate for the birds' requirements and altered as necessary with changes in biomass and external environment. The main instruction parameters which need to be defined are:

- Parameter 1: Target temperature (TT).
- Parameter 2: Minimum ventilation, the volume of air required to achieve basic air quality requirements.
- Parameter 3: Heater control. At what deviation (below and above) from target temperature should the heaters switch on and off?
- Parameter 4: At what temperature over target does the ventilation increase beyond minimum levels? Depending on the system, either fan speed increases and / or additional fans are operated.
- Parameter 5: The rate at which ventilation is increased from minimum to 100%. This will be linked to the external conditions and bird age.
- Parameter 6: At what temperature does the cooling system begin to cool? This is temperature based and again is linked to external temperatures.

Other settings to consider - some systems have fan baffles and air inlets that operate separately to the fans. It is therefore important to make sure that the baffles and inlets are appropriate for any changes in ventilation that are implemented.

All parameters respond to Target Temperature (TT).

A practical example of the instruction parameters for an environmental management system in the broiler house are given in the table below.

Table 1: An example of the instruction parameters for a moderate environment diurnal range of minimum 13°C (55°F) and maximum 26°C (79°F).

Parameter	Day 7	Day 28
Target temperature (TT)	27°C (81°F)	20°C (68°F)
Minimum ventilation	As per requirement	As per requirement
Heaters	On: 1.0°C (2.0°F) below TT Off: 0.2°C (0.4°F) above TT	On: 2.0°C (4.0°F) below TT Off: 0.2°C (0.4°F) above TT
Increases in transitional ventilation	2.0°C (4.0°F) over TT	0.5°C (1.0°F) over TT
Increase in temperature over TT to achieve 100% ventilation	5.0°C (10.0°F)	3.0°C (6.0°F)
Cooling systems	Not required	Not required

This example is for a moderate environment (min temp 13°C [55°F], max temp 26°C [79°F]). The settings will need to be altered appropriately for hotter or colder environments, but for all environments the aim is to maintain an appropriate constant in-house environment with minimal variations in temperature.

The environmental management control system detects changes in house environment using temperature sensors. It is important that these sensors are regularly calibrated and checked. To do this, a min/max thermometer should be placed within the house next to the sensor. If there is a difference in the temperature recorded by the environmental management system and the min/max thermometer then the sensor should be re-calibrated. This process is best done prior to bird placement.

Fluctuations in internal house temperature (i.e. the cyclical minimum and maximum temperatures) also need to be monitored. To do this, record the temperature at the sensor using a thermometer and immediately record the temperature registered on the control system. This should be done at the coldest point in the cycle (heaters on) and the warmest point in the cycle (when the heaters turn off).

If the difference between the temperature recorded on the thermometer and the temperature on the control system is more than 1.2°C (2.4°F) the settings on the control system may need to be modified to compensate for the slow sensor reaction times. If the variation is greater than 2.0°C (4.0°F), the sensors may need to be replaced.

Aviagen Technical Managers have visited numerous farms where cyclical temperatures vary by more than 3°C (6°F) and in some cases 5°C (10°F). These houses invariably have poorer uniformity, growth, FCR, litter conditions and higher heating bills, compared with houses on the same farm with better control over swings in internal temperature.

Lighting Programs

After the first 7 days it is not recommended to give broilers near continuous lighting (23 hours light and 1 hour of darkness). The recommended lighting program to optimize live-weight gain is given in **Table 2**.

Table 2: Basic light intensity and photoperiod recommendations to optimize live performance.

Live weight at slaughter	Age	Intensity lux (foot candles)	Day length hours
Less than 2.5 kg (5.5 lb)	0–7 days	30–40 (3–4)	23 light/1 dark
	8–3 days before slaughter*	5–10 (0.5–1.0)	20 light/4 dark**
More than 2.5 kg (5.5 lb)	0–7 days	30–40 (3–4)	23 light/1 dark
	8–3 days before slaughter*	5–10 (0.5–1.0)	18 light/6 dark

*For at least the last three days before slaughter, 23 hours light and one dark should be provided.

** EU Broiler Welfare Directive requires a total of six hours darkness, with at least one uninterrupted period of darkness of at least four hours.

While the provision of 4-6 hours of darkness is considered to be optimal for live weight performance, the actual amount of darkness given to a flock will depend upon the particular circumstances of that flock and the market requirements. For example, increased levels of darkness can help where there are FCR or mortality problems (see **Figures 2 and 3**).

Figure 2: Influence of lighting on FCR in broilers (0-31/32 days of age).

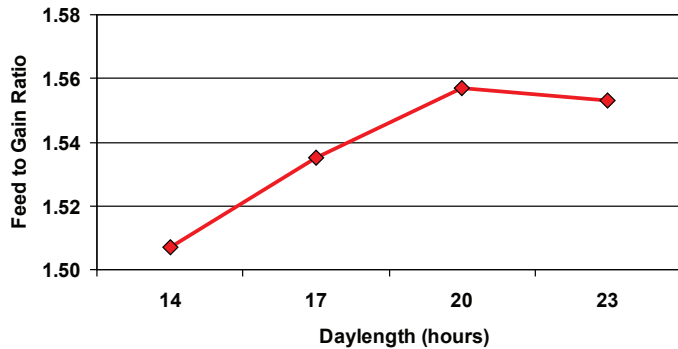
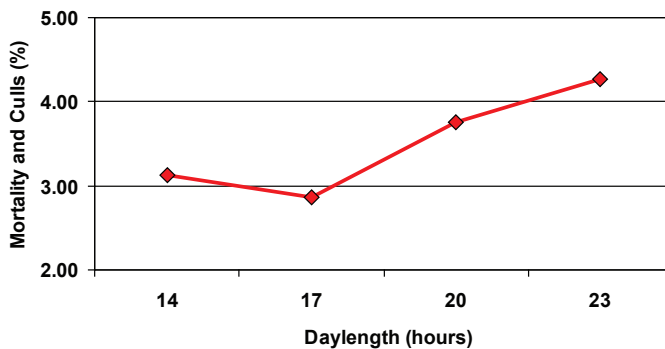
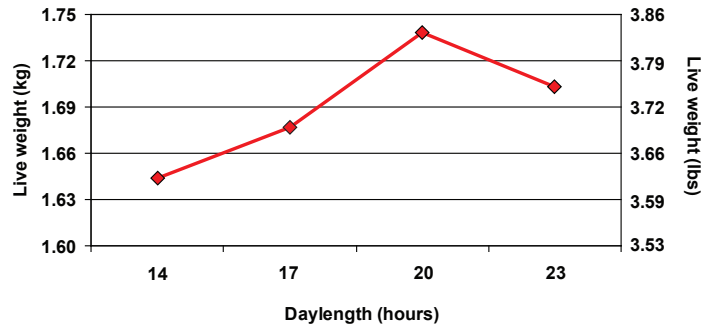


Figure 3: Influence of lighting on mortality (7-32 days of age).



However, any increase in continuous darkness beyond 4 hours must be implemented with care as any benefits to mortality or FCR may be offset by a reduction in live-weight gain, as illustrated in **Figure 4**.

Figure 4: Influence of lighting on live weight at 31/32 days of age.



It is important that the lighting program implemented can be practically managed on the farm, and that it is suitable for the feed and water provision and availability. Lighting recommendations may be subject to local legislation and these will also need to be taken into account when designing an appropriate lighting program. The primary concern when managing a lighting program is to ensure that damage to the carcass is minimized. With all lighting programs it is important to monitor bird behavior from 18 days onwards when lights come on, to ensure that bird activity does not cause any carcass damage. Any effects of inadequate feeder and drinker space and high stocking densities will be made worse when the amount of darkness is increased.

Rules for lighting programs:

- Make sure the lights always go off at the SAME time each day.
- Ensure adequate feed is provided BEFORE and AFTER the lights go off. This will allow birds to crop up before the lights go off and ensure that adequate feed is immediately available when the lights come back on again.
- Ensure there is adequate water pressure.
- Consider the time of day that the lights come on. This is related to the external environmental temperature. When the lights are off bird activity will be low, so it is better to avoid lights off during the coldest part of the day. This will also allow more efficient heater usage.
- Ensure adequate ventilation to meet bird activity during light and dark periods.
- Be aware of carcass damage - the risk of carcass damage is increased when the hours of darkness are increased.
- Be aware of the influences of:
 - Number of birds/pan.
 - Feed quality.
 - Feeder heights.

Feeding and Importance of Feed Physical Form

Providing the birds with feed of a good physical quality is vital for optimizing broiler performance. A high percentage of fines in the feed presented to the birds will negatively influence feed intake, increase feed spillage and result in a significant loss of vitamins and minerals (which may impact bird health and growth). While feed quality is ultimately determined by the feed mill, the importance of managing feed quality on the farm through the appropriate management of the feeding system should not be ignored.

Chain Feeder Systems

A poorly managed chain system can lower profitability without the manager even being aware of it. A good example of this is illustrated in the case study given below.

From a mechanical point of view the factors that need to be considered, which will determine the frequency and timing of a feed program are:

- Height of the gate or slide. This will determine the amount of feed that actually enters the track and so will determine how long the feeder needs to run in order to distribute a given amount of feed. Debris in the feed hopper will affect the amount of feed that is able to pass through the gate/slide so it is important to ensure that debris does not build up in the hopper.
- The speed of the motor and length of time taken to complete a full circuit. Some motors run the chain at a very low speed. It is important to take this into consideration particularly when applying lighting programs or longer clean-up periods.

Case Study on the Management of Chain Feeder Systems.

In this particular case, issues with the chain feeder system were identified during a routine technical service visit to the farm by a member of the Aviagen Technical Service Team.

The Problem

It was identified that the feeder was replenishing feed too frequently; the regular movement of the chain was causing pellet degradation and increased levels of fines in the feed. The birds had become accustomed to eating the good quality pellet as it arrived in the feeder and the fines were being disregarded.

The Solution

1. Action was taken to increase the time between the feed being replenished.
2. The manager began to monitor the amount of feed left in the track to establish what the correct length of time between feed replenishment should be. In this case, it was agreed that the feeder would come on only when the chain became exposed within the feeder.
3. Twice a day the feeder was left off for an extended period of time to allow the birds to clean up any fines that had accumulated at the bottom of the feeder.

The Impact

The farm had 158,000 2 kg (4.4 lbs) birds. FCR was improved by 0.08 points resulting in a savings of 25 tons of feed for the flock. Assuming a feed cost of €210/1000 kg (\$300/2205 lbs), this represents a savings on feed at the end of the flock of €5307 (\$7,584).

Pan Feeder Systems

Pan feeder systems are generally easier to manage than chain feeder systems; however, some key points to consider when managing fines in a pan feeder system are:

- Pan feeder systems generally distribute a diet with a poor physical quality unevenly. This is because the pellets travel more easily down the auger and the fines will drop into the pans nearer to the hopper, with the pans furthest away from the auger having fewer fines. If these fines are allowed to accumulate in the pan feeders (**Figure 5**), the uniformity of growth in different areas of the house will be affected. As with track and chain feeders, it is important that there are times during the day where birds are allowed to clean up any fines in the feeders.

Figure 5: Accumulation of fines in a pan feeder.



- With pan feeders, it is important to ensure that feeder height within the pan is monitored and maintained correctly. This will minimize feed wastage and reduce the risk of the birds ingesting discarded feed in the litter during pre-slaughter feed withdrawal periods.

Feeding Strategies When Environmental Temperatures Are High
When environmental temperatures are high feed intake will often be reduced. This will affect growth and potentially FCR. The following strategies can be used to help minimize this effect:

- Provide the correct nutrient levels and use more digestible ingredients.
- Optimize feed form.
- Provide feed during the coolest part of the day.

Catching and Preparations for Catching

Catching the birds ready for processing is the final stage in the management cycle and one that, if mismanaged, will decrease the profitability of the flock.

Key to the success of this stage are:

- Correct feed withdrawal.
- Environmental management.
- Bird handling.

Correct Feed Withdrawal

Prior to the birds being caught for processing they need to undergo a period of feed withdrawal. This is essential to ensure that all feed is removed from the gastrointestinal tract

(GI) at the time of processing. Farmers will be penalized if there is feed in the GI because:

- It artificially increases bird weight
- It increases the likelihood of contamination in the processing plant

At this stage of the birds life they will have developed a regular pattern of feeding behavior and therefore eat at pre-determined times, particularly if a lighting program has been used. It is important that before the birds are caught they have had sufficient time to clean up the feed in the feeders, and the appropriate period of time without feed. Ideally this process should complement the normal eating pattern of the flock and take into account the time required for catching, transportation and holding prior to processing.

REMEMBER

time in the house without feed
+
catching time
+
transport time
+
time in the holding area
=
FEED WITHDRAWAL TIME

The optimum feed withdrawal time depends on the requirements of the processor. Some processors are able to deal with a fuller gut as the gizzard and intestine are removed in one action and discarded. For these processors the minimum requirement is for the gizzard to be empty; to meet this minimum requirement feed withdrawal time should be a minimum of 6 hours prior to processing. For processors who require the entire gastrointestinal tract to be emptied, a feed withdrawal time of 8-10 hours should be adopted.

When considering feed withdrawal it is important to be aware of the following:

- Lighting program.
- Changes to light intensity.
- Temperature.
- Previous day's catching.
- Human activity.

It is important to keep water available continuously until point of catching to allow the digestive contents to be cleared. If birds do not have water available they will be unable to empty their digestive tract and may become dehydrated.

Environmental Control

In warmer climates and larger houses it is important that catching is completed at night to ensure bird welfare is not compromised.

The manager should be present during the catching process to monitor bird migration and the temperature within the house because normal ventilation flow will be compromised as personnel and machinery come in and out of the house.

Ventilation should be modified to meet the needs of the birds, and the room that houses the ventilation controls should be secured to prevent any unauthorized alterations being made to the ventilation during the catching process.

Bird Handling

Catching is a stressful time for the birds. Noise must be kept to a minimum and sudden increases in light intensity avoided. Bird behavior must be closely monitored for any signs of migration in the house. If migration starts to occur, the catching plan will have to be altered.

A good tool for daylight catching is the use of blackout curtains (strips of rubber). However, if the negative pressure within the house is high these can flap and cause bird migration.

Manual catching crews can catch and load up to 10,000 birds per hour, but personnel can be subject to fatigue and this may affect the process. Catching teams need to be careful while handling the birds (birds should be handled by two legs or by the breast with two hands). Inappropriate handling can cause damage to the carcasses such as broken bones, dislocations and bruising.

Regular inspections of the birds once they are crated-up should also be carried out to ensure that all birds are on their feet. Any birds that are upside down will be dead before arrival at the processing plant.

CONCLUSION

Broiler management post-brooding is about building on the good start achieved during brooding to ensure that broiler performance is optimized and profitability maximized. A management strategy should be developed which allows bottom line profitability to be increased by maximizing livability and ensuring least cost per kilogram. To do this management must be proactive, problems must be identified quickly and the appropriate knowledge must exist to allow these problems to be rectified as rapidly as possible. Above all management must adapt and respond to the requirements of each individual flock.

Observe → Investigate → Identify → Act!