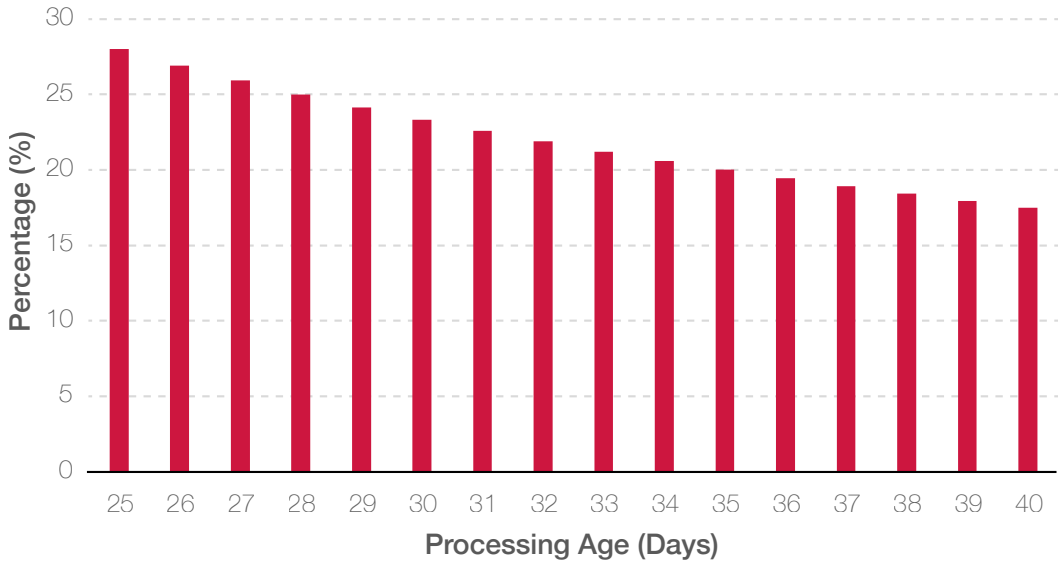
BROILER MANAGEMENT FOR BIRDS GROWN TO LOW PROCESSING WEIGHTS (1.5-1.8 KG/3.3-4.0 LB)

With continual genetic progress, the age at which the bird reaches its processing weight continues to be reduced. A consequence is that the brooding period accounts for a much more significant proportion of the bird's life. Therefore, successful brooding management within the flock is critical, particularly when birds are being grown to low processing weights. For example, if birds are grown to 1.5-1.8 kg/3.3-4.0 lb (approximately 28 days of age), the brooding period (or the first 7 days) represents 25% of the bird's life (**Figure 1**).

FIGURE 1: *The relationship between brooding (as a percentage of processing age) and processing age in broilers.*



This article describes the key factors in the first 7 days of a chick's life for optimizing broiler performance when birds are to be grown to low processing weights (1.5-1.8 kg/3.3-4.0 lb), discussing the following important areas:

- Chick supply and planning
- Brooding
  - House preparation and placement
  - Temperature and environment
  - Feed and water
  - Crop fill
- 7-day weights and 7-day checks

Correct management of these key factors will allow the broiler grower to optimize performance by meeting the broiler's requirements at critical growth stages.

CHICK SUPPLY AND PLANNING

PARENT STOCK FLOCK AGE

Placement of broiler flocks should be planned to ensure that the differences in age and/or immune status of donor parent flocks are as small as possible. This will minimize variation in final broiler live weights. Mixing chicks from young and old source flocks should be avoided as this will lead to reduced uniformity due to the initial variation in chick size and ability to compete for feed and water. If mixed-age flocks are unavoidable, keep similar parent flock ages (less than 5 weeks of difference) together — in particular, avoid mixing chicks from parent flocks under 30 weeks with chicks from PS flocks over 40 weeks. Ideally, one donor flock age should be placed per house.

TRANSPORT FROM HATCHERY TO FARM

Chicks have a yolk sac that keeps them sustained for a period of time after hatch. However, they are not able to regulate their body temperature. Chick transport should be planned to avoid unnecessary delays and provide environmental conditions to keep the chicks comfortable until they arrive at the farm. Planning hatch times and transport times is, therefore, essential to minimizing dehydration and stress for chicks.

BROODING

HOUSE PREPARATION AND PLACEMENT

House preparation should be completed before chick arrival so that chicks can be placed into the brooding area immediately (more information can be found in the **Broiler Management Handbook**). The brooding layout will depend on whether the house heating system is spot- or whole-house brooding (**Figures 2 and 3**).

The chicks should be gently placed into the brooding area as soon as possible after arrival, tipped quickly and evenly onto paper, and fed over the brooding area. The use of paper prevents the chicks from eating litter material, increases activity, and increases the feeding area. A minimum of 60% but preferably 100% of the floor in the brooding area should be covered in paper. The amount of paper will depend on whether it is spot- or whole-house brooding and what type of litter material is used. Feed should be distributed (40 g (1.41 oz) per chick) onto the paper before the chicks arrive.

Where half-house brooding is used with an increased initial chick density (approximately 40 chicks per m^2/0.27 ft^2/chick), feeding and drinking space should not be compromised.

It is recommended that a sample of chicks be weighed individually and the CV% calculated at placement. This will give a good indication of chick condition.

FIGURE 2: *Spot-brooding.*

FIGURE 3: *Whole-house brooding.*

TEMPERATURE AND ENVIRONMENT

The house must be maintained at the correct temperature if the birds are to be active and develop a good appetite. Temperature in the brooding area should be considered in two parts: first, the temperature of the air (measured at chick height and in the vicinity of the feeders and drinkers) and second, the temperature of the litter.

Air temperature should be 30°C (86.0°F) for whole-house brooding and 32°C (89.6°F) at the edge of the brooder for spot-brooding. A floor temperature of 28-30°C (82.4-89.6°F) and litter temperature of 28-32°C (82.4-89.6°F) are recommended/required when chicks are placed. Local environmental conditions will significantly influence house temperature and must be correlated to the effective temperature perceived by the chick and updated to reflect bird behavior. Variations in relative humidity (RH) will influence the effective temperature experienced by the chicks. Higher RH reduces evaporative heat loss, increasing the effective temperature; lower RH decreases the effective temperature. Regionally, significant variations will occur in RH, so it is critical that when and where low RH occurs, care is taken to increase RH in the brooding area. RH should ideally range between 60-70%. This can be difficult to achieve, especially in dry, hot climates. Humidifiers/ultra-high-pressure foggers (48-69 bar with a 5-micron droplet size) or the addition of surface water may help in some situations. Brooding temperature settings should be adjusted if RH increases above 70% or falls below 60% responding to changes in chick behavior.

It is easy to assume the litter temperature is correct if the air temperature is. However, unless the preferred temperatures are achieved at least 24 hours before placement, there can be significant differences between air and litter temperatures. This is especially so in areas with significant diurnal temperature differences. If chicks are standing on litter that is <28°C (82.4°F), they may become chilled through their feet. Chick behavior is the best indicator as to whether the correct temperatures are being achieved and should be monitored closely in the first 7 days.

Figures 4 and 5 indicate chick behavior when the correct temperatures are achieved.

FIGURE 4: *Bird distribution under spot brooders.*

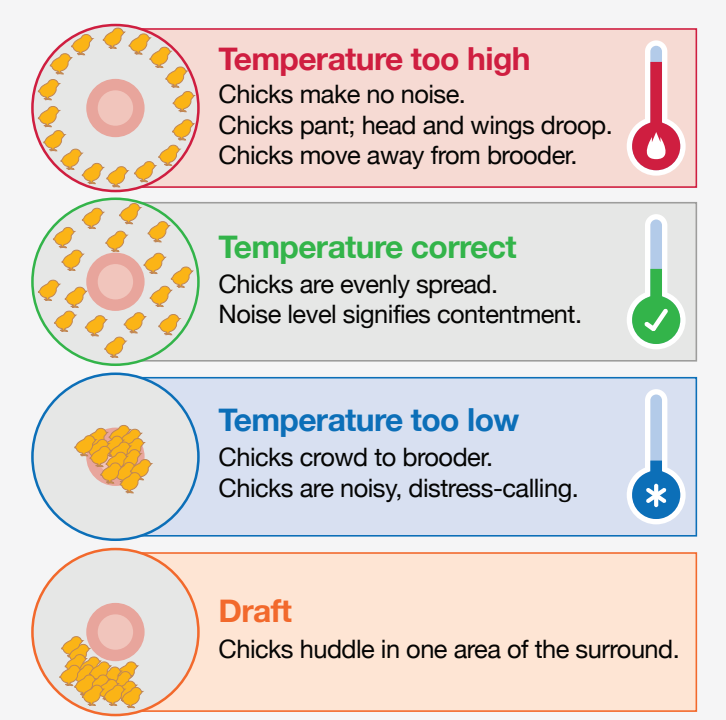
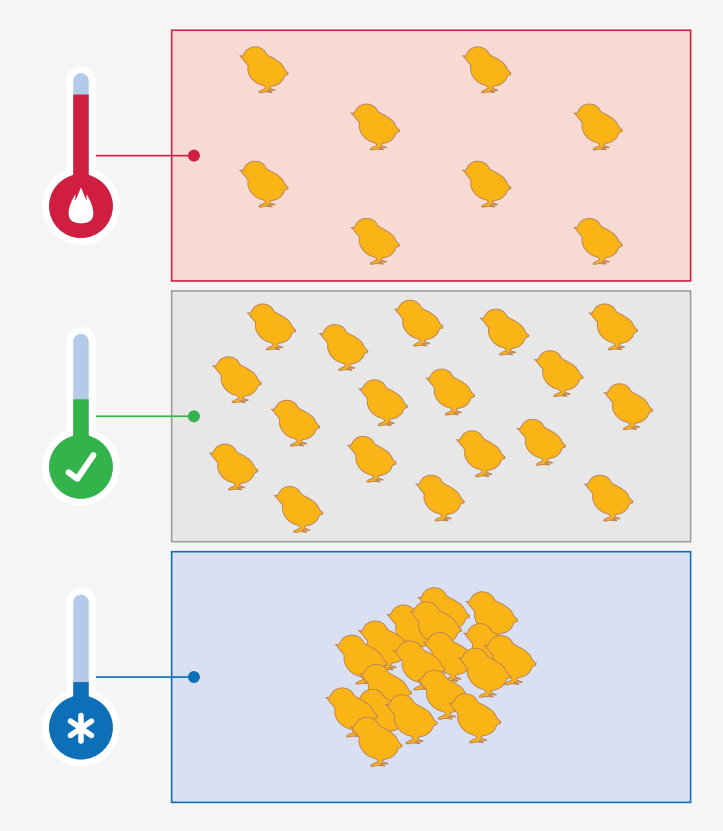


FIGURE 5: *Bird distribution in whole-house brooding.*



FEED AND WATER

Feed and water must be available immediately to the chicks at placement. At this time, there must be enough feeding and drinking space. To ensure this, supplementary feeders and drinkers should be provided (**see Figure 6**).

Achieving the correct light intensity in the brooding area will help chicks find the feed and water and stay active; a uniform light intensity (minimum/2.8 - 3.7 fc) should be used for the first 7 days.

FIGURE 6: *Supplementary feeders and drinkers for newly placed chicks.*

Small amounts of feed should continue to be distributed onto the paper frequently (every 2-3 hours), particularly during the first 24 hours. Supplementary feeding in this way will stimulate and encourage the chicks' instinctive pecking behavior by creating noise and movement as the chicks walk on the paper and the feed. After 3 days, the birds should eat from the pans or tray feeding system only, and the paper can be removed. Feed form at this stage is crucial, and the feed should be a good-quality sieved crumb. Manual pan feeders should be accessible by the chick from placement and have a low depth. Feeders should be emptied daily from day 10-12 to prevent the build-up of any fines/dust.

During the first 7 days, additional supplementary drinkers should be provided. This is essential in hot, dry climates and where bell drinkers are used. Drinkers should be positioned to ensure that chicks do not have to travel more than 2 m (6.6 ft) for access to water in the first 24 hours. Unrestricted access to fresh, good quality clean water is essential. Steps can be taken to ensure that water is as cool as possible (**Table 1**). For example, flushing drinker lines, using cool pads, positioning tanks underground, or insulating drinkers.

TABLE 1: *The effect of water temperature on water intake.*

WATER TEMPERATURE	WATER INTAKE
Less than 5°C (41.0°F)	Too cold, reduced water consumption
18-21°C (64.4-69.8°F)	Ideal
Greater than 30°C (86.0°F)	Too warm, reduced water consumption
Above 44°C (111.2°F)	Birds refuse to drink

The whole flock must easily access all drinkers. Nipple drinkers should be placed and maintained at eye level of the chick during the first 24 hours. Thereafter, the nipple drinker should be placed at a height that allows the bird to drink easily. The back of the chick should form an angle of 35-45° with the floor while drinking is in progress. As the bird grows, the drinker height should be adjusted accordingly (see the **Broiler Management Handbook** for further information). Supply 1 nipple drinker for every 8-10 birds. For bell drinkers in hot climates, 1 drinker for every 60 birds should be provided. Adhering to these targets will ensure correct drinking space through the growing period.

CROP FILL (MONITORING OF APPETITE DEVELOPMENT)

When they start to feed, chicks tend to eat a good meal. If the chicks are feeding and drinking correctly, the crop will be a mixture of food and water. Gently assessing the chicks for crop fill within the first 24 hours will give a good indication as to whether the chicks have eaten and had a drink. Ideally, the crop should be full, soft, and rounded (**Figure 7**), and the contents should have a soft consistency. If the crop contents are stiff, or the original texture of the feed can be felt through the crop wall, then little or no water has been consumed.

FIGURE 7: *Crop fill assessment in the first 24 hours. The chick on the left has a full, rounded crop, while the chick on the right has an empty crop.*

Crop fill should be monitored for the first 48 hours, with the first 24 hours being the most crucial. An initial check at 2 hours will indicate if chicks have found feed and water at placement (**Table 2**).

TABLE 2: *Target crop fill assessment.*

TIME OF CROP FILL CHECK AFTER PLACEMENT	TARGET CROP FILL (% OF BIRDS WITH FULL CROPS)
2 Hours	75
4 Hours	80
8 Hours	>80
12 Hours	>85
24 Hours	>95

Checks at 48 hours are important to confirm that all birds have found feed and water and that the transition onto mechanical or manual feeders has occurred.

VENTILATION

Providing good air quality for the chick is critical. Even short periods of exposure to high ammonia levels can negatively affect body-weight gain and feed efficiency and increase the risk of damage to the eyes and cardiovascular and respiratory systems.

As a general rule, the required minimum ventilation airflow rate for starting chicks is $1m^3$/kg/hr or 0.10-0.20 CFM/chick – depending on outside temperature and internal air quality condition. Airspeed at chick level should be low and kept below 0.15 m/sec to ensure a good environment and start.

7-DAY WEIGHT AND 7-DAY CHECKS

When growing birds to a low processing weight, getting the birds off to a good start and achieving a good 7-day body weight is essential. The primary objective in the first few days of life is to get the broiler chick eating and drinking. If broiler chicks are restricted in their feeding and drinking during this time by management or environmental factors, performance will be depressed. The potential 7-day body weight of the modern broiler chick is ±213 g (0.470 lb). If chicks achieve a 7-day body weight of 180 g (0.397 lb) or more (a minimum of 4.5 times the day-old chick weight), this indicates that they have had a good start. If a flock achieves less than this, then brooding management and nutrition must be reviewed.

The importance of achieving a good 7-day weight is further emphasized when it is considered that for every 10 g (0.02 lb) improvement in 7-day body weight gained, an improvement of 130-140 g (0.287-0.309 lb) will be achieved at 35 days (under good management conditions).

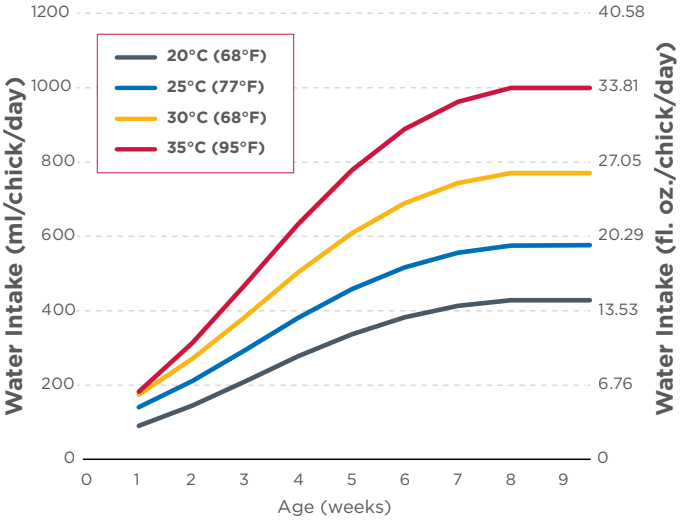
BROILER MANAGEMENT AFTER 7 DAYS

Although brooding management is critical when processing at low body weights, appropriate management must also be employed for the remainder of the birds' lives if a good early start is to be built upon.

WATER INTAKE

High environmental temperature can significantly impact water intake. Under normal conditions, chickens' water intake is approximately double that of feed intake (1.6-1.8:1). However, water intake can be up to 3 times that of feed intake in hot environments (**Figure 8**).

FIGURE 8: *Effect of environmental temperature on water intake based on daily feed consumption defined in the **Broiler Performance Objectives**, and the assumption that water intake increases by 6% per °C increase in temperature.*



Monitoring the feed-to-water ratio daily and checking that birds are drinking sufficient water is important. Allowances should be made for increased water intake at higher temperatures (6.5% increase per degree over 21°C / 3.6% increase per degree over 70°F).

8 TO 14 DAYS OF AGE

Management of temperature and air quality are vital at this stage. In spot brooder-type systems, pens are being opened up, and by 14 days, the birds will be given access to the whole house. A watch-out at this stage can be over-ventilating the house with birds becoming chilled due to high airspeeds, especially in tunnel housing systems.

Feed management remains a priority, and the volume of feed in the track or pans should be reduced. The idea is that the mechanical feeders will run more frequently with a lower volume of feed in each pan or track, resulting in fresh feed being circulated and reducing the build-up of fine material <1 mm (0.04 in) each time the system is run. This can be done by using time clocks on track feeders or by putting a bright light over the control/sensor pans on pan systems to encourage birds to feed from the control/sensor pans and activate the system (birds must be feeding from the control pan if this is to work). For manual systems, tube feeders should be given fresh feed 2 to 3 times daily.

Average daily gain can be affected when the transition from crumbled to pelleted feed takes place, and care must be taken to minimize selective feeding; issues can arise where there is a high percentage of fines in the feed. Pellets used at this stage should be 3-5 mm (0.12-0.20 in) shortcut.

15 TO 21 DAYS

This is the time when feeders must be managed correctly to maximize potential growth. Feed integrity must be maintained, and fines must be kept to a minimum. A high percentage of fines in the mechanical feeders will potentially affect feed intake and may impact gut health. The feeder's height must also be kept to ensure birds stand to feed and do not eat and lay down next to the feeder, thus reducing the available feeding space. Feeding space should be approximately 45-80 birds per pan (33 cm/13 in diameter) for birds grown up to 1.5 kg (3.3 lb).

22 DAYS TO DEPLETION

At this time in the bird's life, the temperature heat load starts to build up in the house, and ventilation and cooling management are the priority to keep the broiler in their comfort zone. The environment must be managed to ensure birds eat and drink. If the bird starts to show signs of overheating, growth rate will be reduced as energy is expended during panting and appetite is depressed. Managing stocking density, measured as biomass (kg/m^2 or ft^2/bird), is essential in preventing this issue. In hot climates, stocking density will depend on the environmental temperature, humidity, and ventilation system. Stocking density should be adjusted depending on the age and weight at which the flock is to be processed.

CONCLUSION

To grow broilers successfully and to lower weights, attention to the smallest detail is essential.

Remember, the average flock will be about 672 hours (28 days) old at processing, and one day is 3.5% of the birds' life — there is little or no time to catch-up if the flock has deviated from the standard. This means that good management during the brooding period is critical in broilers that are processed at low body weights. However, appropriate management must also be employed for the remainder of the birds' lives if a good early start is to be built upon.

Growers must ensure that best management practices are there to support the genetic potential of the broiler. This is achieved by understanding the biological needs of the birds and adapting management to maximize overall flock performance.