The specifics of starting broiler flocks to maximise profits

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Brooding has been well documented for many years, but you do not often see the specific figures required to unlock the full genetic potential of broilers. Relating your own practices to these will help provide your flocks with the best start in life and so unleash this potential.

The first thought that comes to mind is temperature. There are three temperatures to consider – air temperature, internal body temperature and the floor, or more importantly, concrete temperature.

Brooding temperature

What is the correct temperature during brooding? The most important factor is not to look at temperature by itself, but in relation to relative humidity. As a rough guide: add the temperature (in Celsius) to the humidity. The target for this should be 85 for the first 14 days of life, for example if day one temperature is 33°C and the humidity is 52%, this would equal 85. If when added together you get a figure of 90 then the environment is starting to become suboptimal, and when it reaches 95 the conditions are poor.

The easiest way to change suboptimal conditions is to increase temperature. However, the correct way would be to condition incoming air correctly bringing the relative humidity down by keeping incoming air close to the ceiling, increasing the air temperature and decreasing the humidity. This air can then be pulled across the litter, picking up the waste gases and excess humidity before being expelled, resulting in an improved environment for the birds.

For every increase in temperature by 1°C the relative humidity will decrease by 5%. This 85 calculation has its limits; it is not a sufficient calculation where the outside relative humidity is under 35% for most of the time.

The internal temperature of the bird should also be monitored closely, both on arrival at the farm and for at least the first 24 hours. The target temperature should be 40-41°C for the first three days of life, then 41-41.8°C is required. The internal (rectal) temperature will be higher from birds with increased feed and water intake than those with lower crop fill.

The concrete temperature is also vital during the early period. The houses should be pre-heated for 48 hours before placement, not just to pre-warm the air and the contact surface areas but actually penetrate the concrete floor. The minimum acceptable concrete temperature is 28°C, even at the side walls.

The feed and water intake of the birds reflects the floor temperature. With every increase in floor temperature by 1°C the feed and water intake increases, peaking at 32°C, and then dropping after this point and stopping altogether at 35°C. Thus, the acceptable tolerances for concrete temperature is between 28-32°C.

Actually achieving the required minimum level of 28°C in older housing can be a challenge. It is important that minimum ventilation is used during the pre-heat phase. It is incorrect that fuel usage will be massively increased, in fact if the balance of fan to inlet ratio is correct and running on a five minute cycle time with a minimum run time of 20%, the fuel usage can actually be reduced.

The importance of using the ventilation system at this time is to pull down the heated air that has risen to the roof and distribute this across the floor and litter, increasing the concrete temperature as it goes.

Another aspect on heating is the available capacity. Measured in Kilowatts, the total capacity in the house should be divided by the house volume.

The minimum acceptable level is 0.05Kw/m^3. The increase in available heater capacity usually yields better performance and can also make it very difficult for a farm to perform regardless of management practices when the available capacity is below 0.05Kw/m^3. Our recommendation would be to install a minimum level of 0.07Kw/m^3 in new or retro fitted houses and, where external temperatures are frequently below 0°C (as in Russia and Canada), the minimum heater capacity should be 0.1Kw/m^3.

Measuring the internal (rectal) temperature of a chick.

Table 1. The importance of early growth.

Week	Distribution (%)	
	Maintenance	Growth
1	20	80
2	30	70
3	40	60
4	50	50
5	60	40
6	70	30
7	75	25
8	80	20

Feeding during brooding

Supplementary feed and feed space should also be used during the brooding period. Cobb recommends that a minimum of 50% of the floor space should be covered with paper, placed either side of the nipple drinking system. The paper should be of a newspaper quality (47-55gsm/55-68% brightness-news print paper) which will be able to stand up to the activity in the house for 4-5 days.

The amount of feed that is placed on the paper prior to placement is 65g per bird. When it is known that the flock source will be from young parent flocks, this could be raised to 80-90g to help achieve the required weight gain.

For a more individual performance target, the chicks at day seven should be four times the bodyweight

Continued on page 13

Continued from page 11
at day zero, from parent flocks over 32 weeks. For chicks from a younger parent flock, the multiplication target should be 4.5 times day-old bodyweight. The chicks from a younger parent flock are often seen to be less desirable than those from an older parent flock but the truth is they have a higher possible growth curve, but do start smaller so it can be more of a challenge to achieve the same performance.

For every gram of bodyweight achieved at day seven, this should then be multiplied by 11.5-12.0g at day 35. If these multiplication factors are achieved, the commercial potential is being achieved.

Even during the early stages of the flock the automatic feeding system should be run and charged. This increases the activity in the houses and also helps the bird to associate the sound of the feeders running with meal time. Most notably this practice helps to reduce a possible drop off in feed intake after removing supplementary feeders.

Cobb's device for measuring flow rate.

Early growth essential

A common mistake is the lack of attention in achieving the early performance and thinking the compensatory growth will be sufficient and also reduce mortality. In fact this is far from correct; the available energy that can be used in the early stages for growth is far greater than later due to a higher demand in maintenance requirements.

Table 1 shows a rounded version of how important it is to achieve early growth as FCR will greatly be affected if we rely on back-end growth.

One of the simplest ways to view how the bird has adapted to its new environment is by checking the crop fill of the bird 24 hours after placement. 95% of the birds should have both feed and water in the crops. However, this measurement can be misread or incorrectly recorded; rather than looking at crop fill alone, the rectal temperature can be recorded and also water consumption.

The goal would be to have the birds consume 1ml for every hour, for the first 24 hours after placement – in reality this means 24ml. When considering that the average chick weighs 44g, this equates to 50% of its bodyweight. Neither one of the methods will give a really clear picture of how the bird is adapting to its new environment, but all three together provide an accurate account.

When looking at a goal for water intake, it is more relevant to consider external temperature and nutritional contributions rather than a 'one type fits all' water consumption chart. Ideally a target will be created under a company's feed formulation and also considering the external and seasonal influences over a period of flocks.

Table 2 shows, as a rough guide, a starting point for the expected feed to water ratio.

The amount of water available to a bird should increase as the bird grows. A bird will drink for just less than one minute whether it has consumed enough water or not. If not then the bird will alter its feed consumption to match. The outcome of the incorrect availability of water can be seen by reduced growth rates.

High flow rate is also an issue; it does not mean higher growth rates and, due to the excess in flow, will lead to wastage resulting in wet litter.

Devices are available to measure flow rate through a nipple, and it is most important to measure the flow rate when the line is active. Table 3 shows the requirement by age.

When we pull all the points together, our goal is to achieve maximum body weight – but not only in muscle and skeletal growth.

One of the main factors affecting final performance is the growth of the heart, which is mainly affected by air quality that should never exceed a carbon dioxide level of 3000ppm.

Poor air quality in the first week will probably not show its impact until later on, resulting in reduced growth rate and mortality. Intestinal growth is also critical to check. The goal should be an increase of 600% from day 0 to day 7.

The intestine does not start to grow until 24 hours after the bird has consumed feed for the first time. If the intestinal weight is checked at day 0, there will be a variation of 10% due to the hatch window.

If the flock at day seven has a large variation in intestinal weights, the brooding period and set-up should be reviewed for the next placement. While growth of the intestine and within the villi continually grows as the bird ages, this can be very much limited if the bird has a poor start.

Conclusion

In summary, the attention to detail in the first week is paramount for a successful and profitable flock. The Cobb recommendations are to consider each of these aspects:

- Concrete temperature 28-32°C.
- Internal temperature 40-41°C day 0-3.
- Pre-heat 48 hours.
- Heater capacity 0.07Kw/m^3.
- 600% intestinal growth in first seven days.
- 50% of floor area covered in paper.
- Minimum 65g/bird of feed on paper.
- Crop fill 95% 24 hours after placement.
- Water consumption 1ml/bird/hour for the first 24 hours. ■

Table 2. The starting point for the expected feed to water ratio.

Temperature (°C)	Ratio water and feed
4	1.7:1
20	2.0:1
26	2.5:1
37	5.0:1

Table 3. Flow rate requirements by age.

Age (week)	Flow rate (ml/min)
Week 1	40
Week 2	50
Week 3	60
Week 4	70
Week 5	90