

The importance of nutrition in achieving a good start for broilers

The modern broiler is fast-growing and feed-efficient. According to the primary breeders, the first seven days of a broiler's life represent approximately 22% of the growing cycle for a 2kg broiler. There is, therefore, a narrow window of opportunity to provide appropriate management and nutrition in order to maximise performance.

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The brooding phase is the most important stage in the life of a chicken, particularly broiler chickens. Early development is focused on the ability of the chick to self-regulate body temperature, as its own heat-regulating mechanism has yet to develop, as well as the immune system, as the chick is initially relying entirely on maternal antibodies.

The muscles and bones are developing rapidly. This growth can only be accommodated by maximising the development of the digestive system to ensure overall performance. Any reduced development or damage incurred during these first few days may show in performance later in life.

Improper early management could lead to poor livability, reduced uniformity, susceptibility to disease challenges,



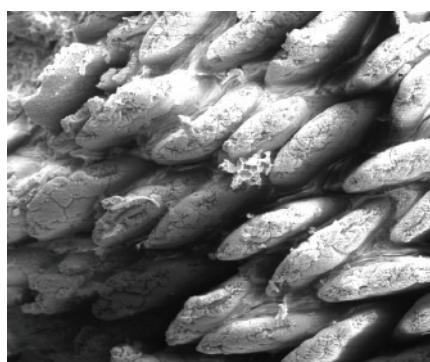
possible sudden death, leg problems, depressed body weight, poor feed conversion and increased processing plant condemnations.

Improved management, feeding and attention to detail will maximise performance and, therefore, profitability.

The period from one day old to 7-10 days is critical; it is during this time that the physiological capability of the broiler is developed. Success in the starting period leads to success in the broiler house, and it starts with the arrival of the day-old chicks.

Having produced a healthy day-old chick, it is important to ensure it gets off to a good start by providing appropriate nutrients to maximise early development and overall performance at 35-42 days.

Fig. 1. Effect on the intestinal villi in broilers fed yeast cell protein source from one to seven days of age. Left, no yeast cell protein and, right, with 2% NuPro (Zauk et al., 2006).



Post-hatch feeding

Any delay in initial feed intake may suppress gastrointestinal development and cause early malnutrition, suppress thyroid activity and inhibit satellite cell proliferation and muscle growth potential. These are the lasting effects of early nutrition and feeding on subsequent performance.

Juul-Madsen H.R. et al. (2004) reported on the effects of delayed starter feed intake on broiler growth rate. They compared three groups of chicks:

- Group 1: Fed six hours post-hatch.
- Group 2: Fed 30 hours post-hatch.
- Group 3: Fed 54 hours post-hatch.

After 42 days, Group 2 resulted in having 2g lower daily weight gain compared to Group 1.

Group 3 resulted in having 5g lower daily weight gain compared to Group 1.

Providing feed as early as possible after hatch will enhance average daily body weight gain. Most of the energy and nutrients consumed by birds younger than four weeks goes toward growth. After this initial four weeks, the majority of energy and nutrients goes toward maintaining the bird's body.

This means that if energy and nutrients are restricted early in the bird's life, it might never catch up with birds that were provided with a good start, in terms of growth and body weight.

In addition, flocks in which the majority of

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birds get off to a good start tend to be relatively uniform in size, making management and optimum results easier to achieve.

Flocks with the highest feed intake will almost always have the highest average daily gain and weigh most at processing.

Importance of intestinal development

The early development of the gut and its integrity is of paramount importance to ensure the overall performance and health of modern broilers. A fully developed gut will result in broilers expressing their full genetic potential.

The gastrointestinal tract grows four times faster than the body weight of a broiler during the first two weeks of life. Therefore, the first 14 days provide an opportunity to put feeding, nutrition and brooding management in place. This is because the maximum development of villi in the duodenum occurs at four days of age and the villi of jejunum and ileum at 10 days of age.

The impact of pre-starter diet composition, more specifically highly digestible protein and energy supplements in pre-starter diets for broiler chickens, is therefore of significant importance in the development of the gut and its morphology. This importance is rightly being emphasised by the primary breeding companies Cobb Vantress and Aviagen, and it is advisable to follow their pre-starter feed specifications and textures; however, the raw materials used to make up the diet may influence the development of the gut and other organs as Zauk et al. (2006) showed in their investigation on the effects of pre-starter diet supplementation with a highly digestible protein source derived from yeast cell protein (NuPro, Alltech Inc. KY).

They reported that at 2% inclusion, yeast cell protein resulted in well-developed villi compared to no yeast cell protein, as shown in Fig. 1.

This yeast-derived protein contains highly concentrated levels of essential nutrients, including nucleotides, glutamic acid, inositol, amino acids and peptides.

Synthesis of nucleotides is important for the development of body tissue and organs.

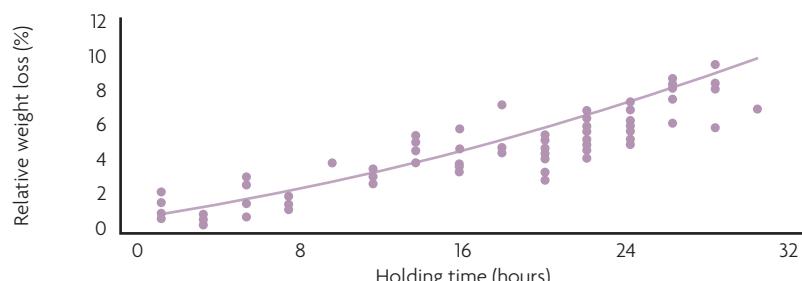


Fig. 2. Linear weight loss in chicks not fed post-hatch (Careghi et al, 2005).

Providing glutamic acid in the diet offers an easily accessible energy source for digestive and immune systems that promotes development.

Inositol contributes to the improved development of chicks by increasing cell growth, development and repair, and the protein content is highly digestible and is easily utilised by young chicks.

In the first week of life, whilst it is important to formulate feed based on primary breeder specifications for a pre-starter, the immature gut will require highly digestible raw materials. Beware of ever-present mycotoxins in feed ingredients which can impair performance, damage the gut and reduce feed intake. Such a challenge at this stage might be more devastating, and long-lasting, and the chicks may not be able to recover.

Impact of feed and water availability

Maximum gut development requires the availability of feed and water as soon as possible post-hatch; Careghi et al. (2005) reported that there is a linear weight loss in chicks not fed post-hatch as shown in Fig. 2.

Careghi et al. (2005) also reported that chicks delayed in feeding time showed lower plasma T3 levels, indicating a lower metabolic rate, which has also been reported by Noy and Sklan (2001).

A good start that includes early access to feed and water will lead to better flock uniformity and may impact the final slaughter weight.

Allowing chicks to eat and drink as soon as they are placed will provide them with much-needed nutrients, electrolytes and energy to get the digestive system functioning and developing along with other internal organs, allowing the chicks to actively utilise the nutrients and antibodies they absorbed from the yolk for their overall development.

Often, a peak in mortality is seen at 3-4 days of age. This could be due to the yolk sac not being absorbed.

If feed and water intake are not optimum, then it will result in more non-starters or cull chicks, leading to increased mortality a few days later. These flocks tend to have

poor uniformity and body weight gain in the first week. A higher average seven-day weight will minimise the number of small birds. As a guide, cumulative mortality should not exceed 1%.

A key point to help ensure optimal early broiler performance is to have correct brooding conditions in the house, which includes recommended temperature profile, relative humidity and, most importantly, minimum ventilation, which helps to stimulate feed and water intake.

Temperature should not be sacrificed for ventilation, and neither should ventilation be sacrificed for temperature. Chicks must have easy access to feed and water.

Managing chick distribution and behaviour helps to provide the optimum brooding conditions.

Monitoring feed intake 6, 12 and 24 hours after chick placement is the first key performance indicator. Checking and recording the crop fill will assist in taking appropriate management action to ensure at least 95% of the crop is full and pliable within the first 24 hours.

Measuring live weight at day seven is a well-established way of assessing pre-placement and brooding management as well as chick quality. This is the second key performance indicator.

Seven-day weights around 180g or 4-5 times the weight of the day-old chick will improve final live weight and FCR due to maximum development of the gut and other organs.

The seven-day weight has a significant impact on the most important parameters, such as performance, carcass quality and body composition. This can be achieved by good chick quality, feed and water, and management.

Spending time in the chicken house during this critical phase is the only way to guarantee that all the chicks' needs are being met.

While tools such as automatic controllers are of great help and allow the stockmen flexibility, there is no substitute for spending time observing chick behaviour and the conditions in the house. ■

References are available
from the author on request