Efficiency in broiler production: Don't take shortcuts!

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Broilers are known for their rapid growth rate and excellent feed conversion ratio. The feed they receive must therefore contain the correct nutrients in the correct ratio to support this rapid growth along with feather development.

In addition to balanced nutrition, there are several other management factors that play a key role in the success of the broiler enterprise, especially since chicks are predominantly reared under intensive conditions.

Genetic potential

In the last 20 years, the slaughter age of a 2kg broiler decreased from 60 days to between 35 to 40 days or less. This quicker growth rate must therefore be supported by meticulous overall management.

Two characteristics of the modern broiler must be kept in mind:

- The typical feed conversion of chicks increases with age – from around 1,2kg initially to around 2,6kg feed/kg of live weight gain at slaughter age.
- The improved growth rate and consequent earlier slaughter age may result in lower carcass fat.

First week = GIT development

The first week of a chick's life is characterised by several physiological changes that must be considered in order to fully meet the chick's nutritional requirements. During the first week, the small intestine almost triples in weight due to villi development to increase nutrient absorption capacity.

Initially much of the energy and protein are utilised for the rapid development of the gastrointestinal tract (GIT), relative to the other organ systems. This rapid development, and the accompanying larger GIT, results in increased feed intake and a longer retention time, improving digestion efficiency and feed conversion. Furthermore, the successful development of the GIT has a positive effect on immune system development and maintenance.

For this reason, the chick needs to start feeding shortly after hatching in order for digestion to commence. This will stimulate GIT development and promote the absorption of nutrients. Immediate and continuous access to feed is vital. Live weight is correlated with feed intake at seven days of age.

Chicks in their first week of life do not have the ability to adapt to lower temperatures, which is why a temperature-controlled environment is so important during this phase.

Feeder management

Inadequate nutrition and feeder management have a major influence on intake, wastage, and therefore feed conversion and growth. Smaller amounts of feed given more often will prevent wastage, positively affect feed conversion, and stimulate chicks to ingest more of the ration. It also assists in adapting chicks to the automatic feeders.

However, do not adjust automatic feeders too high too soon, as it can lead to insufficient intake of the ration and suboptimal growth, as well as less uniformity among chicks due to feeders being out of reach.

Imbalances in the amino acid profile may result in the GIT being underdeveloped. For this reason, balanced protein nutrition is crucial for optimal growth. The main source of protein is oilcake, which is broken down into amino acids during digestion. These amino acids are important building blocks of all tissues, such as muscles, and thus have a major impact on growth. However, it is more important to have a set minimum level and ratio of certain amino acids in rations, than a set total protein level.

The chick will excrete any excess amino acids, which wastes energy. On the other hand, too little of a specific amino acid may, for example, halt muscle-cell development because the building blocks must be put together in a certain ratio. Consequently, the inclusion of synthetic amino acids may have important economic benefits, without adversely affecting growth. Lower protein levels, which are amino acid balanced, may also lead to less nitrogen and moisture in manure, which is beneficial for the overall health of chicks.

Supply of energy

The carbohydrates derived from grains, as well as oil or fat products, serve as an energy source for chicks and are essential for tissue growth and maintenance of body functions. Note that some results suggest that carbohydrate sources are more digestible than fats, especially during the first week of life.

Chicks' daily feed intake increases exponentially as they mature; their energy requirements relative to their protein/amino acid requirements also increase. The nutrition programme must therefore be adjusted during the growth period, taking into account the increase in daily ration intake. These changes can be successfully managed by making use of phase feeding (up to five phases can be included).

The following is an example of a three-phase nutrition programme:

- Starter ration during the first seven to 14 days.
- Grower ration from day seven to 14, until around day 28.
- Finisher ration from around day 28 up to slaughter.

The total feed intake of a broiler up to slaughter is approximately 5kg.

Other nutritional factors

Macrominerals are required for metabolic processes, immune system functioning, and skeletal development, while microminerals are essential for metabolic functions and optimal growth. Vitamins are essential micronutrients the chick requires

for optimal metabolism and immunity. Chicks must ingest the correct amount of vitamins for optimal health and cost-effective production. Vitamin deficiencies lead to metabolic disorders that give rise to stunted growth and weak immunity.

Guard against anti-nutritional factors – some of the feed sources used in rations may contain components that prevent efficient digestion. However, processes such as heat treatment can largely neutralise these components. The inclusion of certain enzymes in rations play a key role in improving the utilisation of nutrients in feed sources.

Ample clean drinking water and adequate drinking space are essential. Lower water intake leads to lower feed intake which, in turn, leads to suboptimal growth. Chicks' daily water intake is approximately 1,6 to twice the weight of the ration they consume.

Good general management

In addition to a balanced nutrition, optimal and efficient broiler growth requires high standards in terms of care, housing and management. Among other things, the following are vital for success:

- **Hatchery management:** Chick quality has a spillover effect on the development of the GIT, and consequently also the efficiency with which the ration is utilised.
- **Day and night cycles:** Light can be used to manipulate feed intake. Short, dark periods combined with maximum light intensity during the first four days stimulate the chick to feed and drink. After that, a single dark period (four to ten hours) can be applied.
- **Ambient temperature:** Chicks grow best when the temperature stays consistent. Chicks' body temperature drops in a colder environment, which means they ingest less feed. This will hamper growth as some of the nutrients are used to maintain normal body temperature and are therefore not available for growth.
- **Heat stress** prevents efficient production because of suboptimal growth (due to lower feed intake) and more chick deaths. Chicks maintain their body temperature quite comfortably at temperatures of around 20 to 27°C.
- **Manure quality:** The material covering the floor absorbs the moisture of the manure the chicks excrete; excessive moisture is a breeding ground for disease conditions.
- **Diseases:** Subclinical coccidiosis and other diseases hinder efficient nutrient uptake, leading to suboptimal growth.
- **Biosecurity** is important for optimal health and growth. Feed sources, and thus the final ration, must be free of any mould and possible mycotoxin formation which may significantly impair digestion and growth.

In short

The modern broiler is genetically geared towards rapid and efficient growth. However, to unlock chicks' full potential, they must be given the correct nutrition and management must be spot on. There are no shortcuts to success. SF

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