

# A good start for the young chick ensures lifetime profitability

A rule of thumb says that every 10g more body weight at day seven results in 1.4% higher ADG and 1% lower FCR until final live weight (Fig. 1). To ensure good broiler chicken profitability, a good start is very important.

by Kelly Vermeer MSc and Dr Gert Hemke, Joosten Young Animal Nutrition, The Netherlands. [www.joosten.nl](http://www.joosten.nl)

During the first week post hatch, the chick's body weight may increase two-threefold, mostly as a result of rapid gastrointestinal growth. The growth of the gastrointestinal tract (GIT) is correlated with the feed intake. In avian species the formation of muscle fibre is completed at hatch and the skeletal muscle growth starts rapidly after hatch. Because of this high muscle growth, the demand for amino acids is high. The highest priority in the first week is the development of the intestinal tract.

## Feed the intestines first

In commercial broiler operations it is not uncommon for newly hatched chicks to experience a delayed access to feed. Despite the

presence of some yolk reserves, the delayed intake results in retarded development of muscle and intestines that result in lower performance and immunosuppression.

In newly hatched chicks, the yolk accounts for 16% of the body weight, which is absorbed during the first 2-3 days.

The low amount of glucose in the yolk results in a lack of glycolytic energy, which is needed for the development and metabolism of the gut cells.

This lack of glycolytic energy can be compensated by the breakdown of proteins via gluconeogenesis, which causes lower muscle growth and poor development of intestines.

This reduced development of the villi results in lower capacity for absorption, lower immune status and higher incidence of leaky gut symptoms (Fig. 2).

In chickens with a healthy start, the villi are able to develop optimally. This results in:

- Development of digestive enzymes.
- Adequate nutrient absorption capacity.
- An effective barrier function to pathogens.

This barrier function is the result of a balanced development of the active immune system and functioning of the 'door keepers', the tight junctions. For the development of

Fig. 1. Higher broiler weights at day seven of life results in better growth performance based on data of 102.3 million broilers.

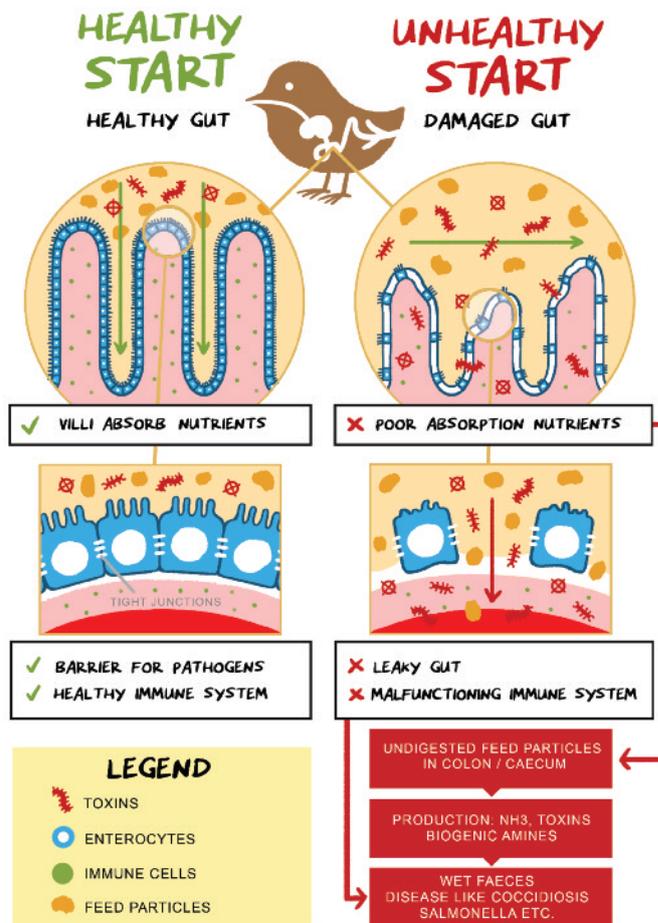
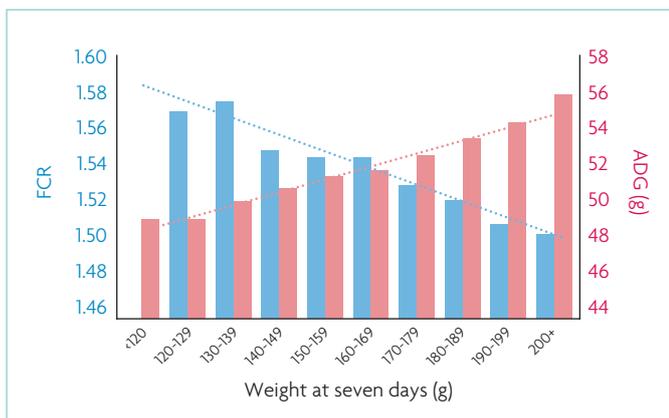


Fig. 2. A healthy start results in good absorption of nutrients and good barrier function. Wider tight junctions (leaky gut) allow bacteria and toxins to translocate by entering into the bloodstream.

the immune system a variety of micro-organisms is relevant.

Without feeding the intestine first and without flora, there is no development of the immune system.

In commercial operations the post hatch feed intake is often delayed, resulting in delayed development of the gut and poor barrier functions:

- Malfunctioning of the digestive system and poor absorption of nutrients.
- Leaky guts due to 'open tight junctions' allowing pathogens to enter the bloodstream.
- More protein fermentation in the caeca and colon.

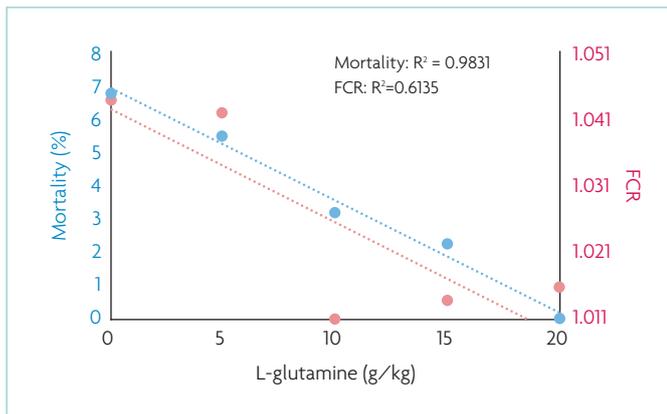
This fermentation of proteins

increases the production of NH<sub>3</sub>, biogenic amines and toxins. This undesired production, together with a leaky gut, causes wet litter, inflammation and poor performance.

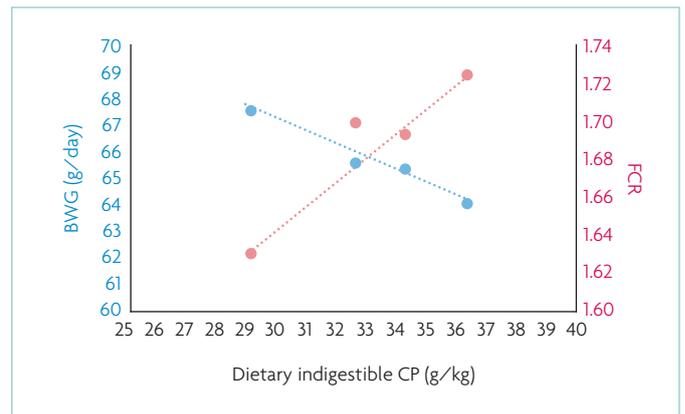
## Modulate the immune system

From the total immune cells in the body, around 70% are located in the intestines. This organ provides a barrier for undesired components, is essential for absorption of nutrients and is an interface in the immune system.

Continued on page 21



**Fig. 3. Extra glutamine in the pre-starter phase (day 1-7 of life) improves performance and reduces mortality of broilers.**



**Fig. 4. Increasing amounts of indigestible protein result in reduced growth performances.**

Continued from page 19

At birth, chicks have no active immune system. The bacterial flora strongly contributes to the modulation of the gut immune system.

Immune cells in the gut, like macrophages and monocytes, are stimulated to produce cytokines that orchestrate the proliferation of B and T cells, resulting in the production of protective immune globulins and the formation of 'invader killing' cells. This development demands a good supply of 'fuel for the villi'.

### Glutamine is the fuel for intestinal growth

Several publications confirm the effects of an adequate supply of glutamine in the first phase of life. Glutamine is a semi-essential amino acid for healthy mature animals, but because it is the preferred source of fuel for the villi, essential for young animals. The effect is evident:

- Increase of villus height and absorption.
- Improvement of gut integrity and reduction of leaky gut symptoms.
- Increase of macrophage activity and proliferation of the B and T cells.

The growth performance and feed conversion of broiler chickens is significantly improved by extra glutamine supplementation. The mortality substantially decreased when more glutamine was added (Fig. 3).

### Highly digestible proteins are essential

In young broiler chickens, the digestive capacity is not yet fully developed. The production of digestive enzymes and the absorptive capacity is limited, especially in conditions where the intake of glycogen energy (glutamine, glucose) is reduced and/or delayed.

Poor digestibility results in more substrate for bacteria that are

always present in the distal parts of the gut. When more proteins reach the colon and caeca, bacteria will produce more harmful products, like toxins, amines, and ammonia.

Feed with low indigestible protein contents result in less protein streaming into the colon and caeca and a lower incidence of clostridium, less salmonella, better gut health and better performance (see Fig. 4).

On the other hand, an adequate supply of essential amino acids is essential for muscle growth.

Broiler weight growth has increased dramatically, weights increased 45% comparing 1980 versus 2013 (LEI, The Netherlands).

The first limiting amino acid is lysine. In modern fast growing broilers the demand of lysine in (pre)-starter feed has strongly increased over recent years.

### Omega 3 fatty acids result in less leaky gut

The basic essential fatty acids are linoleic ( $\Omega 6$ ) and linolenic ( $\Omega 3$ ). Fig. 5 stresses the physiological importance of a good balance of omega 6:omega 3 that results in anti-inflammatory effects.

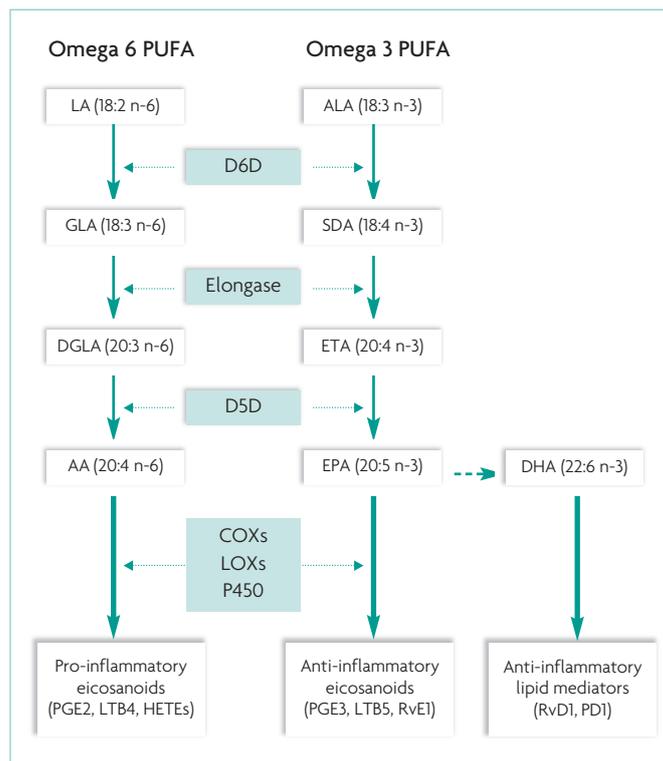
In most broiler diets levels of pro-inflammatory linoleic is high, but the amount of anti-inflammatory

linolenic is too low. Their optimal ratio is 5:1. However most diets have a ratio 20:1. To balance, a source of omega 3 needs to be added.

Sources of omega 3 are fats of rapeseed, linseed, alfalfa, algae and fish, where EPA and DHA in algae and fish are most efficient.

A good supply of omega 3 is essential for structural integrity. It produces anti-inflammatory eicosanoids and results in lower serum levels of LPS (lipopolysaccharides). In broilers infected with *Eimeria tenella* (coccidiosis), the extra supply of omega 3 fatty acids shows a reduced parasite invasion and improvement in performance. So, adding good sources of omega 3 to the diet result in healthier and better performing animals.

**Fig. 5. Inflammatory effects of omega 3 and omega 6 in the diet. Sources of omega 6 are grains, animal products (other than fish), vegetable oils and soya. Sources of omega 3 are rapeseed (ALA), linseed (ALA), algae and fish (EPA/DHA).**



### Products designed to benefit young chicks

Based on this knowledge, Joosten Young Animal Nutrition provides two products specially designed for young animal feeding, to boost gut health and performance: FMR  $\Omega 3$  and JPC 56.

Both products have an excellent protein digestibility of over 95%, a result based on the selection of ingredients and unique in-house processing technology.

The special products contain balanced levels of amino acids, including high levels of glutamine to support gut health development. With FMR  $\Omega 3$  the supply of essential omega 3 fatty acids (EPA/DHA) contributes to an increased anti-inflammatory capacity.

These premium products result in an improved gut integrity, a more efficient nutrient use and significant increased growth performance.

Better performance and better gut health in the starter phase strongly contribute to a better profit for a lifetime.

References are available from the author on request