

## **The importance of an optimized DOC feed during early brooding**

Modern commercial broiler strains have been selected for maximal processing yields and the ability to reach desirable processing weights as soon as possible. Due to a continuous shortening of the growth period, the first days after hatch become decisive for the technical results obtained at slaughter. A good start leads to a flock with good uniformity and also beneficially affects the final body weight of birds. In practice, chick quality is influenced throughout different stages of the total process, i.e. parent stock management, hatchery practice and efficient delivery of chicks.

### ***Challenge***

The best way to improve flock uniformity and performance is by decreasing the number of slow starters. In commercial hatcheries, chicks hatch over a 24- to 48-hour period, depriving the chicks of feed and water for up to 72 hours. However, these first days are crucial for the ultimate performance of the newly hatched chicks because the skeleton, internal organs and the gastro-intestinal and central immune system start to develop. Making use of a wide hatching window thus leads to a higher susceptibility to infections and a restricted development of tissues, organs and the pectoral muscle in early-hatched chicks, resulting in a high mortality rate (2 to 5% of the hatchlings do not survive the critical brooding period) and more slow starters in the flock. Therefore, early feeding strategy should be optimized in order to ensure an optimal start for all chicks, which will result in better flock uniformity.

### ***Pre-starter versus brooding complement***

Upon arrival, it is common practice in broiler houses to use chicken paper topped with the pre-starter feed to improve feed access for day-old chicks. A pre-starter is formulated for the first seven to ten days after hatch. However, the physiology of broilers is changing very fast during the first days of life. The transition of the digestive system from embryonic absorption of yolk to ingestion and digestion of feed is taking place. At the same time, a metabolic transition occurs: while in the embryonic stage most of the energy is supplied by fat, the main energy source of the post-hatched chick are carbohydrates.

A brooding complement, which is specialized for the first two days after hatch, can therefore prepare the chick more optimally to overcome these dramatic changes during its life. As chicken paper is commonly used by the farm manager, no extra labour is needed to replace the pre-starter on the chicken paper by a special brooding complement.

### ***Stimulation of early feed intake***

To achieve the best start, chickens should begin to eat and drink straightaway. Feed intake is influenced by many factors. The gastro-intestinal tract (GIT) is suggested to be involved in short-term regulation of feed intake. The presence of feed in the stomach and/or other parts of the GIT gives rise to satiety signals which negatively affect feed intake. A brooding complement provided in the form of a quite soft and fine crumble which easily disintegrates in the crop into its constituents (i.e. highly digestible raw materials), improves the emptying of the crop and gizzard which reduces the satiety signals and increases early feed intake. Furthermore, hatchlings have difficulties consuming feed particles that are too large relative to the dimensions of their beak and therefore prefer a very fine crumble the first days after hatch.



### ***Yolk sac absorption and improved passive and innate immunity***

As the chick embryo prepares for hatching, the yolk sac is internalized. The latter comprises 20-25% of the body weight at hatch but becomes negligible in size within the first following week. During the first days after hatch, the contribution of the yolk sack is approximately 40% of the total protein supply. It is, however, not economical to use yolk proteins as an amino acid source. After all, a large fraction of the yolk proteins are immunoglobulins, which are not intended to be digested as amino acids. If the protein needs of the hatchling are immediately covered by a well-digestible brooding complement, the yolk can be optimally used as a source of (maternal) immunoglobulins thereby increasing passive immunity of the bird. Also the residual yolk lipid, with its specific fatty acid composition, has a positive effect on the development of the early immune response of the birds. Therefore, even though it contributes approximately 50% of the total energy supply, the residual yolk lipid should not be used as an energy source. The residual yolk is taken up more quickly in birds that start eating faster. Feed present in the digestive system stimulates the peristaltic movements and increases the yolk sac utilization. The first contact of the chick with the environment brings a dangerous microbiological threat to the chick. Most hatchlings are fasted for 48 hours or more which makes them more susceptible to pathogens.

### ***Development of gastro-intestinal tract and internal organs***

The period immediately after hatch is critical for the morphological development of the intestine. This is evidenced by an increased intestinal organ-to-body weight ratio of approximately 30% the first day after hatching and initiation of feeding. This rapid development of intestinal organs is essential for optimal feed digestion and nutrient assimilation. In order to provide enough 'building blocks' for the rapid growth of demand organs (such as muscles and bones), first a rapid growth and maturation of the supply organs (GIT, liver, pancreas, heart) is required. The formation of intestinal crypts starts immediately post-hatch. The crypts, containing enterocyte-producing stem cells, start to develop during the first hours and become well defined in two to three days. New enterocytes migrate from the crypts up the villus, reaching the tips at full maturity after approximately 72 hours in chickens younger than four days. The necessary nutrients have to be available for optimal crypt and villus formation. However, digestion during the first days post-hatch is limited due to poor activity of digestive enzymes in broiler chicks. Therefore, it is important to provide highly digestible raw materials containing a correct balance of nutrients for the development of the small intestine. Complementation of a special diet high in readily digestible ingredients for the first days after hatch will compensate for the limitations of the immature digestive tract. Faster development of the digestive system increases the digestion and absorption of nutrients, which are the building blocks for the development of the supply organs such as the liver and gizzard.

**Nuscience** has developed **DOC Star**, a new brooding complement to overcome the difficult post-hatch period of broiler chicks. This product was developed with special attention to stimulation of feed intake, improved yolk sac absorption and immunity and early development of the gastro-intestinal tract and internal organs, and thus an increased technical performance.