

Feeding, management and early gut development of the young chick

by Aziz Sacranie, Technical Director, Global Poultry Services.

The feeding, management and development of the young chick is a continuous process. It begins with the nutrition and health of the parent flocks, which impacts embryonic well being, moves through the egg handling and hatching process, all of which impact on chick quality and development, through to the nutrition and management of the chick.

The nutrition of the hen is the key to early chick development. Egg formation depends on sufficient nutrients in the hens' diet or from body reserves to ensure that the eggs are produced to meet the embryo's requirement to hatch.

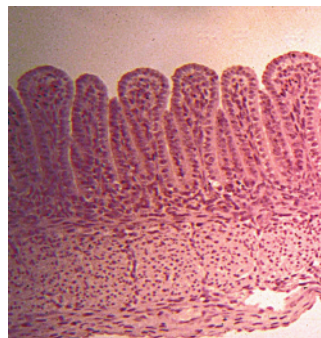
The chick's life cycle begins nine days before the egg is laid – the time it takes for the follicle to mature to develop the yolk.

Components of the egg

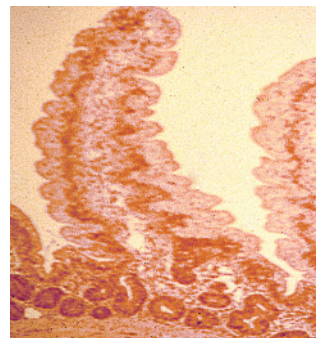
The different egg components provide the nutrition for the development of the embryo, its immune system and, the young chick.

Yolk lipid supplies the embryo with 90% of its caloric needs and is directly transported to the circulating blood by endocytosis. The yolk is the sole embryonic nutrient supplier until it is internalised into the abdomen close to hatch.

The positive impact of selenium protein, zinc proteinate, vitamin E, choline, folic acid, omega-3 fatty



Left, villai at pipping and, right, villus at seven days post hatch (Noy et al).



acids (particularly DHA) in the egg on hatch and chick quality have been the subject of research by the number of people.

The early post hatch period presents an opportunity for getting everything in place to control the overall capacity of body protein deposition throughout its productive life.

Ekaman summed up the importance of intestinal development with, "The intestinal system is the engine that drives all others. Its integrity from first day to market is paramount in the expression of the genetic potential of the broiler."

Nitsan et al. (1991), reported that the gastro-intestinal tract grows four times faster than the body weight of a broiler during the first two weeks of life. Noy & Skyran (1997), reported that 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. Therefore, in order to facilitate maximum development of the gastro intestinal tract, appropriate nutrients and water have to be made available to chicks as soon as possible after hatching. Any delay may compromise this development and subsequent performance.

The effect of early feeding on broiler body weight has been well researched. Noy et al reported that delaying feeding by 48 hours could result in reduced bodyweight at harvest by approximately 8-9%. The effect is greater in chicks sourced from young parents, which is most likely due to the young hen not transferring all the appropriate nutrients into the eggs.

Management

Feeding the broiler during the first week of life can represent a nutritional challenge.

- The young broiler has yet to develop fully physiologically and anatomically.

- As genotypes improve, the growth during the first seven days becomes even more important.

For birds slaughtered at 35 days, the first week of life represents 20% of production. A good start leads to a good flock uniformity and impacts the final slaughter weight. Approximately 80% of the yolk is 'digested' during incubation, the remaining 20% is internalised (the yolk is drawn into the abdominal cavity)

prior to hatching. Yolk weight is variable and affected by many factors, including nutrition, management and maturity. The amount of retained yolk ranges from 4-11g in a 40g chick, which accounts for 10-28% of the bodyweight. There is generally a peak in mortality at 3-4 days, likely due to the absorption of the yolk sac. If feed and water intake is not optimum, non-starter and cull chicks may lead to mortality a few days later. These flocks have poor uniformity, increased number of small cull chicks, due to poor growth in the first week. A higher average seven-day weight will minimise the number of small birds that have not started to eat.

Seven day weight

Several different parameters have been used to determine the quality of the chick, such as live weight, growth, crop fill, body temperature, and livability.

Measuring body weight at day seven is a well established way of assessing, pre-placement and brooding management, as well as chick quality. As a guide the bodyweight should increase 4-5 times of day-old weight in seven days.

Weights above 180g will improve final live weight and FCR due to maximum gut development as well as other organs.

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

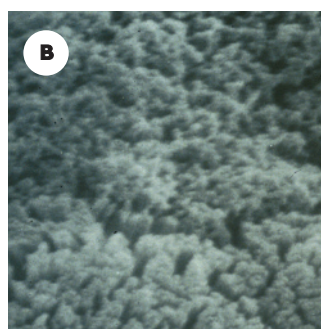
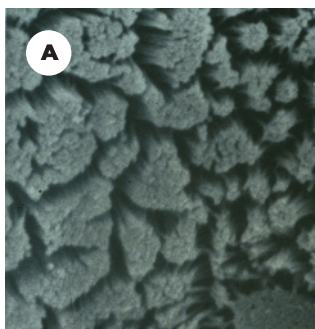
Dietary actions

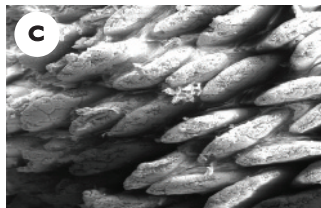
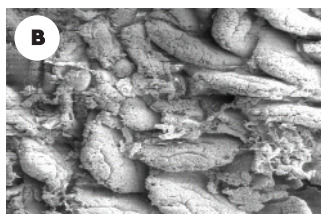
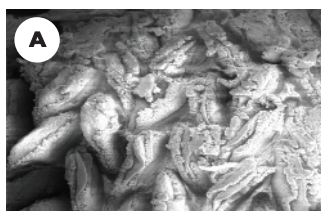
For the immature gut in the first week, it is important to compose feed based on primary breeders specifications for a pre-starter, which require:

- Highly digestible raw materials, in particular protein (digestible amino acids), vitamins and trace mineral sources.

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Microvilli – 48 hours post hatch (A: Unfed birds, B: Fed birds).





Levels of YCP. A. 0% B. 1% C. 2%.

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- High quality raw materials should be used.

As the immune response system is developing, a challenge might be more devastating to young chicks. Beware of mycotoxins that are always present. There is a need to minimise the impact by using a broad spectrum, fast acting mycotoxin binder.

- Optimum breed specific diets and a high quality of the feed presentation will enable the chicks to consume the amount of feed needed for adequate growth.

Zauk et al (2006) examined the impact of Yeast Cell Protein (YCP) on the intestinal villi of broilers from 1-7 days of age. Histological results

	Treatment means*	Intake (g/bird)	Weight gain (g/bird)	FCR	Livability (%)
No challenge	None	3798 ^a	2541 ^a	1.494	91.7 ^{ab}
	Zn Bacitracin	3668 ^a	2597 ^a	1.413	96.7 ^a
	Actigen	3997 ^a	2699 ^a	1.481	91.7 ^{ab}
	Salinomycin	3782 ^a	2575 ^a	1.469	93.3 ^{ab}
Challenge	None	3165 ^b	2105 ^b	1.508	51.7 ^c
	Zn Bacitracin	3672 ^a	2474 ^a	1.484	90.0 ^{ab}
	Actigen	3826 ^a	2561 ^a	1.494	81.7 ^b
	Salinomycin	3947 ^a	2704 ^a	1.460	93.3 ^{ab}

* Means not sharing like superscripts within a column are significantly different (P<0.05)

Table 1. Results of SFW program: performance of broilers from 0-35 days.

improve villi development when YCP is included in the diet. The best results were at 2% inclusion level. The improved villi development is most likely due to better digestible amino acids as well as high level of nucleotides contained in the YCP.

Dr Steve Collett, University of Georgia, reported that inclusion of Manan Rich Fraction (MRF) or Actigen in broiler diets will enhance overall gut health in broilers.

Dr Collett has developed a unique concept on gut health and integrity in broilers. His 'Seed, Feed, Weed' (SFW) program is a 'whole-life' broiler gut management system designed to improve gut health,

reduce the use of antibiotics, improve bird welfare, for example via a reduction in footpad lesions, and improve birds performance.

SFW is a natural programme targeted at reducing and/or removing the need to use antibiotics for gut-health related issues.

- Seed: spraying probiotic on day old chickens at the hatchery or on farm in order to inoculate with pioneer bacteria (All-Lax XCL).

- Feed: water sanitation – chlorinate and acidify water lines to encourage gut flora to grow (Acid-Pak 4 Way).

- Weed: eliminate 'bad' bacteria that compete for resources and can

disturb gut health, for example E. coli or salmonella (Type I fimbriae blocker such as Actigen).

Management actions

The key to help ensure optimal early broiler performance, is to provide the appropriate environment for the chicks, ie correct brooding conditions which include correct temperatures, humidity, minimum ventilation, which will stimulate feed intake, and access to feed and water. It is important to monitor feed intake by checking the crop fill, 95% of the crops should be full within 24 hours.

Left, with Actigen. Optimum villi integrity: colour, thickness and tonicity. Right, without Actigen. Excessive duodenal mucus.



Ensure early feed intake

The long term effect of early feeding is multiple, birds that eat will grow. The yolk is used for initial gut development, however feed stimulates yolk utilisation and intestinal motility. Nutrients stimulate intestinal growth and lack of nutrients retards intestinal growth. ■