

Turkey nutrition to optimise performance and production costs

Apart from growth performance, a turkey's productivity highly depends on the quality of their litter and their legs. This article presents major nutritional factors to control in turkey nutrition to optimise performance and production costs: protein link to litter quality and its consequences on the digestive tract balance, control of calcium and phosphorus levels in diet for good bone mineralisation, feed cost and feed presentation.

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Protein and amino acid intakes are highly correlated to growth, FCR and meat yields thereby leading to high protein levels in the diet of turkeys. Since soybean meal is one of the best sources of protein, turkey feeds usually contain high levels of this raw material. It is likely to cause wet litters resulting in serious issues such as footpad disease, breast blisters and overall poor performance. Therefore, the level of crude protein should be controlled as much as possible. Formulating a diet on digestible amino acids values using the concept of ideal protein model allows the correct amino acid supply to be provided.

Using synthetic amino acids, fishmeal (when permitted by local legislations) can also be useful in this respect. Once the nutritional constraints are defined according to the fixed objectives, the raw materials included in the formula should be



Fig. 1. Pododermatitis incidence (1-low to 5-high) of turkey flocks with or without the Avidry program. Rating assigned to the condition of the legs of 50 animals (male and female) at 70 days (France, 2014).

selected based on their digestibility. Protein sources must be as highly digestible as possible to reduce undigested ammonia excretions.

Litter quality

As litter quality is one of the major concerns in turkey production, it is necessary to limit the water content of droppings and reduce caecal fermentation. At farm level, wet litter and footpad disease usually stems from an unbalanced functioning of the turkeys' digestive tract.

For a proper functioning of the gut, a dynamic balance must be struck between the epithelial cells, the immune system and

the microbiota. The context of intensive production exposes the integrity of the turkey's digestive tract to high risks of breaking down. This problem generally occurs with the deterioration of the state of the intestinal and caecal droppings.

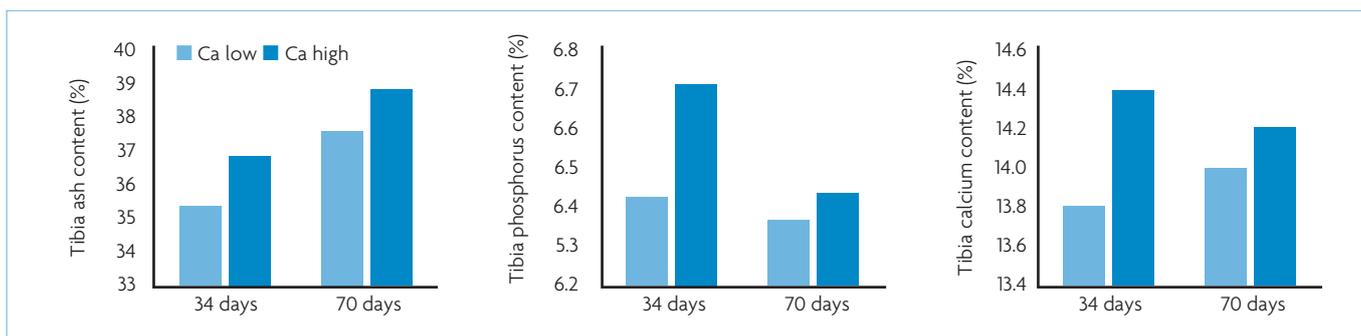
By reducing hazardous intestinal dropping and managing the orientation of caecal flora and fermentation, feed ingredients can also act as a valuable tool for improving litter quality.

The Avidry program consists of three phases which each correspond to three critical points limiting the digestive tract balance: epithelial cells, immune system and microbiota.

This program should be implemented

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Fig. 2. Effect of two levels of calcium on tibia content of turkeys at 34 and 70 days old.



Continued from page 7 during the risky stages of turkey production from brooding until 56 up to 70 days.

A field study conducted in five French commercial farms (France, 2014), showed that the Avidry program leads to a reduction of the incidence of pododermatitis while maintaining growth performance (Fig. 1).

Calcium and phosphorus

Considering that raising turkeys is a fast-growing and long term production, nutritionists sometimes prefer to include over-fortified calcium and phosphorus in diets so that the birds do not suffer from leg disorders (deformation, fractures).

Not only are calcium and phosphorus key nutrients in the sense they impact bone mineralisation and strength, but they also influence feed intake and growth.

To evaluate the effect of calcium and phosphorus on turkeys' bone mineralisation and performance, a trial was conducted on an experimental farm (St Symphorien, France).

The goal was to examine whether two phosphorus levels combined with two calcium levels had an impact on Grade Maker male turkeys' mineral content of bones, feed intake and growth. Increased

levels of calcium clearly showed a positive effect on the weight of the tibia along with bone phosphorus and calcium content at 34 and 70 days old.

Turkeys that were fed a high level of calcium had significantly higher ash (38.9% vs 37.8%, $p=0.002$), phosphorus (6.72% vs 6.75%, $p=0.001$) and calcium (13.8% vs 14.4%, $p=0.006$) contents.

Conversely, adding 0.3% of calcium in the starter diet significantly decreased liveweight by 2.3% and feed intake by 5.2% at 20 days old.

The effect on feed intake was observed until 70 days old: when they were fed lower calcium, turkeys' feed intake significantly increased by 4.5%. Phosphorus levels had the same tendency for improving growth and feed intake. In this experiment phosphorus levels showed no effect on bone mineralisation (weight, Ca and P level in tibia). It appeared that optimising calcium to phosphorus ratio tended to improve zootechnical performances.

Therefore optimal ratio Ca to P turned out to be obtained by adjustment of phosphorus and/or calcium depending on the situation.

This trial showed the importance of feeding adequate levels of this mineral for the competitiveness of turkey production: at least enough to ensure a good leg strength but not to the extent that feed

intake and growth are depressed, in which case, production cost would increase.

Rising feed costs are currently a major trend as these account for 60-70% of the cost of turkey production. This is especially true since the volatility of raw material prices has substantially increased. Since energy is closely related to feed intake, energy level and its proportion to protein level in the diet (diet concentration) is used as a tool to manage feed cost.

The optimum diet concentration and feeding schedule differ depending on the objective sought. Examples of objectives include, among other things, the lowest FCR, the lowest cost of live weight production, highest yields or lowest cost of breast meat.

Sanitary conditions and health status also determine the nutritional concentration of feed: a lower feed concentration can help to reduce digestive disorders. On the other hand, high nutritional levels are useful for supporting sanitary pressure.

Feed presentation

Turkeys are very sensitive to feed presentation. In fact for them, feed presentation matters as much as nutrient content. Feed form and size need to be adapted to their oral cavity: they cannot easily pick up fines or dusty feed and they cannot ingest particles that are too large.

This is the reason why crumbles or mini pellets (<2mm) are recommended for starter diets. Crumble size should be increased as turkeys get older. Pellets should then be introduced in their diets but not before 3-4 weeks old. Changing from one diet stage to another is a sensitive period. Indeed when turkeys receive a novel feed they express a neophobic reaction: they spend more time having exploratory behaviours than pecking; as a consequence their feed intake reduces.

On the basis of the review of different issues, practical application for turkey feeding has to be adapted to the management level of the farm without forgetting sanitary restrictions like drinking water quality. ■

Fig. 3. Effect of two levels of calcium and two levels of phosphorus on the performance of turkeys at 34 and 70 days old.

