The effect of feed form and quality on turkey performance

Aviagen Turkeys (ATL) provide guidelines on the nutritional specifications required to achieve breed performance objectives. However in order for birds to respond to feed nutrient density, they need to be able to consume the required amount of feed on a regular basis to achieve these objectives.

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Many factors influence feed consumption; environment and management being two of the most important. Feed form is known to have a significant impact on consumption and poor crumb or pellet quality results in the occurrence of fines which can have a negative effect on feed intake.

The effect of feed physical quality on bird performance is well established; work by Nixey, (1994) demonstrated that even a moderate improvement in pellet quality resulted in a 5% improvement in performance. Brewer (1989) fed turkeys diets containing 10% and 50% fines, the resulting feed conversions were 2.61 and 2.71 respectively.

A small scale evaluation examining the effect of different feed forms was conducted in ATL facilities in the UK. This involved feeding B.U.T. 6 males 'good' and 'poor' quality crumbs and pellets from 0-20 weeks. Diets were prepared according to the ATL recommended nutrient specifications and feeding programme. The starter diet was provided as a sieved crumb for the 'good' feed physical quality control and an unsieved crumb for the 'poor' feed physical treatment.

The 'poor' pellet quality treatment was prepared by hammer grinding pellets to a fine consistency (fines) and then blended with intact pellets to result in a 50:50 mix of pellets and fines (see Fig. 1).

The mix of fines and pellets resulted in a feed physical quality similar to poor feed physical quality which can sometimes be seen in the field.

The results showed there was a significant depression in body-weights to 20 weeks of age; the poor treatment resulted in a 12.3% reduction in bodyweight loss relative to the control. FCR deteriorated by 36% in the poor treatment relative to the control at 20 weeks of age (see Fig. 2).

The negative effect of poor feed form on bodyweight was evident through the lifetime of the birds. The negative effect of the poor treatment was detected as early as three weeks of age and continued, with increasing effect, to the end of the trial period (see Fig. 3).

Breast meat yield was assessed at 20 weeks of age, poor treatment reduced breast meat yield by 7.5% (see Fig. 4). This effect on breast meat yield is most likely related to the effect of feed form on physiological development to this age. For example, the birds fed the poor feed form were physiologically less developed at 20 weeks of age compared to the birds fed the control, hence breast meat was not as well developed.

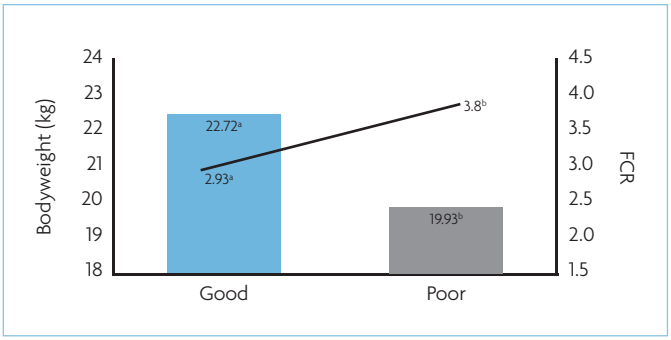

Fig. 2. The effect of feed form on bodyweight (kg) and FCR (20 weeks). [a,b]different letters indicate differences (P≤0.05) among treatments.

Effect on performance

The effect of feed form on performance was much greater than previously observed, in particular the magnitude of effect on FCR was unexpected.

The data suggests that those birds fed the poor feed form ate significantly more feed than birds fed the control diet but did not convert this feed to liveweight.

Feed wastage is often evident when birds are fed poor quality pellets, while feed wastage was evident in some pens, this was superficial and not enough to account for the degree of difference in FCR.

Another possible explanation for the degree of effect on FCR may be related to the preparation of the 'poor' feed treatment.

The degree of fine material within the poor feed treatment was very significant and also the extent of pulverisation during the feed grinding process may have resulted in a more extreme 'poor' feed form than assessed in some other trials which compared pellets to mash diets.

Nonetheless, the poor treatment was representative of poor feed form in the field and the results reinforce the importance of ensuring feed physical quality is optimal and is adequately assessed within the organisation.

Assessment of feed physical

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Fig. 1. Preparation of the 'poor' pellet treatment. From left: intact pellets, hammer grinder, fines, pellet and fines blend.

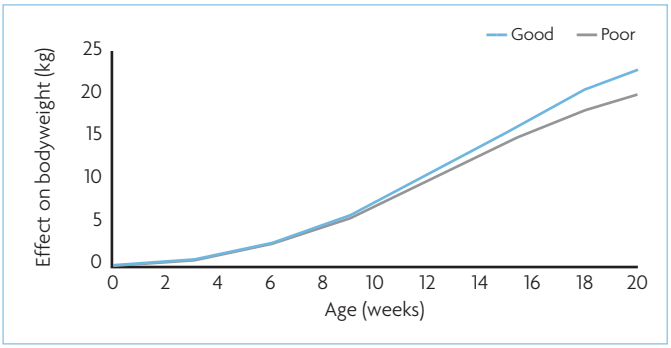

Fig. 3. The effect of feed form on bodyweight from 0-20 weeks of age.

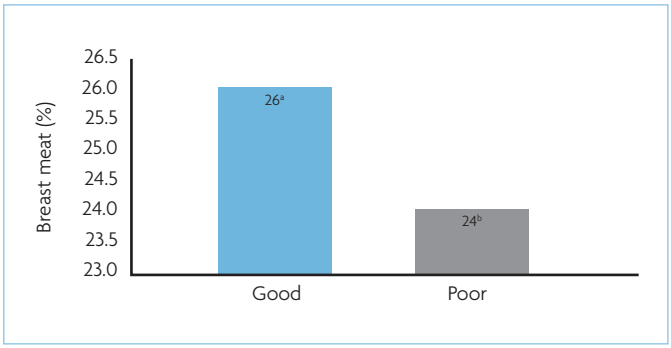

Fig. 4. The effect of feed form on breast meat yield.

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quality is usually measured by a sieving assessment of crumbs and a pellet durability index (PDI). The target particle size profile for starter diets in a crumb form are shown in Table 1.

Pelleted products must contain a minimised quantity of fines particles (<1mm), aiming for less than 10% fines (farm sample assessment) with the remainder as intact pellets.

Pellet durability assessments are normally made at the mill laboratory via specialised devices such as a Holmen Tester or Tumbling Tester; a durability of >90% is realistic for most pelleted feeds.

These assessments involve placing a sample of feed through an aggressive process which is aimed at replicating the physical insults to the pellet in the field. This assessment allows the mill to know that manufactured feeds meet physical quality standards.

Assessment of feed physical quality should not just be conducted at the mill, farm assessments give a good indication as to what is provided to the bird especially if the sample is taken directly from the feed pan.

This can be conducted via the use of a hand sieving device (Fig. 5), the procedure is straightforward and practical for most farms to conduct. There are many courses of action which the mill can take to improve poor feed physical quality. Behnke (1994) quantified the effect of different feed manufacturing processes on pellet durability, the main areas identified were grinding, conditioning and pelletising processes.

Table 1. Crumble particle size profile.

Particle size	<1mm	1-2mm	2-3mm	>3mm
Starter 1	0-10%	45-55%	30-40%	0%
Starter 2	0-10%	25-30%	35-45%	10-15%

However, changes in the formulation can also have an effect, for example even the addition of 5% wheat based materials can improve the pellet durability significantly.

The key point is that poor feed physical quality is not acceptable and there are means to improve feed physical quality.

Summary

- Feed physical quality has a significant impact on turkey performance, perhaps significantly more than previously determined.
- Optimising feed physical quality not only supports farm performance but also improves processing yield.
- Communication of feed physical quality standards between the farm and the mill is vital to ensure that the needs of the modern bird are understood and are met.
- There are several approaches to improving feed physical quality within the mill, some of which do not involve significant investment.
- Monitoring of feed physical quality in the mill and also on the farm is vital to ensure that the feed form is continuously meeting standards. ■

References are available from the author on request

Fig. 5. Aviagen Turkeys' feed sieving device showing starter 1 crumb.