The effect of the physical presentation of feed on commercial turkeys

A review of evaluations on the effect of feed form on commercial turkeys shows that modern turkey strains appear more responsive to feed physical quality than in the past.

An evaluation conducted 34 years ago showed that the performance of male BUT6 birds was adversely affected by feed physical quality. liveweight was reduced by 6.3% and FCR by 3% (Fig. 1).

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An evaluation examining the effect of different feed forms was conducted in Aviagen Turkeys' facilities in the UK. This involved feeding BUT6 males 'good' and 'poor' quality crumbs and pellets from 0-20 weeks. Diets were prepared according to Aviagen Turkeys Ltd's (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.

The mix of fines and pellets resulted in a feed physical quality similar to the physical quality of feed sometimes seen in the field (see Fig. 2).

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 (Fig. 3a). FCR deteriorated by 36% in the poor treatment relative to the control at 20 weeks of age.

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. Breast meat yield was assessed at 20 weeks of age.

The poor feed physical treatment reduced breast meat yield by 8.4% (Fig. 3b).

This effect on breast meat yield is most likely related to the effect of feed form on physiological development to this age.

Birds fed the poor feed form were physiologically less developed at 20 weeks of age compared to those fed the control, hence breast meat was not as well developed. The effect of feed form on performance was much greater than previously observed, in particular the magnitude of the 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 they did not convert this feed to live weight.

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.

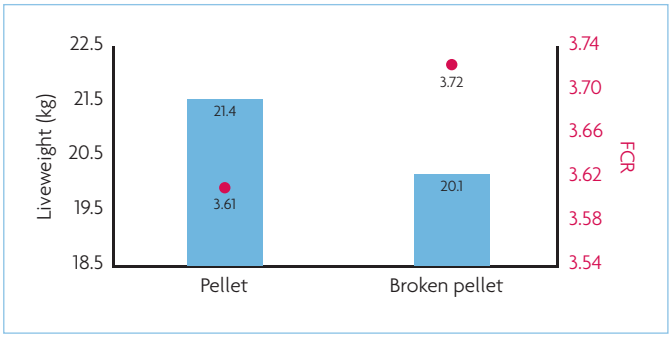

Fig. 1. The effect of feed form on bodyweight and FCR of BUT6 males at 167 days of age (BUT 1986).

The degree of fine material within the poor feed treatment was very significant and the extent of pulverisation during the feed grinding process may also 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.

A further trial investigated the effect of poor physical quality following the same methodology and design as the previous trial. However, an additional treatment with 75:25 pellets to fines was introduced, resulting in a total of three treatments; 100% pellets; 75:25 pellets fines; and 50:50 pellets fines.

The live weight and FCR response to increasing the proportion of fines was consistent, the 75:25 and 50:50 treatments reduced bodyweight by 2.9 and 4.8% respectively.

FCR deteriorated in the 75:25 treatment by 7.9% and 50:50 treatments by 14.5%. Although the response to feed form was not as dramatic as the initial evaluation, the results suggest that, across a wide range of feed physical quality, the bird's response to feed form is very consistent (Fig. 4).

Effect of feeding mash diets

Feeding a mash feed is often resorted to if pelletised feeds are not available.

A trial was conducted assessing the BUT6 male bird response to four different treatments:

- **Treatment 1:** A standard pelletised control diet.
- **Treatment 2:** A pelletised diet with whole grain wheat incorporated within the pellet.
- **Treatment 3:** A coarse mash diet from 21-144 days.
- **Treatment 4:** A mash diet from 21-84 days followed by a pelletised diet fed to 144 days of age.

The nutrient specification of the diets was identical across all four treatments.

Treatment 2 resulted in a similar performance to the control, however Treatment 3, the mash diet,

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Fig. 2. Feed form treatments. Left, intact pellets, centre, fines and, right, pellet and fines blend.

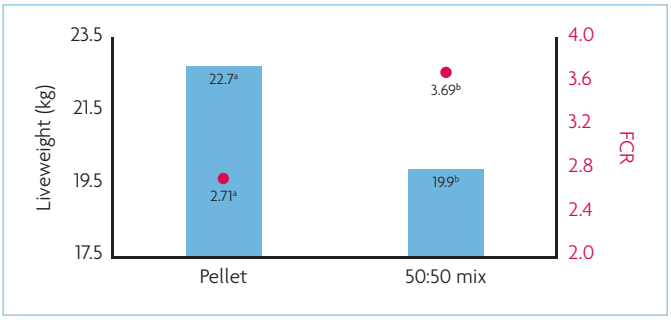

Fig. 3a. The effect of feed form on bodyweight (kg) and FCR. [a,b] Different letters indicate differences (P≤0.01) among treatments.

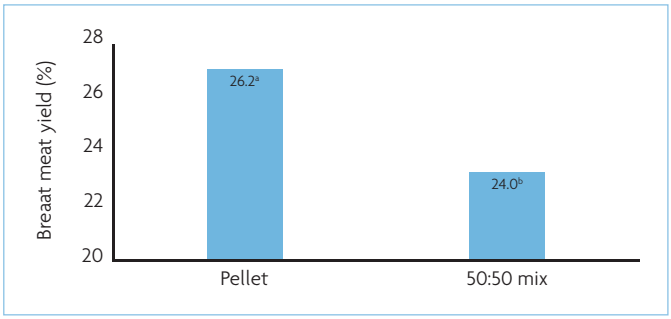

Fig. 3b. The effect of feed form on breast meat yield (20 weeks). [a,b] Different letters indicate differences (P≤0.01) among treatments.

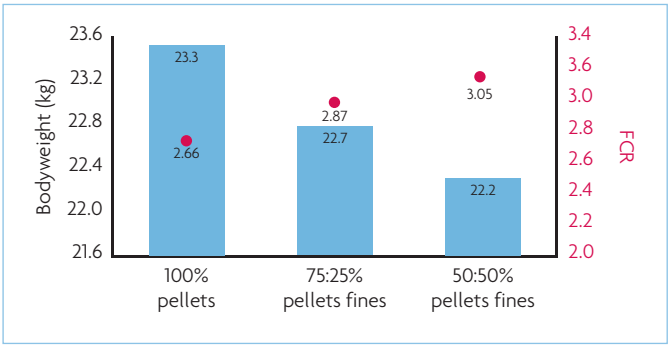

Fig. 4. The effect of feed form on bodyweight (kg) and FCR (20 weeks). [a,b] Different letters indicate differences (P≤0.05).

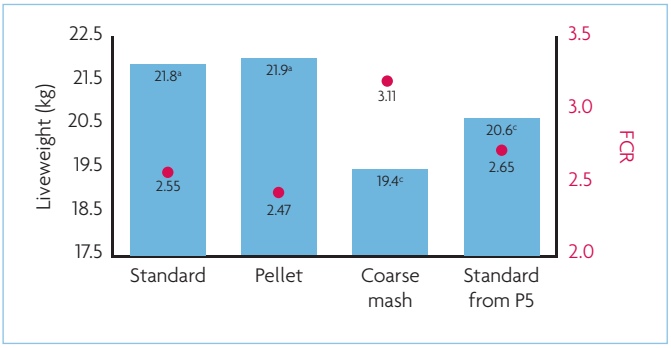

Fig. 5. The effect of different feed forms on BUT6 male liveweight (kg) and FCR at 144 days of age.

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resulted in a reduction in liveweight of 11.1% and deterioration in FCR of 21.9% relative to the control. Treatment 4, the mash-pellet treatment, reduced liveweight by 5.6%, while FCR deteriorated by 3.9% (Fig. 5). The results from this trial suggest that incorporation of whole grain wheat provides some benefit in FCR relative to the control, and a coarse mash diet has a negative effect on liveweight and FCR similar to poor pellet quality.

Feeding a coarser feed particle size is associated with positive effects on both broiler litter quality and foot pad dermatitis (FPD). There were no assessments made of litter quality, however FPD was assessed at 144 days of age based on the method of Hocking (2008).

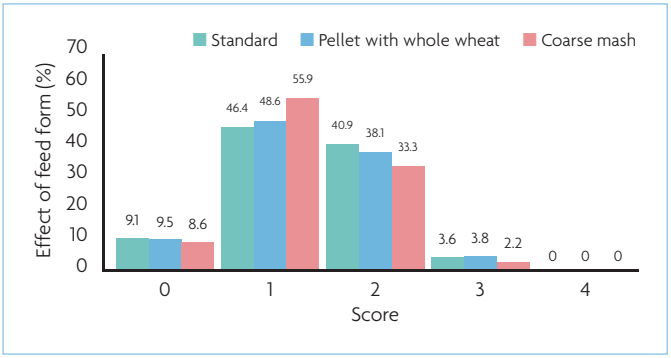
The mash treatment resulted in a higher percentage Score 1 and lower Score 2 and 3 compared to the other treatments suggesting feeding a mash diet had positive effects on foot condition compared to feeding pelletised feed (Fig. 6).

Feed physical quality

Feed physical quality is usually measured by a sieving assessment of crumbs and a durability test of 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 pelletised 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.

Fig. 6. The effect of feed structure on foot pad dermatitis score (144 days).



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 and 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, however changes in the formulation can also have an effect. For example, even a 5% addition of wheat based materials can improve pellet durability very significantly.

The key point is that if poor feed physical quality is not acceptable there are means whereby improvements can be made.

There are recommended guidelines for feed particle sizes for turkeys. Table 1 shows the recommended particle sizes for starter crumbed and pelletised diets.

Summary

Feed physical quality has a significant impact on turkey performance, perhaps more than previously determined. Optimising feed physical quality not only supports farm performance but also improves processing yield.

Replacement of pelletised feeds with a coarse mash diet results in a negative effect on performance.

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.

Monitoring of feed physical quality in the mill and also on the farm is vital to ensure that feed form is continuously meeting standard. ■

References are available from the author on request

Table 1. Recommended guidelines for feed particle size.

Crumb profile – in front of the poults					
Particle size (mm)	‹1	1-2	2-3	›3	–
Proportion (%)	‹10	40-50	30-40	5-10	–
Pellet size					
Age (weeks)	0-2	2-4	4-8	8-12	12+
Proportion (%)	Crumb	2-3mm	3-3.5mm	3-3.5mm	3-4.5mm