A look at the key factors for cost efficient broiler nutrition

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Broiler feed prices have changed considerably in the last two years due to increasing raw material prices.

Fig. 1 shows the variability of corn and soyabean meal prices during this time period. The price of both have increased by as much as 300%.

During times of volatility in raw material price it is important that nutritionists make the right decision about what feed nutrient density should be fed. Particularly when feed raw material prices increase it is tempting to control feed prices by reducing dietary nutrient density; however consideration must be given to the negative effect this can have on financial performance. This article looks at what key factors should be considered in order to make the right decision.

Reducing balanced protein

The results of a trial demonstrating the effect of decreasing balanced protein levels (available amino acids) in the diet on Ross 308 male growth and FCR to 41 days of age are given in Fig. 2.

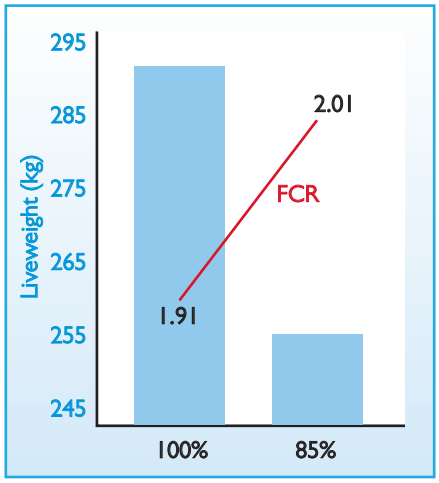

Fig. 2. The effect of differing balanced protein levels on male live weight and FCR at 41 days of age.

In the trial the control treatment (100%) was formulated to meet the current Ross 308 recommendations for protein level, while the protein level in the other treatment was formulated to achieve 85% of current recommendations.

In this article, protein refers to available amino acids and all trial diets were designed to provide different levels of balanced protein using the ideal amino acid profile as per the recommendations published in the Ross Broiler Manual (2007). It can be seen from Fig. 2 that body weight and FCR improve significantly as protein levels are increased. These results are consistent with previous trials and field experience. However, the cost of a diet with a lower balanced protein level will be cheaper than that of a diet with a higher balanced protein level.

Before altering the nutrient density of a diet it is therefore important that the overall financial performance of the flock is assessed. Fig. 3 shows the effect of balanced protein level on margin per bird. All calculations were based on Central European costs and revenues.

Although the lower balanced protein diet was cheaper, the margin (€/bird) was lower when feeding this regime compared to the higher balanced protein diet, which means the reduced cost of the lower balanced protein diet did not compensate for the reduced revenue due to poorer biological performance. The key points are:

1 In general reducing balanced protein density will reduce biological performance.

1 Within the balanced protein ranges used in

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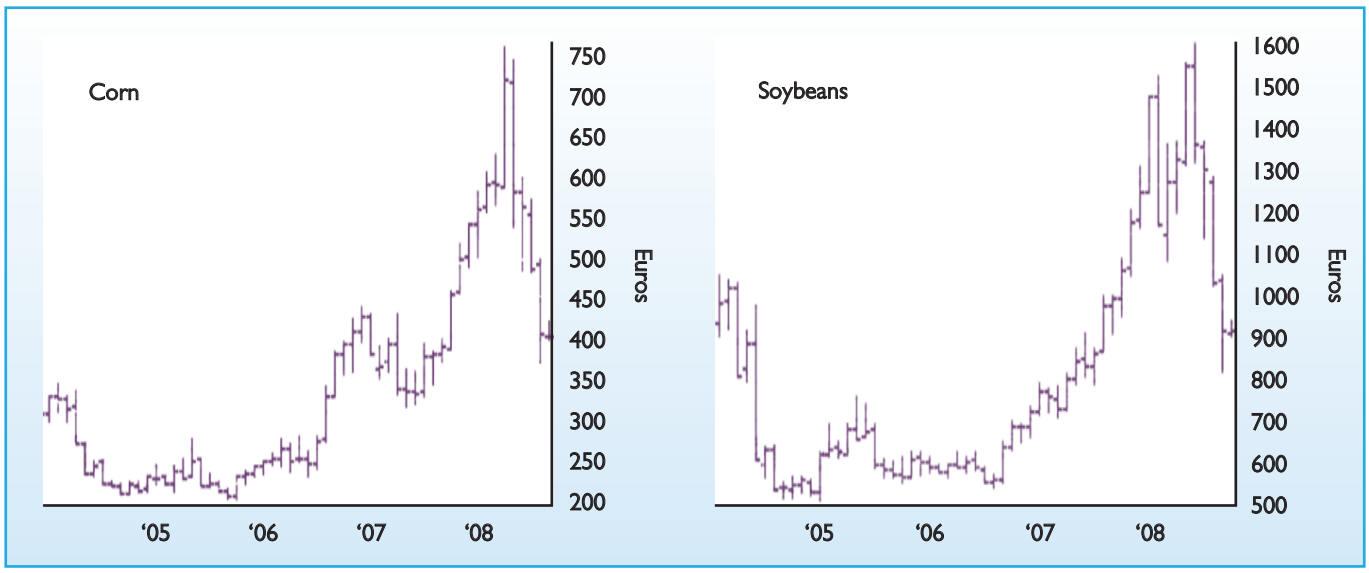
Fig. 1. Changes in corn and soybean meal price since 2005.



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the trial described, reducing balanced protein levels will reduce cost but also decreases margin due to lower biological performance.

1 When feed raw material prices increase it is tempting to control feed prices by reducing dietary nutrient density however consideration must be given to the negative effect on financial performance.

Nutritional response data

From the trial data given above it is clear that significant reductions in balanced protein density will have a negative impact on biological and financial performance. However, in order to properly assess the implications of altering nutrient density, there is a need to consider the implications of other nutrients on flock performance using a more significant database.

Aviagen have developed an economic calculator (Broiler Economics – Energy and Protein, BEEP) which takes into account nutritional trial data from around the world.

The nutritional response data includes that from trials examining both energy and balanced protein.

BEEP is a directional tool rather than an exact nutrient density solution; it provides a guideline as to what nutrient density to feed given a certain set of circumstances.

Strain	Ross 308
Kill weight (kg)	2
Age (days)	37
Market	Live
Sex	As hatched
Feed texture	Pellets
Feed price (€)	230.00
Live bird price (€)	0.76
Average energy (kcals/kg)	3,180
Average lysine (% total)	1.10

Table 1. Input data from the Central European Region (data April/May 2009).

What is BEEP?

Global trials data which deal with different nutrients and different broiler products provide the basis of the model. The calculator allows the user to select different trials data, feed costs and revenues which reflect the users' situation.

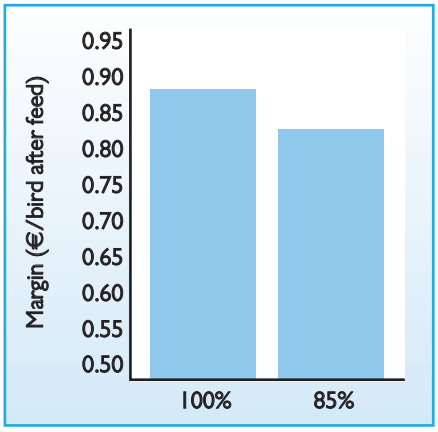
The user can then select different broiler weight categories, sample numbers for each category are provided allowing the user to identify the strength of data behind each chosen weight group. The calculator then performs a regression analysis on a number of traits. Fig. 4 shows the effect of energy and protein on FCR.

BEEP allows the nutritionist to appreciate the responses to different nutrient densities simultaneously. For the example given in Fig. 4, the effect of different levels of lysine can be explored over a number of different energy densities. FCR can be seen to deteriorate as lysine level decreases, this effect is seen across all energy levels, however the response to reduced lysine is greater at lower energy densities.

Economic calculations

BEEP can also be used to investigate different economic scenarios.

Fig. 3. The effect of balanced protein level (nutrient density) on margin (€/bird) of male broilers at 41 days of age.



	Predicted (predicted from 'actual' current nutrient density)	Optimal (the calculated nutrient density for best financial performance)	Difference (%)
Digestible lysine (%)	1.1	1.06	-4
Energy (kcals/kg)	3,180	2,900	-9
Estimated margin over feed cost (€/bird)	0.57	0.61	+7

Table 2. Comparison of predicted ('actual') and optimal solutions: Live bird scenario.

An example using inputs from the Central European region is given in Table 1. The calculator predicts the 'actual' broiler performance based on the current nutrient density and then calculates the nutrient density which attains optimal financial performance.

Table 1 shows the input data and Table 2 shows the predicted performance versus optimal solution for a Central European situation.

The calculator suggests a digestible lysine level of 1.06% and energy density of 2900kcals/kg for optimal economic performance (Table 2).

This optimal nutrient density is very different to the actual nutrient density fed, a 4% reduction in lysine and 9% reduction in energy density, however the calculator estimates an increase in margin over feed cost from 0.567 to 0.607 (€/bird).

This optimal solution is only an example, any change to nutrient density must be evaluated in the field, especially lower density regimes, as feed consumption and FCR are likely to be affected.

The optimal solution for a portions scenario were also investigated. Table 3 shows the inputs for a central European situation where all products are processed.

In this scenario the calculator gives a very different outcome to the first scenario. The calculator estimates that the optimal margin is 4.5% more when 18% more lysine is fed and 10% less energy is fed than actual (Table 4).

The key points are:

1 The BEEP calculator provides guidance as to what nutrient density should be fed and highlights the need to review nutrient specifications in different situations.

1 In the example of the live bird situation (Table 2) feeding a slightly lower amino acid density with a significantly lower energy density compared to Ross recommendations appears optimal. For a portions situation (Table 4) feeding significantly higher amino acid density and lower energy than the Ross recommendations will produce a higher margin.

1 In the two Central European examples shown, both scenarios suggest feeding significantly lower energy density will provide higher margins. The BEEP calculator is only a directional tool and it is essential that any change in nutrient density must be properly evaluated before being implemented. ■

	Predicted (predicted from 'actual' current nutrient density)	Optimal (the calculated nutrient density for best financial performance)	Difference (%)
Digestible lysine (%)	1.1	1.3	+18
Energy (kcals/kg)	3,180	2,848	-10
Estimated margin over feed cost (€/bird)	4.85	5.07	+4.5

Table 4. Comparison of predicted ('actual') and optimal solutions: Portions scenario.

Strain	Ross 308
Kill weight (kg)	2
Age (days)	37
Market	Live
Sex	As hatched
Feed texture	Pellets
Feed price (€)	230.00
Breast price (€)	5.00
Wing price (€)	2.18
Drum price (€)	2.73
Thigh price (€)	2.73
Offal price (€)	2.36
Average energy (kcals/kg)	3,180
Average lysine (% total)	1.10

Table 3. Input data from the Central European Region (data April/May 2009).

Fig. 4. FCR as a function of lysine and energy.