Maximising performance with amino acids

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Different levels of amino acid fortification in broiler diets can have a great impact on bird growth, breast yield and profitability.

Because of this, Novus International Inc recently conducted studies not only on how amino acid density affects broilers, but also on broiler nutritional strategies around the world.

Research conducted between 2001 and 2004 confirms the benefits of increasing amino acid density in broiler diets under a wide variety of conditions, as well as identified opportunities for improving animal performance and profitability of poultry operations.

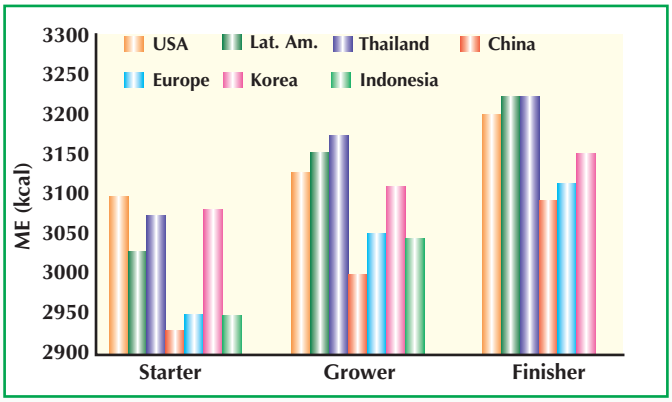

Fig. 1. High metabolisable energy for <2.25kg birds in the USA, Latin America and Thailand.

Nutritional strategy survey

In May 2004, Novus International Inc began conducting a comprehensive study to assess nutritional strategies implemented by leading broiler producers around the world.

The survey attempted to reflect the different production environments and market conditions as well as to identify opportunities for optimising nutrition for improving animal performance and profitability.

Data were collected between May and July 2004. Some 62 companies/complexes in 14 countries were surveyed. The companies were categorised in three different processing weight classes: less than 2.25kg, between 2.25 and 3.00kg and over 3.00kg. Weighted averages for nutritional profiles were calculated for each country by processing weight.

The survey showed three very different energy strategies currently applied. The United States, Latin America, Korea and Thailand feed much higher energy levels compared to those in Europe and Indonesia, while China fed the lowest energy levels of all regions. In terms of amino acids, Europe feeds the highest levels, while the United States feeding strategy has improved significantly as a result of a shift away from the so called 'strip down diets' that employed reduced nutrient density to minimise feed cost per ton. Total sulphur amino acid levels fed in Latin America, Thailand and China are low particularly in the grower and finisher periods.

It is estimated that increasing dietary density would result in significant performance increases, which could be beneficial to feed and livestock producers in these areas depending on market conditions (Figs. 1-3).

Table 1. Average nutrient specifications.

NUTRIENTS	STANDARD	HIGH DENSITY
Starter		
ME (kcal/kg)	3058	3083
CP (%)	21.1	23.2
Dig Lys (%)	1.05	1.18
Dig TSAA (%)	0.80	0.87
Grower		
ME (kcal/kg)	3128	3145
CP (%)	19.7	21.1
Dig Lys (%)	0.97	1.07
Dig TSAA (%)	0.75	0.82
Finisher		
ME (kcal/kg)	3176	3191
CP (%)	17.8	19.0
Dig Lys (%)	0.86	0.94
Dig TSAA (%)	0.67	0.72
Withdraw		
ME (kcal/kg)	3222	3237
CP (%)	16.8	17.5
Dig Lys (%)	0.79	0.85
Dig TSAA (%)	0.62	0.68

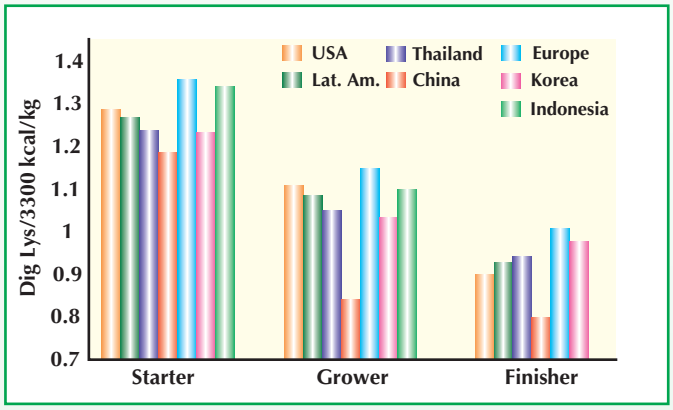

Fig. 2. Energy adjusted digestible lysine levels for <2.25kg birds is higher in Europe.

Better financial returns

Since 2001 Novus has conducted several studies to assess the impact of different amino acid strategies on broiler growth, breast yield and profitability of different breed crosses and genders.

Feeding high amino acid density resulted in improvements in all parameters measured.

Positive financial results were confirmed even under scenarios with different meat and raw material prices.

The experiments conducted by Novus consisted of six floor pen studies between 2001 and 2004. The studies utilised both multipurpose and high yielding broiler strains.

The experiments were designed to test the effect of diet, breed and/or sex on performance and carcase quality of broilers raised in floor pens.

Birds were allowed to consume ad libitum, diets representing either standard or high amino acid density levels during the starter, grower, finisher and withdrawal periods. Pelleted diets were fed in all phases except the starter in which crumbled diets were used.

Production parameters of economic importance, such as weight gain, feed conversion, carcase and breast yield, followed a quadratic response to graded levels of dietary essential amino acids.

Consequently, increasing amino acid density in broiler diets also affected total revenues per bird in a quadratic manner. However, graded levels of limiting amino acids influenced these parameters differently.

The effect of amino acid density

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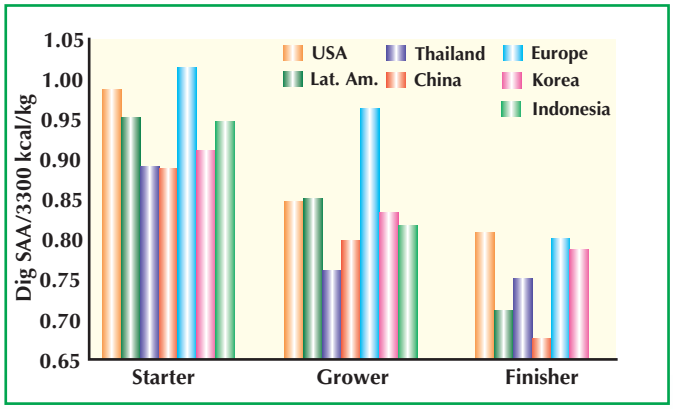

Fig. 3. Opportunity to increase energy adjusted digestible SAA for <2.25kg birds in grower and finisher diets.

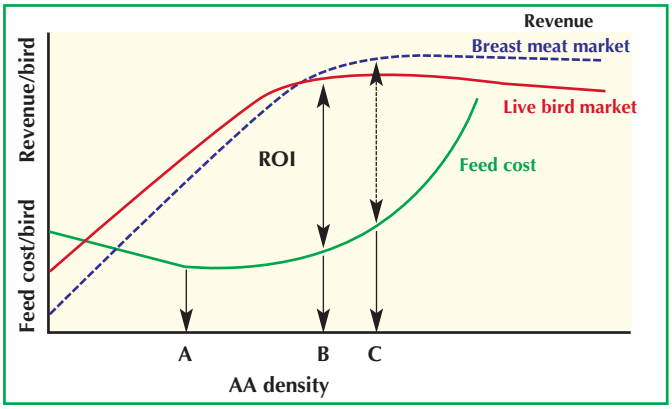

Fig. 4. Maximum ROI (B and C) normally occurs at a great diet AA density than the AA density at lower feed cost (A) (Adapted from Ruud Eits, 2004).

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on total revenue may depend on the way the birds are marketed – total revenues tend to increase further as a function of amino acid density when birds are sold for breast meat versus being sold as live birds (Fig. 4).

Optimum dietary density

Amino acids should be fed at a level such that maximum gross margin is attained. While increasing amino acid density in broiler diets increases feed costs, it also improves weight gain, feed conversion and breast yield.

The optimum dietary amino acid density should target maximum return over investment (ROI) rather than minimum feed costs.

Carcase characteristics, feed intake and body weight of modern genetic lines are rapidly changing, influenced by demanding genetic selection programmes.

This may affect the nutrient requirements of modern broilers over time and their response to dietary amino acid density.

Requirements for amino acids may also differ between male and female birds and between high yield and multi-purpose broiler strains. Age may also affect the relative response of birds to dietary amino acid density since amino acid requirements tend to decrease with age.

Finally, it is important to realise that other non-breed specific factors, such as disease and environmental stress, may affect the magnitude of the expected performance response to programmes with increased nutrient density.

The role of these factors on the response of birds to changes in amino acid density, volatile prices of feed ingredients costs and constant changes in prices paid to producers for their products complicates the assessment of optimal dietary programmes in commercial operations. From the results of these studies, a calculator was developed aimed at testing the economic feasibility of feeding high amino acid diets under various scenarios, wherein costs of key ingredients and prices paid to producers for live birds and breast meat could be entered.

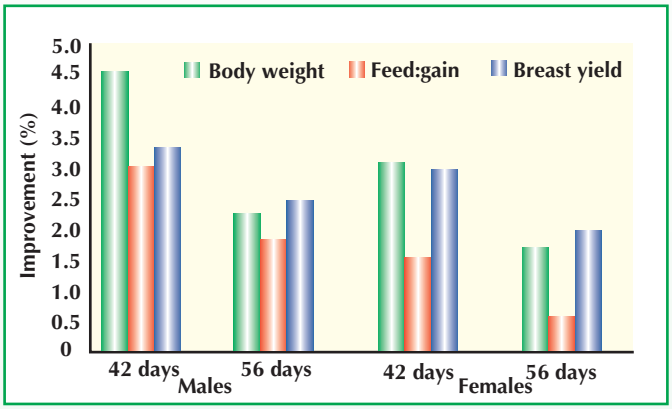

Fig. 5. Average performance improvement at 42 and 56 days after feeding high AA density diets.

Using the composition of experimental diets and the corresponding feed consumption from all treatments in all experiments, the cost of feeding can be calculated.

Likewise, using the data for live weight and breast yield obtained from each study, the economic return of feeding standard or high density diets can be assessed when birds are sold as live birds or for carcase cuts (Figs. 5-7).

Under all scenarios tested, increasing amino acid density improved return over investment even with expensive raw materials and cheap meat prices.

Obviously this result may change depending on input cost and expected performance output.

Significant inputs

However, it is important to highlight that this assessment considered only the most significant inputs of feeding costs and changes in performance.

Other inputs such as chick cost, length of cycle, etc were not considered for these calculations.

In general, increasing amino acid density resulted in improvements in bird weight, feed conversion ratio and breast yield which improved the return over investment.

Returns ranged from US$60-160k in the best case scenarios to US$5-65k for the less favourable cost scenarios per million birds.

In addition, these benefits were greater for males than females and for 42 day old birds than 56 day old birds. n

Fig. 6. Best case ROI scenario – high AA density diets, cheap ingredients and high poultry prices.

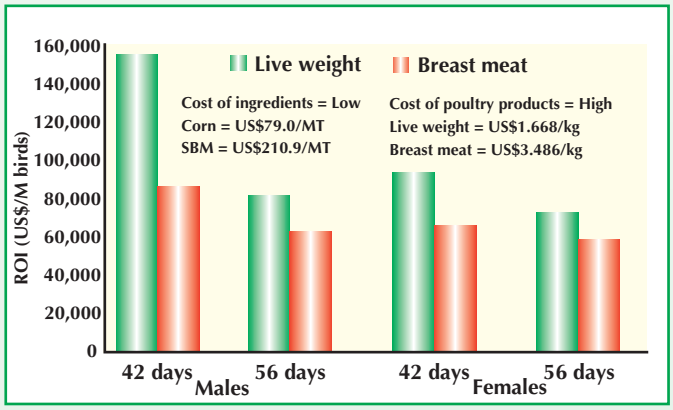

Fig. 7. Positive ROI with high AA density diets, expensive ingredients and low poultry prices.