

# Feeding protein for profit and not for cost

**Broiler growers must feed their birds efficiently by providing the optimum amount of nutrients. To maximize margins, birds should be fed protein levels according to whether the business is set up to sell live birds, eviscerated carcasses or portions.**

By Wiebe van der Sluis

Continued genetic improvements in broiler growth, efficiency and body composition demand a continuous review of the bird's nutrient levels. It is widely accepted that the choice of dietary protein level is an economic decision made by each individual feed manufacturer. Most of these decisions are made on the basis of least cost formulation, irrespective what effect it will have on the physical development of the bird. There is also little or no flexibility for growers to change the feed composition or to adjust it to the specific requirements of that particular flock. So far this strategy worked well, but as margins become smaller the need to optimise growth in economical terms becomes more important.

Many factors influence the choice of an optimum protein level and a lot of information is needed to calculate that.

However most of this is readily available in modern broiler companies, while the use of computers enables the complexity to be managed on a day-to-day basis. Broiler companies publish recommendations for nutrient density for diets fed to broilers in the starter, grower and finisher period. They also warn that the nutrient levels may need to be adjusted to local conditions to maximise profitability.

## The protein calculator

During 2002-2004, UK based Aviagen breeding company carried out many experiments to develop a method that would allow them to calculate the optimum digestible amino acid levels in feeds for their broilers. They designed a calculator that integrates local raw material prices and product values with an understanding of how their Ross broilers respond, and explores the appropriate levels of dietary protein for broilers under local conditions.



**To maximise profit, feeding birds for whole carcass production may require a different protein level in their diets compared to birds for portioning.**

In their experiments Aviagen nutritionists defined protein by the level of digestible lysine with other essential amino acids maintained at a minimum level relative to lysine – the so-called ideal amino acid ratio. They call this balanced protein and the units used are percent or g/kg digestible lysine. With synthetic lysine, methionine and threonine available it is generally possible to formulate feed with these amino acids in exactly the intended ratios. The level of one additional amino acid can also be exactly controlled by variations in crude

protein level. Other essential amino acids are provided at levels in excess of the defined ratios to lysine.

The unique and valuable part of the Aviagen protein calculator is the data set of 64 different responses including feed conversion, liveability, eviscerated carcass, breast, drum and thigh meat yields and abdominal fat levels.

## Optimum protein level

The calculation of an optimum balanced protein level involves four steps (*Figure 1*),

**Table 1 - Feed recommendation for as-hatched broilers grown to 2.3-2.5 kg live weight at 42-45 days (Ross 308)**

		Starter	Grower	Finisher
Age Fed	days	0-10	11-28	29-slaughter
Energy	Kcals	3010	3175	3225
Digestible Lysine	%	1.27	1.08	0.88

summarising the outputs and inputs. Various pieces of information will be needed to use the calculator to explore the dietary amino acid level, which will maximise profitability. Firstly, feed prices will need to be calculated for each range of diets, from 70% to 130% of manual protein level (levels of all other nutrients left unchanged). Diets should be formulated on the basis of true faecal amino acid digestibilities, using the ideal amino acid profile given in the broiler manual. The revenue prices for live birds, eviscerated carcass and carcass portions will also be needed, depending on the objective of the broiler growing business under examination. For example breast fillet prices will not be of any relevance to a grower that is selling all its birds on the basis of live weight or whole eviscerated carcass. Fixed costs for growing and processing the birds are useful in generating realistic values. The calculator can then be used to calculate the margin at the farm gate (live, whole birds), after primary processing (eviscerated carcasses) and after secondary processing (portions or deboned meat).

### Various scenarios

The Aviagen balanced protein calculator runs of an Excel spreadsheet. Margins are calculated for broilers at target weights of 1.7, 2, 2.5 or 3 kg, and all the biological response data are based on fixed feed programs for starter, grower and finisher diets, with energy levels as recommended in the Ross broiler manual (Table 1). Other management issues, which might have an impact on financial weights, for example stocking density or house temperature, are not taken into account in this calculator.

Typical feed costs, live bird values and portion values show that the amount of dietary protein needed to maximise the profitability of the business varies depending upon whether the business is set to sell live birds, eviscerated carcasses or portions. To maximise profitability on live bird sales, a protein level equivalent to 100% of the manual was required; eviscerated bird margins were maximised at 106% and portioned bird margins at 120% of the manual recommendations.

### Lower costs may decrease profit

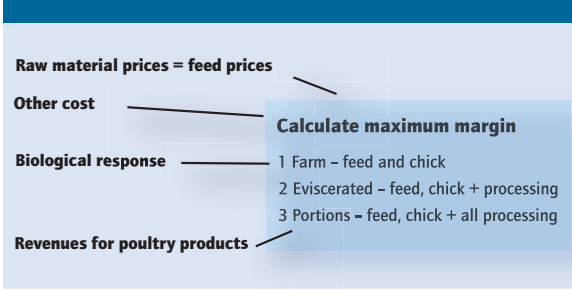
Alternative scenarios, examined for the same cost/revenue base, established some interesting points of principle. If for some reason the target kill weight is increased, the maximum margin for live bird production remains unchanged at a protein level of 100% of the manual. The margins for eviscerated carcasses and portioned birds however be maximised at a higher protein level as the target weight increases. Conversely, if feed prices increase across the range of nutrients, then the optimal amino density is unchanged for all products. Overall margins will of course be lower, but trying to reduce feed cost by lowering nutrient density will make the

losses worse.

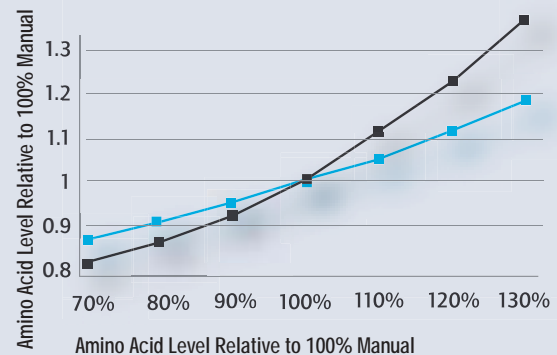
The situation changes if the marginal cost of balanced protein increases, as shown in Figure 2. This situation is likely to arise if the price of any of the protein raw materials increases, especially if the possible alternatives are limited. In this case, moving from 100% to 110% of the manual, which used to increase the diet cost by 5%, now increases diet costs by 10%. Under this situation, the optimal level of amino acids will be lower.

With this calculator companies can adjust the balanced protein content of the feed, and hence its cost, according to different market conditions. Although the key elements of the calculator are based on the bio-response data for male and female Ross 308 broilers, it shows how important it is to make the calculations and not easily think that saving on protein costs will automatically increase margins: the opposite can often be more true. ■

**Figure 1 - Schematic for calculating balanced protein levels to maximise profitability of broiler production**



**Figure 2 - Relative feed price changes - Current compared to Increased**



## A case study

A case study examined the optimal amino acid densities in different parts of Europe. The countries were chosen to have different target weights, different final products and different relative protein costs. Under existing market conditions the results of the study showed a range of optimal protein levels for live bird production from 104% of the Aviagen manual to 92% of that manual (Table 2).

**Table 2 - Optimal amino acid level for different regions of Europe (relative to Aviagen manual)**

	United Kingdom		Netherlands		Russia	
Kill weight (kg)	2.5		1.7		2.0	
Protein raw material cost	High		Low		Intermediate	
	Males	Females	Males	Females	Males	Females
Farm	100	99	104	104	97	92
Eviscerated	112	103	104	102	98	94
Portioned	122	117	110	110	103	103

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