Quantitative input-output approach to feed formulating for broilers Jata

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The biological features of modern broiler hybrids are well known and are published by all breeding companies involved in the poultry industry. Information about top performance of broiler flocks is usually available as shown in **Table 1**.

Table 1: Performance characteristics of modern broiler hybrid (as hatched)

Age (days)	Live weight (gms)	Feed/Gain	Mortality (%)
42	1,725	1.90	3.0

Source : Summers J. and Lesson S., 1985.- *Poultry Nutrition Handbook.*

This kind of table does not provide information about the inputs which enable this kind of performance to be achieved.

The aim of this report is to highlight the role of feed as a flexible input element which represents the major cost item for all types of domestic poultry and thus highly influences the performance and economics of poultry meat production.

The performance characteristics shown in **Table 1** could be achieved by high energy and high protein feed with the basic characteristics shown in **Table 2**. Feed with such characteristics is usually formulated on maize and soyabean meal base with the addition of fat or oil. In industrial countries it is usually steam treated and fed as pellets or crumbs.

In certain situations, this kind of feed can be very expensive and, due to import restraints on some ingredients, even technically unsuitable and impossible. Despite the good performance that it enables, its economic impact is not as high as one would expect.

It is more and more obvious that the price of feed should be incorporated as a flexible element in the profit making equation instead of being treated as a constant.

The progress in evaluating the nutritive value and substitution possibilities made possible by using linear programming in computer formulating method, have emphasized the need for more elasticity in the feed formulating approach, the goal of which should be profit maximizing feed.

Different authors have established basic relationships between nutrient concentration and appropriate balance in feed and birds' responses in performance. High concentration of nutrients leads to better performance in the sense of increasing growth rate and low feed gain ratio. But achieving this high concentration of nutrients results in high costs per unit of feed. Lowering the nutrient concentration in feed leads to lower growth rate and worse feed/gain ratio even in the range where some theories suppose

Table 2: Some basic characteristics of high energy, high protein feed commonly used in poultry meat production (per 1 kg of feed)

	FEED	
	Starter	Finisher
Period (days)	**0 - 21**	**22 - 42**
Metabolisable Energy (MJ/kg)	13.4 (3,200 kcal)	13,4 (3,200 kcal)
Crude protein (%)	23	20
Lysine (%)	1.20	1.00
Methionine (%)	0.50	0.38
Meth.. + Cystine (%)	0.93	0.73
Tryptophan (%)	0.23	0.20

(NCR, 1977).

intake compensation. Thus low nutrient concentration in feed means low feed costs but, on the other hand, additional costs in prolonged growing periods and worse feed/gain ratios.

With vitamins and microminerals, producers cannot risk any quantitative variations. In feed formulae they are treated as a constant input with no reference to cost. This is not the case for proteins (including amino acids) and energy concentration. These two input elements highly influence feed costs and birds' performance. They are also easily varied in terms of concentration and ratio. Because of their importance it is essential to determine birds' response in performance to varying energy and protein concentration in feed.

The optimal solution for profit maximization surely lies in the range of all possible biologial combinations of these two input elements. But reasonable range borders must be imposed for the physiological well-being of the birds and technological restraints, such as minimum and maximum live weight and carcass quality. This flexible approach demands exact predictions about the responses of birds when fed in different ways.

Accepting this kind of view on good or bad feed formulating results *per se*, without knowing the feed characteristics with which they are achieved, is of little importance. Good results are those with maximum economic yield.

In our breeding company, we have decided to start broad testing procedures in order to estimate input/output coefficents which will enable our partners to predict the responses of JATA broilers when fed different diets.

Our partners can now get incomplete but simple information about JATA broilers' response to feeds with different nutrient concentration.

Feeding programmes on four concentration levels (**Table 3**) with fixed energy-protein ratio have been designed and birds' responses estimated. The results have been tested with the commercial flocks and for our contract growers, represent the obligations which are shown in **Table 4**.

Even this incomplete information helps our partners to treat performance as a function of feed costs and find their best economic solution.

Table 3: Feed characteristics of four different feeding programes

		FEED		
		Starter	Grower	Withdrawal
Concentr. Level	Period (days)	0 - 14	15 - 42	Last five days
1	AME (MJ, kcal) CP (%) AME / CP Lys (%) Met (%)	13.4 (3,200) 22.5 0.6 (142) 1.28 0.57	13.4 (3,200) 20.5 0.65 (156) 1.00 0.43	13.4 (3,200) 18.5 0.72 (173) 0.96 0.41
2	AME (MJ, kcal) CP (%) AME / CP Lys (%) Met (%)	13.0 (3,100) 21.8 0.6 (142) 1.24 0.55	13.0 (3,100) 19.9 0.65 (156) 0.97 0.41	13.0 (3,100) 17.9 0.72 (173) 0.93 0.39
3	AME (MJ, kcal) CP (%) AME / CP Lys (%) Met (%)	12.5 (3,000) 21.1 0.6 (142) 1.20 0.53	12.5 (3,000) 19.3 0.65 (156) 0.94 0.40	12.5 (3,000) 17.3 0.72 (173) 0.90 0.38
4	AME (MJ, kcal) CP (%) AME / CP Lys (%) Met (%)	12.1 (2,900) 20.4 0.6 (142) 1.16 0.51	12.1 (2,900) 18.6 0.65 (156) 0.93 0.39	12.1 (2,900) 16.8 0.72 (173) 0.87 0.37

Table 4: Estimations of broiler's performance responses to different feed concentration levels (fixed energy-protein ratio)

Concentration level	Live weight (gms)	Feed/Gain	Age (days)
1	2,020	2.02	47
2	2,020	2.14	48.5
3	2,020	2.25	50
4	2,020	2.40	51