

COMMUNICATION (II)

The Use of "Pruteen"¹ in Broiler Diets

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RINGKASAN

Satu kajian yang melibatkan 1,200 ekor ayam telah dijalankan untuk membandingkan prestasi burung daripada kumpulan yang diberi makanan "pruteen-based" dengan burung daripada kumpulan yang diberi makanan "commercial". Nilai-nilai min bagi pengambilan makanan, kenaikan berat dan nisbah pertukaran makanan seekor ayam dalam kumpulan "pruteen-based" ialah 4673.8 g, 2172.3 g dan 2.15, manakala nilai-nilai min bagi parameter tersebut untuk kumpulan "commercial" ialah 4832.5 g, 2151.8 g dan 2.25 masing-masing.

Ayam daripada kumpulan "pruteen-based" telah memakan kurang makanan dan mendapat nisbah pertukaran makanan ($P < 0.05$) yang lebih baik. Ayam daripada kumpulan "pruteen-based" mendapat nilai kenaikan berat seekor ayam sebanyak 20.5 g lebih dari kumpulan "commercial" tetapi perbezaan ini tidak significant. Peratus kematian sebanyak 4.5% dan 3.8% daripada kumpulan "pruteen-based" dan kumpulan "commercial" adalah dianggap normal. Didapati kos makanan seekor ayam daripada kumpulan "pruteen-based" adalah kurang sebanyak \$0.0878 daripada kumpulan "commercial".

SUMMARY

A study, involving 1,200 birds, was conducted to compare the performance of birds fed pruteen-based and commercial diets. The mean individual feed intake, weight gain and feed conversion ratio (F.C.R.) of birds fed the pruteen-based diet were 4673.8 g, 2172.3 g and 2.15 respectively, whereas in those fed the commercial diet they were 4832.5 g, 2151.8 g and 2.25 respectively. Birds fed the pruteen-based diet consumed significantly less feed and had better F.C.R. ($P < 0.05$). However the difference of 20.5 g in weight gain/bird in favour of the pruteen-based diet was not found to be significant. Mortality figures of 4.5% and 3.8% respectively of birds fed pruteen-based and commercial diets were considered normal. There was a difference of \$0.0878 in the feed cost/bird in favour of the pruteen-based diet.

INTRODUCTION

"Pruteen", a cream coloured and odourless powder, is a highly concentrated and digestible source of nutrients suitable to be included in the diets for farm animals. It is produced from single-cell living organisms called *Methylophilus methylo-trophus* which is reputed to grow well when it is provided with methanol, ammonia and compressed air. As shown in Table 1, "pruteen" has high crude protein, true protein and fat values, all of which indicate a high digestibility of 93% (I.C.I., 1981).

The objectives of the study were to determine whether "pruteen" could be incorporated into

broiler diets; and to compare the performance of birds fed pruteen-based and commercial diets.

MATERIALS AND METHODS

A completely randomized design as described by Steel and Torrie (1960) was used in this experiment. A total of 1200 day-old birds (Isa Vedette) were assigned to two treatments with each treatment having 12 replicates. Each replicate consisted therefore of 50 birds, which were kept in a cage measuring $1.82 \times 4.88 \times 0.76$ metres.

The two treatments were designated pruteen-based diet and commercial diet respectively. The pruteen-based diet consisted of a farm-mixed

¹ A registered trademark of Imperial Chemical Industries Limited.

TABLE 1
Chemical Composition of Pruteen-powder

Constituent	%
Moisture	8.0
Crude Protein	71.2
True Protein	51.7
Fat	13.2
Ash	7.9
Crude Fibre	1.0
Calcium	0.07
Available Phosphorus	2.3
Amino Acids:	
Lysine	4.4
Methionine	1.7
Cystine	0.5
Threonine	3.4
Tryptophan	1.0
Energy:	
ME (kcal/kg)	3610
Digestibility:	
crude protein (%)	93
true protein (%)	93
fat (%)	93
Availability:	
lysine (%)	93
Phosphorous (%)	100
Iron	Low

ration in which 3% pruteen was added. The commercial diet was obtained from a reputable feedmill and no "pruteen" was added to it. The calculated analyses of pruteen-based and commercial diets are shown in Table 2.

Out of the 50 birds from each replicate, 10 birds were chosen at random and weighed on the 14th, 35th, 49th and 63th day of the experiment. Feed consumption data were recorded at weekly intervals up to nine weeks. Mortality of birds was also recorded during the nine-week period so as to adjust the amount of feed consumed per period. The birds were also vaccinated against Ranikhet and Fowlpox according to the recommended vaccination programme. Feed and water were available to the birds *ad libitum*.

RESULTS AND DISCUSSION

As indicated in Table 3, chicks from the pruteen-based group consistently consumed less feed per period compared to those given commercial feed. From 0 to 9 weeks, the mean feed consumption per bird from the pruteen-based group was 4673.8 g of feed whereas the commercial group consumed 4832.5 g. This difference of 158.7 g was significant at the 5% level.

During the periods from 0 to 2 weeks and 2 to 5 weeks the weight gain per bird from the pruteen-based group was lower than that from the commercial group. However, in the other two subsequent periods, from 5 to 7 weeks and 7 to 9 weeks, the birds from the pruteen-based group gained 17.5 g and 44.8 g respectively when compared to birds given commercial feed. For the

TABLE 2.
Calculated analyses of Pruteen-based and Commercial diets

	Pruteen-based		Commercial	
	Starter	Finisher	Starter	Finisher
Crude protein %	23.00	20.25	22.00	19.00
Fat %	5.62	3.75	5.00	5.00
Crude Fibre %	4.62	4.49	5.00	6.00
Calcium %	1.16	1.27	0.8-1.4	0.8-1.4
Available phosphorus %	0.50	0.50	0.7-1.1	0.7-1.1
ME, kcal/kg	3100	3077	3000	3000

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TABLE 3.
Mean values for feed intake, weight gain and feed conversion ratio per bird up to 9 weeks of age

	Feed Intake (g)		Wt. gain (g)		F.C.R.	
	Pruteen-based	Comm.	Pruteen-based	Comm.	Pruteen-based	Comm.
0-2 wks	276.3	316.1	177.3	208.8	1.56	1.52
2-5 wks	1322.8	1398.7	735.5	745.8	1.80	1.88
5-7 wks	1394.8	1442.7	688.1	670.6	2.04	2.17
7-9 wks	1679.8	1675.1	571.4	526.6	2.96	3.39
0-9 wks	4673.8 ^a ± 36.3	4832.5 ^b ± 32.6	2172.3 ^a ± 16.0	2151.8 ^a ± 33.5	2.15 ^a ± 0.02	2.25 ^b ± 0.03

^{a,b}Different letters in the same row, for each parameter, denote significance at the 5% level.

whole 9-week period there was a weight gain of 20.5 g per bird in favour of the pruteen-based group. However, this gain was not statistically significant at the 5% level.

With the exception of the period from 0 to 2 weeks, the pruteen-based feed exhibited a better feed efficiency than the commercial feed. Analysis of the overall data from 0 to 9 weeks indicated a significant difference of 0.10 in feed efficiency ($P < 0.05$) in favour of the pruteen-based group.

The number of birds that died during the different periods of the experiments are shown in Table 4. The percentage of birds that died in

TABLE 4.
Mortality figures per period in Pruteen-based and Commercial groups

	No. died in Pruteen-based group	No. died in Comm. group
0-2 wks	9	9
2-5 wks	11	8
5-7 wks	2	3
7-9 wks	5	3
Total	27 (4.5%)	23 (3.8%)

(At the start of the experiment there were 600 birds in each group)

the pruteen-based and commercial groups was 4.5% and 3.8% respectively. These mortality figures, however, are small enough to be considered as acceptable and normal in broiler rearing.

This experiment verified that birds from the pruteen-based group consumed less feed and gained more body weight which resulted in a better feed conversion ratio, in comparison to those which were on the commercial feed.

A total of 34 trials, varying from 41 to 56 days conducted in the United Kingdom, France, Holland, Belgium, Japan, West Germany and Iran, and involving 55,200 birds were reported to show a significant improved performance in live-weight gain and feed efficiency when 5 and 10% "pruteen" respectively was added to broiler diets. (I.C.I., 1981). However, in this study, we obtained a significantly better feed efficiency due to significantly lower feed intake when 3% "pruteen" was added to broiler diets. Although a higher level of "pruteen" could be incorporated in broiler diets, economic considerations have to be taken into account.

A price comparison between pruteen-based and commercial diets (Table 5) showed that, for birds from 0 to 5 weeks the commercial diet was more expensive by \$0.0256 per kg when compared to the pruteen-based diet. However, for birds from 5 to 9 weeks, the pruteen-based diet was shown to be more expensive by \$0.0206 per kg. The pruteen-based diet was essentially a farm-mixed ration in which labour cost and price of "pruteen" were

TABLE 5.
Price Comparison between Pruteen-based and Commercial Diets

	Pruteen-based	Commercial
For birds from 0 to 5 weeks:		
Price of 970 g feed (\$)	0.5636	—
Price of 30 g Pruteen (\$)	0.1014	—
Labour cost/kg feed (\$)	0.0200	—
Final price/kg feed (\$)	0.6850	0.7106
For birds from 5 to 9 weeks:		
Price of 970 g feed (\$)	0.5468	—
Price of 30 g Pruteen (\$)	0.1014	—
Labour cost/kg feed (\$)	0.0200	—
Final price/kg feed (\$)	0.6682	0.6476

TABLE 6.
Comparison of feed cost per bird between Pruteen-based feed and Commercial feed

	Pruteen-based			Commercial		
	feed intake (g)	price/kg (\$)	Cost (\$)	feed intake (g)	price/kg (\$)	Cost (\$)
0-2 wks	276.3	0.6850	0.1893	316.1	0.7106	0.2246
2-5 wks	1322.8	0.6850	0.9061	1398.7	0.7106	0.9939
5-7 wks	1394.8	0.6682	0.9320	1442.7	0.6476	0.9343
7-9 wks	1679.8	0.6682	1.1224	1675.1	0.6476	1.0848
			3.1498			3.2376

accounted for. The price of the commercial diet was based on the tender price. Based on these criteria, the computation of feed cost per bird was calculated from the data on feed intake from the pruteen-based and commercial groups respectively. As shown in Table 6, the feed cost per bird in the pruteen-based and commercial groups was \$3.1498 and \$3.2376 respectively. The difference of \$0.0878 per bird is in favour of the pruteen-based diet.

Oh *et al.*, (1978) reported that maximum profit could be realized by poultry farmers using farm-mixed rations. In this study it is demonstrated that farm-mixed ration, in which 3% "pruteen"

was added to broiler diets, could be used successfully. A saving of \$0.0878 per bird in feed cost is a definite economic advantage when large scale broiler farmers use a farm-mixed ration.

From this study it is concluded that 3% "pruteen" can be used in broiler diets to improve the performance of broilers.

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(Received 24 May 1983)