

BIOAVAILABILITY OF METABOLIZABLE ENERGY THROUGH KEMZYME SUPPLEMENTATION IN BROILER RATIONS

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ABSTRACT

This project was planned to study the bioavailability of metabolizable energy through enzyme (kemzyme) supplementation in broiler rations. One hundred and fifty day-old broiler chicks were randomly distributed into 15 pens, with 10 chicks per pen. Five isonitrogenous starter and finisher rations (A, B, C, D and E) were formulated such that rations A and F contained 3200 KCal/kg energy, B and C contained 3000 KCal/kg, while rations D and E contained 2800 KCal/kg energy each. Ration A served as control ration. Kemzyme was added only in rations C and E @ 0.5 kg/ton of feed. Performance of birds in terms of weekly weight gain, feed consumption, and feed conversion ratio (FCR) of each treatment was recorded. The results indicated that higher levels of energy (3200 and 3000 KCal/kg) with kemzyme produced better weight gain and FCR as compared to rations containing low energy levels without kemzyme.

Key words: Bioavailability, metabolizable energy, kemzyme, broilers.

INTRODUCTION

Wheat is the cereal which is available to feed industry as an alternative to corn and is used when corn is too expensive and in short supply. However, the rate of inclusion of wheat into rations is limited to certain extent due to the presence of complex non-starch polysaccharides (NSP). Major NSP are pentosans and β -glucan which possess chemical cross linking (phenolic coupling, ester bond and calcium ion bridges) between them and, therefore, are not well digested by poultry (Adams and Pough, 1993). Due to their physical properties (viscosity, surface activity and water holding capabilities), they block the digestive enzyme efficiency in the gut and reduce the absorption of nutrients (Graham *et al.*, 1993). These pentosans greatly increase the water intake by the birds which lead to wet droppings (Dunn, 1996).

Dietary inclusion of enzymes to broiler diets having wheat can improve feed digestibility and nutrients absorption by reducing the foregut digesta viscosity and breaking the bonds between NSP and thus releasing the blocked energy (Zhang *et al.*, 2001). Kemzyme is a stabilized multienzyme product which helps in better utilization of feed and better performance of birds. The present experiment was conducted to determine the effect of kemzyme on the

bioavailability of metabolizable energy from wheat-based diets in broilers.

MATERIALS AND METHODS

One hundred and fifty day-old broiler (Hubbard) chicks were randomly divided into 15 experimental units of ten chicks each. The birds were kept in clean, white washed and properly disinfected shed. The chicks were reared on the deep litter system, using dry saw dust (soft wood) throughout the experimental period (6 weeks). Brooding temperature was maintained at 95°F for first week and then the temperature was decreased by 5°F each week upto 4 weeks of age. Thereafter, it was maintained at 75°F throughout the experimental period. Five isonitrogenous (23% crude protein) starter rations were formulated such that ration A contained 3200, rations B and C contained 3000 and rations D and E contained 2800 KCal/kg energy. The ration A served as control and contained 40% wheat in the total ration as it is conventionally commercially used. Kemzyme (Kemin Europa, NV, Belgium) was added in rations C and E only as per recommendation of manufactures (0.5 kg/ton of feed). Accordingly, five corresponding broiler finisher rations were formulated with the same energy but 20% crude protein. Composition of broiler starter and finisher rations is given in Table 1.

Table 1: Composition (%) of broiler starter and finisher rations

Ingredients	Starter rations					Finisher rations				
	A	B	C	D	E	A	B	C	D	E
Maize	40	3	3	3	3	40	5	5	5	5
Wheat	6	50	50	50	50	10	50	50	50	50
Rice broken	6	3	3	3	3	6	5	5	5	5
Rice polishing	3	3	3	4	4	7	7	7	7	7
Wheat bran	0	0	0	0	0	0	0	0	2	2
Cotton seed meal	7	5	5	7	7	7	4	4	4	4
Corn gluten meal (30%)	0	0	0	0	0	0	0	0	2	2
Corn gluten meal (60%)	6	5	5	5	5	2	2	2	2	2
Soybean meal	14	13	13	11	11	10	9	9	8	8
Fish meal	6	6	6	6	6	6	6	6	6	6
Blood meal	5	5	5	5	5	5	5	5	5	5
Soy oil	4	3	3	0	0	4	3	3	0	0
Molasses	0	1	1	3	3	1	2	2	2	2
DCP	1	1	1	1	1	1	1	1	1	1
Limestone	1	1	1	1	1	0	0	0	0	0
Vitamin mineral premix	1	1	0.95	1	0.95	1	1	0.95	1	0.95
Kemzyme	0	0	0.05	0	0.05	0	0	0.05	0	0.05
Total	100	100	100	100	100	100	100	100	100	100

Each experimental ration was allotted to three experimental units at random. Broiler starter rations were given from 1 to 28 days, while finisher rations were fed from 29 to 42 days *ad libitum*. Fresh and clean water and 24 hour light were made available throughout the experimental period. Chicks were weighed at the end of each week. A measured amount of feed was offered to each experimental unit and residual feed was weighed at the end of each week. From this data average weight gain, feed consumption and feed conversion ratio per replicate per week were calculated. Data were subjected to statistical analysis using analysis of variance technique in completely randomized design. Means were compared by Duncan's multiple range test (Steel and Torrie, 1982).

RESULTS AND DISCUSSION

Weight gain

The values of average weight gain of chicks fed on rations A, B, C, D and E are given in Table 2. Maximum weight gain was observed in chicks fed on ration C (having 3000 KCal/kg energy plus kemzyme) and lowest weight gain was recorded in chicks fed on ration D (having 2800 KCal/kg energy without kemzyme), the difference was significant ($P < 0.05$). These results show that kemzyme supplementation enhanced the weight gain of the birds. Similar results

were also reported by Graham and Pettersson (1992) and Brenes *et al.* (2002), who reported that enzyme addition in wheat based rations significantly improved the weight gain of the birds.

Feed consumption

The highest amount of feed (3565 ± 5.94 g) was consumed by the chicks fed on ration A and the minimum amount (3345 ± 6.32 g) was consumed by those fed on ration E (Table 2), the difference was significant ($P < 0.05$). It was observed that the major source of variation in feed consumption was not due to energy levels of kemzyme supplementation but when kemzyme and different energy levels were studied together, they were correlated and caused the major source of variation. These results are in agreement with the findings of Bhat *et al.* (1991) and Zhang *et al.* (2000), who reported that response to enzyme supplementation for feed consumption was significant and energy X kemzyme interaction was the major source of variation.

Feed conversion ratio

Better feed utilization was noticed in the chicks fed on ration C, while the poorest FCR was noticed in ration D (Table 2). The data, when subjected to analysis of variance, showed significant ($P < 0.05$) difference in response of feed conversion ratio of chicks. These

Table 2: Mean values (\pm SEM) for weight gain, feed consumption and FCR of broilers fed different experimental rations

Parameters	Rations				
	A	B	C	D	E
Weight gain (g)	1850 \pm 10.31 ^a	1580 \pm 12.02 ^c	1863 \pm 11.94 ^a	1426 \pm 12.45 ^d	1614 \pm 10.12 ^b
Feed consumption (g)	3565 \pm 5.94 ^a	3389 \pm 6.21 ^b	3543 \pm 6.02 ^a	3406 \pm 6.07 ^b	3345 \pm 6.32 ^b
FCR	1.927 \pm 0.04 ^d	2.145 \pm 0.02 ^b	1.902 \pm 0.03 ^d	2.389 \pm 0.02 ^a	2.073 \pm 0.01 ^c

Means with different superscripts within the same row reflect significant differences among themselves ($P < 0.05$).

results are in line with the findings of Graham and Pettersson (1992), who observed significant improvement in feed efficiency of the birds fed enzyme supplemented diets.

The results of the present study confirm the previous findings that inclusion of kemzyme helped in better growth and FCR in broiler rations. Our traditional rations contain high levels of wheat which contains NSP that are not digested properly by broilers. However, inclusion of kemzyme in the wheat based diets helps to improve the feed digestibility and nutrient absorption by reducing the foregut digesta viscosity and breaking the bonds between NSP (Adams and Pough, 1993). Thus, from the present study it can be concluded that inclusion of kemzyme @ 0.5 kg/ton may be beneficial for the optimum broiler growth.

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