

The nutritive value of quality protein maize in the diets of broiler chickens

S. A. OSEI, C. C. ATUAHENE, D. B. OKAI, A. DONKOH & A. K. TUAH

Department of Animal Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

SUMMARY

Two experiments, each lasting 6 weeks, were conducted to evaluate quality protein maize (QPM) as a feed ingredient for broiler chickens. In Experiment 1, either normal hybrid maize (NM) or QPM was used as the sole source of protein and amino acids, and the diets were balanced for vitamins and minerals by the addition of a vitamin-mineral premix. These diets were compared with a balanced 21 per cent crude protein starter-finisher broiler diet. In Experiment 2, broiler chicks were fed combined starter-finisher diets of varying protein contents in which QPM replaced normal maize. The aim was to assess the potential for reducing dietary fishmeal incorporation as QPM replaced normal maize. In both experiments, feed and water were supplied *ad libitum*. The parameters measured included feed intake, growth rate, feed conversion efficiency, and carcass characteristics. The economics of broiler production was determined in Experiment 2. In Experiment 1, birds receiving QPM as the sole source of amino acids performed significantly better ($P < 0.05$) than their counterparts fed on normal maize. QPM-fed birds weighed an average 708.0 g each at the end of the trials compared with 532.0 g for those on normal maize. The corresponding feed efficiencies were 4.28 and 6.55, respectively. Compared with birds on the balanced diet, however, QPM was inadequate in supporting broiler growth. In Experiment 2, the use of QPM allowed the fishmeal to be reduced from 19.5 to 13.5 per cent without adversely affecting performance. It was cheaper to produce broilers using QPM than using normal maize.

RÉSUMÉ

OSEI, S. A., ATUAHENE, C. C., OKAI, D. B., DONKOH, A. & TUAH, A. K.: *La valeur nutritive du maïs ayant la qualité de protéine dans les régimes des poulets de chair*. Deux expériences, chacune durant 6 semaines se sont déroulées pour évaluer le maïs ayant la qualité de protéine (MQP) en tant qu'ingrédient de régime pour les poulets de chair. En expérience 1, soit le maïs normal (MN) soit MQP s'est servi comme la seule source de protéine et d'acides aminés et les régimes étaient équilibrés pour les vitamines et les minéraux par addition de pré-mix de vitamine-minérale. Ces régimes étaient comparés à 21 pour cent de protéine brute du régime d'hors-d'œuvre-apprêteur de poulet de chair. En expérience 2, les poussins de poulet de chair étaient nourris avec des régimes d'hors-d'œuvre-apprêteur combinés, ayant des contenus variables de protéine en quels MQP remplaçait le maïs normal. Le but était d'évaluer le potentiel pour réduire l'incorporation de guano de poisson diététique tandis que MQP remplaçait le maïs normal. Dans les deux expériences le régime et l'eau étaient fournis ad lib. Les paramètres mesurés comprenaient la consommation de régime, la proportion de croissance, l'efficacité de conversion de régime, et les caractéristiques de carcasse. Le côté économique de la production de poulet de chair était déterminée en expérience 2. En expérience 1, les volailles recevant MQP comme la seule source d'acides aminés avaient des résultats considérablement meilleurs ($P < 0.05$) que leurs contreparties nourries avec le maïs normal. Les volailles nourries de MQP pesaient une moyenne de 708.0g chacune à la fin de l'essai par rapport à 532.0g pour ceux nourries du maïs normal. Les efficacités correspondantes de régime étaient 4.28 et 6.55 respectivement. Comparé aux volailles nourries du régime équilibré, cependant, MQP se montrait inadéquat pour le soutien de la croissance de poulet de chair. En expérience 2, l'utilisation de MQP permettait au guano de poisson d'être réduit de 19.5 pour cent à 13.5 pour cent sans influant sur le résultat défavorablement. Il était moins cher à élever les poulets de chair en utilisant MQP qu'en utilisant le maïs normal.

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TABLE 4
Performance of Chicks in Experiment 1

Parameter*	Diet		
	QPM	NM	Starter-finisher
Ave. initial body wt., g	282.0	284.0	267.0
Ave. final body wt., g	708.0 ^a	532.0 ^b	2017.0 ^c
Weight gain, g/bird	426.0 ^a	248.0 ^b	1750.0 ^c
Mean feed intake, g/d	53.0 ^a	46.4 ^b	95.8 ^c
Food: gain ratio	4.28 ^a	6.55 ^b	2.3 ^c
Total deaths	7 ^a	9 ^a	1 ^b

*Means in a row with different superscripts are significantly different ($P < 0.05$).

on the average, consumed 14 per cent more feed and gained weight at 1.7 times that of the NM group, and the feed conversion efficiency was 20 per cent better in the QPM group. It was further observed that the NM group progressively decreased its feed intake after the 1st week on the experimental diets; a similar decline was noted in the QPM group only after 21 days on the diets. The superiority of QPM has been attributed to its higher content and improved balance of essential amino acids (Cromwell *et al.*, 1967; Sullivan *et al.*, 1989). However, the birds that received the balanced diet significantly out-performed those on the QPM diet (Table 4), indicating that QPM

alone is an inadequate source of amino acids for broilers (NRC, 1984, 1988). Post-mortem autopsy showed that the mortalities recorded among birds on the experimental diets resulted from starvation.

Table 5 summarizes the results of Experiment 2. An increase in the amounts of QPM in the diets, although coupled with progressive reductions in fishmeal use, had no detrimental effects on the main performance criteria studied: feed intake, growth rate, feed utilization, and carcass dressing yield. When QPM was used, it was possible to reduce the dietary crude protein contents from 21 to 16 per cent. However, even at the lowest level of fishmeal use, the diets contained amounts of amino acids within the range of normal requirements (NRC, 1984). It was more economical to use QPM in broiler diets and reduce fishmeal use. Feed cost was reduced by a maximum of about US\$21.00 per tonne when the highest amount of QPM was incorporated in broiler diets. This was primarily due to the reduction in fishmeal use; fishmeal cost almost four times the price of maize at the time of the study. There was no price disparity between NM and QPM.

The results of the study suggest that where broiler diets are based largely on maize and fishmeal (as is typical of small-scale poultry farms in Ghana), the use of QPM may reduce feed and production costs.

TABLE 5
*Performance of broilers in Experiment 2**

Parameter	Diet				
	NM	QPM-1	QPM-2	QPM-3	QPM-4
Ave. initial body wt., g	245.0	245.0	245.0	245.0	245.0
Ave. final body wt., g	2149.0	2189.0	2229.0	2140.0	2149.0
Ave. wt. gain, g	1904.0	1944.0	1983.0	1894.0	1904.0
Ave. food intake, g/bd.	101.0	103.1	102.3	104.3	108.7
Food: gain ratio	2.60	2.60	2.55	2.70	2.80
Dressing percentage	74.5	73.0	74.3	74.7	76.4
Mortality, %	0.5	1.5	0.5	0.5	0.5

*Treatment effects were not significant ($P > 0.05$)

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