Raw Pigeon seed meal in Weaner Rabbit Diet: Effect of Methionine Supplementation

E.B. Etuk*, O.N. Abaoja and B.O. Esonu

Department of Animal Science and Technology, Federal University of Technology, Owerri, Nigeria.

*Corresponding author; edeheetuk@yahoo.com

Abstract

Effect of graded levels of methionine supplementation on the performance of weaner rabbits fed diets containing raw pigeon pea seed meal were studied in a 42-day feeding trial. Four experimental weaner rabbit diets were formulated such that raw pigeon pea seed meal (RPSM) made up 300.0g kg⁻¹ in each diet. Methionine was respectively supplemented at 0.0, (control diet), 2.5, 5.0 and 7.5 g kg⁻¹ in the four weaner rabbit diets. These diets and water were offered ad libitum to 3 replicates of 2, six weeks old mixed breed rabbits. The results indicated that the daily weight gains were, 2.62, 2.85, 5.23 and 4.64 for rabbits fed 0.0, 2.5, 5.0 and 7.5g kg⁻¹ methionine supplemented diets respectively. Feed intake of rabbits fed 7.5g kg⁻¹ methionine supplemented diets was significantly ($P < 0.05$) lower than other treatment groups except the control. Rabbits fed 0.0 and 2.5 g kg⁻¹ methionine supplemented diets recorded significantly ($P < 0.05$) poorer feed conversion ratio than rabbits fed 5.0 and 7.5g kg⁻¹ methionine supplemented diets. The feed cost per kg weight gains were ₦363.58, ₦351.49, ₦197.64, ₦204.38 for rabbits fed 0.0, 2.5, 5.0 and 7.5 g kg⁻¹ methionine supplemented diets respectively. It would appear that weaner rabbits performed best on 300.0g kg⁻¹ raw pigeon pea seed meal diet when supplemented with methionine at 5.0g kg⁻¹ diet.

Keywords: Raw, Pigeon pea, Rabbits, Methionine

Introduction

Rabbits have been recognized to have a very important role to play in the supply of animal protein to Nigerians especially in rural and peri-urban areas (Egbo *et al.*, 2001). The production of rabbit will be more widespread in Nigeria if cheaper feedstuff that are readily available could be developed since rabbits have the potential of utilizing unconventional feedstuff like pigeon pea (Alawa *et al.*, 1990 and Igwebuike *et al.*, 2001).

Pigeon pea [*Cajanus cajan* (L.) Millsp] seed meal has been extensively reported as a useful feed ingredient for poultry and pigs in the tropics

(Visitpanich *et al.*, 1985; Udedibie and Igwe, 1989; Etuk and Udedibie, 2002; Amaefule and Obioha, 2005). The potential of pigeon pea to replace the conventional protein ingredients like soybean and groundnut cake is based on its availability and low utilization as food by humans and for industrial purposes (Udedibie and Igwe, 1989; Amaefule and Obioha, 2001). Pigeon pea seeds depending on the variety are rich in protein (18.5 – 31.1%); it also contains 36–66% carbohydrate, 2.0% fat, 6–9% crude fibre and 3.8% ash (Salunke *et al.*, 1986; Amaefule and Obioha, 2005). However the protein of pigeon pea seed is deficient in the

sulphur containing amino acid, methionine (Olomu, 1995; Tara and Romaro, 1972).

Recent studies by Amaefule *et al* (2004) and Amaefule *et al* (2005) indicated the potential of pigeon pea in weaner rabbit diets. Work done with poultry also indicated that methionine supplementation could improve the utilization of pigeon pea seed meal (Etuk *et al*, 2003; Tangweewipat and Elliot, 1989; Pezzato *et al*, 1997). Biobaku and Olaiyupo (2001) reported increased daily weight with increase in percentage of methionine supplementation in rabbit diets. This study therefore was designed to evaluate the performance of weaner rabbits fed methionine supplemented diets containing raw pigeon pea seed meal.

Materials and Methods

Brown coat coloured pigeon pea seeds used for this study were purchased from Owerri main market having been originally sourced from Gboko, Benue State in the middle belt agricultural zone of Nigeria. The seeds were made into coarse meal and stored in bags. Synthetic methionine made by Animal Nutrition Company, United Kingdom was used for the study as well. Four experimental weaner rabbit diets were formulated such that raw pigeon pea seed meal made up 300g kg⁻¹ of each feed. The four experimental diets were respectively supplemented with the synthetic methionine at 0.0, 2.5, 5.0, 7.5g kg⁻¹ formulated feed. Compositions of the experimental diets are presented in Table 1.

Table 1: Composition of experimental weaner rabbit diets (g kg⁻¹)

Ingredients	Inclusion level of methionine (g kg ⁻¹)			
	0.0	2.5	5.0	7.5
Maize	370.00	367.50	365.00	362.50
RPSM	300.00	300.00	300.00	300.00
Methionine	0.00	2.50	5.00	7.50
Others*	330.00	330.00	330.00	330.00
Calculated composition of experimental diet (g kg⁻¹)				
ME (MJ kg ⁻¹)	11.40	11.37	11.34	11.31
Crude Protein	168.70	168.50	168.30	168.10
Crude fibre	54.70	54.60	54.50	54.40
Ether extract	35.00	34.90	34.80	34.70
Calcium	10.60	10.6	10.6	10.6
Phosphorus	8.20	8.20	8.20	8.20
Methionine	3.50	6.00	8.50	11.00
Lysine	9.40	9.40	9.40	9.40

*Each diet contained the following (g kg⁻¹): Soybean meal – 30.00, Wheat – 100.00, Palm kernel cake – 150.00, Fish meal – 20.00, Bone meal – 25.00, Salt – 2.50, Vitamin Mineral premix** – 2.50.

**Vit E = 2000iu, Vit K = 800mg, Vit B₁ = 800mg, Vit B₂ = 1600mg, Vit B₃ = 600mg, Niacin = 600mg, Vit B₁₂ = 4mg, Pantothenic acid = 2000mg, Folic acid = 200mg, Biotin = 8mg, Choline chloride = 80mg, Antioxidant = 50mg, Manganese = 32mg, Zn = 20mg, Iron = 8mg, Copper = 2mg, Iodine = 0.48 mg, Selenium = 80mg, Cobalt = 80mg.

Twenty-four weaner rabbits of mixed breeds were divided into four treatment groups. Each treatment group was subdivided into 3 replicates of 2 rabbits each on weight equalization basis. Each group was then randomly assigned to one of the four treatment diets in a completely randomized design (CRD). Each replicate was housed in a separate compartment measuring 60cm x 45cm x 45cm. The experimental diet and water were offered *ad-libitum*. Each replicate was also offered measured quantity of forage supplement (*Centrosema pubescens*) daily. The diet without synthetic methionine served as the control. All routine management practices including deworming at the beginning of the study with piperazine^a were carried out. Rabbits in each replicate were individually weighed at the beginning of the study and subsequently on a weekly basis. Obtaining the difference between quantity of feed offered and the leftover determined feed consumption the next morning. The feeding trial lasted 42 days. Data obtained were used to calculate daily weight gain, daily feed intake, feed conversion ratio. Feed cost per kg, feed cost per kg weight gain and mortality were also determined and recorded.

Means of each treatment were subjected to one-way analysis of variance (ANOVA) (Little and Hills (1978). Where significant treatment effects were detected, means were separated using Least Significant Difference (LSD) as outlined by Obi (1990).

Results and Discussion

The daily weight gain of rabbits increased progressively with increasing level of methionine supplementation up to 5.0g kg⁻¹ but decreased slightly at 7.5g kg⁻¹. This agrees with results obtained earlier by Etuk *et al* (2003) with finisher broilers and Biobaku and Oladipupo (2002) with weaner rabbits. Final weights of rabbits on 5.0g kg⁻¹ and 7.5g kg⁻¹ methionine supplemented diets did not differ significantly ($P>0.05$), these weights nevertheless, were significantly ($P<0.05$) higher than values obtained for rabbits fed 0.0 and 2.5g kg⁻¹ supplemented diets. The poor performances of rabbits fed 0.0 and 2.5g kg⁻¹ suggest an imbalance in amino acid of the diets.

Rabbits fed diets containing 2.5-g kg⁻¹ methionine supplemented diet recorded the highest feed intake. Daily feed intake was not significantly

Table 2: Effect of methionine supplementation on the performance of weaner rabbits

Parameters	Dietary inclusion levels of methionine (g kg ⁻¹)				SEM
	0.00	2.5	5.0	7.5	
Initial live weight (g)	450.00	420.00	415.00	415.00	21.50
Final live weight (g)	56.00 ^a	540.00 ^a	635.0 ^b	610.0 ^b	26.85
Average weight gain (g)	110.0 ^a	120.0 ^a	220.0 ^b	195.0 ^b	11.80
Daily weight gain (g)	2.62 ^a	2.85 ^a	5.23 ^b	4.64 ^b	0.50
Feed intake	798.00 ^{ab}	807.00 ^b	804.0 ^b	711.00 ^a	29.96
Daily feed intake	19.0 ^a	19.21 ^a	19.14 ^a	16.92 ^b	0.95
Feed conversion ratio (FCR)	7.25 ^a	6.74 ^a	3.65 ^b	3.64 ^b	0.97
Feed cost per kg (N)	50.15	50.15	54.15	56.15	4.54
Feed cost (N) per kg weight gain	363.58 ^a	351.49 ^a	197.64 ^b	204.38 ^b	39.2
Mortality (Number)	1	2	1	2	-

^{ab} means within the same row with different superscripts are significantly ($p<0.05$) different.

N = Naira

₦138.00 = US\$1.00

different ($P>0.05$) among the treatment groups except at 7.5g kg^{-1} methionine supplemented diet group where there was a depression. This depressed feed intake was however still statistically similar to figures obtained for rabbits on the control diet (0.0g kg^{-1} methionine supplementation). This result suggests a progressively better utilization of protein with increasing level of methionine supplementation in the diet (Maynard *et al*, 1979). The FCR of rabbits on 0.0 and 2.5g kg^{-1} methionine supplementation was however significantly ($P<0.05$) lower than values recorded for rabbits on 5.0 and 7.5g kg^{-1} methionine supplemented diets. This agrees with earlier results by Etuk *et al* (2003) with broilers. Biobaku and Oladipupo (2002) obtained a similar result except that rabbits recorded the best FCR on 5.0g kg^{-1} methionine supplemented diets. Feed cost per kg was not significantly different ($P>0.05$) with increasing level of methionine supplementation in the diet. However, significantly ($P<0.05$) lower feed cost per kg weight gain was obtained for rabbits fed 5.0g kg^{-1} and 7.5g kg^{-1} methionine supplemented diets. One death each was recorded among rabbits fed 0.0 and 5.0g kg^{-1} methionine supplemented diets while two mortalities each were recorded in the treatment groups fed 2.5 and 7.5g kg^{-1} . These mortalities occurred within the first week of the study.

Conclusion

The following conclusions can be drawn from this study:

1. Methionine supplementation of weaner rabbit diets containing 300g kg^{-1} pigeon pea seed meal will improve the performance of the weaner rabbits.
2. 5.0g kg^{-1} and 7.5g kg^{-1} dietary supplementation were most efficient in feed utilization.
3. Weaner rabbits fed pigeon pea seed meal based diet supplemented

with 5.0g kg^{-1} methionine appear the most efficient in economic terms.

4. It is therefore safe to recommend that weaner rabbit diets containing 300g kg^{-1} pigeon pea seed meal should be supplemented with methionine at 5.0g kg^{-1} of feed.

References

- Alawa, J.P., Karibi-Botoye, D.T., Ndukwe, and F.O Berepubo, (1990). Effect of varying proportions of brewers' dried grains on the growth performance of young rabbits. *Appl. Rabbit. Res.* 12: 252 – 255.
- Amaefule, K.U. and F.C. Obioha, (2005). Performance of pullet chicks fed raw or processed pigeon pea (*Cajanus cajan*) seed meal diets. *Livestock Res. Dev.* Vol. 17 Art # 29 Retrieved June 10, 2005 from <http://www.cipav.org.co/Irrd/Irrd17/3/ame/amae/7029.htm>.
- Amaefule, K.U., Iheukwumere, F.C. and C.C. Nwaokoro (2005). A note on the growth performance and carcass characteristics of rabbits fed graded dietary levels of boiled pigeon pea seed (*Cajanus cajan*). *Livestock Res. Rur. Dev.* Vol. 17 Art # 48. Retrieved June 10, 2005 from <http://www.cipav.org.co/Irrd/Irrd17/5/amae.htm>.
- Amaefule, K.U., Nwaokoro, C.C. and F.C. Iheukwumere, (2004). The effect of graded levels of raw pigeon pea seed (*Cajanus cajan*) meal on the performance, nutrient retention and carcass characteristics of weaner

- rabbits. *Nig. J. Anim. Prod.* 31(2): 154 – 160.
- Amaefule, K.U and F.C. Obioha, (2001).** Performance and nutrient utilization of broiler starters fed diets containing raw, boiled or dehulled pigeon peas seeds (*Cajanus cajan*). *Nig. J. Anim. Prod.* 28(1): 31 – 39.
- Biobaku, W.O. and Oladipupo (2002).** Determination of optimum methionine and lysine requirements for growing rabbits. *Proc. 7th Ann. Conf. Anim. Sci. Assoc. of Nig. (ASAN)* Sept. 16 – 19, University of Agriculture, Abeokuta.
- Egbo, M.L., Doma, U.D. and A.B. Lacdaks, (2001).** Characteristics of small-scale rabbit production and management in Bauchi metropolis. *Proc. 26th Ann. Conf. Nig. Soc. Anim. Prod.* March 18 – 21, Ahmadu Bello University, Zaria pp. 160 – 162.
- Etuk, E.B. and A.B.I. Udedibie, (2002).** Substitution value of toasted pigeon pea (*Cajanus cajan*) seed meal for maize and soybean in broiler starter diet. *Int. J. Agric. Rur. Dev.* 3: 92 – 97.
- Igwebuike, J.U., Anugwa, F.O.I., Ikurior, S.A. and N.G. Ehiobu, (2001).** Effect of feeding graded levels of soaked *Acacia albida* pods on the performance and organ weights of growing rabbits. *Proc. 26th Ann. Conf. Nig. Soc. Anim. Prod.* March 18 – 21. Ahmadu Bello University, Zaria, 165 – 167.
- Little, T.M. and F.J. Hills, (1978).** Agricultural Experimentation – Design and Analysis. John Wiley and Sons, N.Y. pp. 20 – 22.
- Maynard, L.A., Loosli, H.F., Hinth, H.F. and R.G. Warner, (1979).** Animal Nutrition 7th Ed. Tarta McGraw Hills Publishing, New Delhi.
- Obi, I.U. (1990).** Statistical methods of detecting differences between treatment means 2nd Edition. Snaap Press, Enugu, Nigeria.
- Olomu, J.M (1995).** *Monogastric Animal Nutrition – Precepts and Practice.* Jachem Publication p. 75.
- Pezzato, A.C., Silveira, A.C., Pezzato, C.E. and M. de Beni Arrigoni (1997).** Substitution of soybean by pigeon pea seed meal in broiler feed *Pesquisa-Agropecunia Brasileria*, pp. 123 – 133.
- Salunkhae, D.K., Kadam, S.S. and J.K. Chavan, (1986).** Pigeon pea is an important Food Source. *Food Sci. Nutri.* 23: 102 – 145.
- Tara, M.R. and M.V. Romaro, (1972).** Changes in essential amino acid content of arhar dhal (*Cajanus cajan*) on dehydration. *J. Food Sci. and Tech.* 9: 76 – 79.
- Tangweewipat, L and R. Elliot, (1989).** Nutritional value of pigeon pea (*Cajanus cajan*) seed meal in poultry diet. *Anim. Feed Sci. and Tech* 25: 123 – 135.
- Udedibie, A.B.I. and F.O. Igwe, (1989).** Dry matter yield and chemical composition of Pigeon pea (*C. cajan*) leaf meal and the

nutritional value of pigeon pea leaf meal and grain meal for laying hens. *Anim Feed Sci. and Tech.* 24: 111–119.

and rats. 2. Effect of autoclaving and alkali treatment. *Aust. J. Agric. Res.* 36:327–345.

Visitpanich, T., Batterham, E.S and B.W. Norton, (1985). Nutritional value of chickpea (*Cicer arietinum*) and pigeon pea (*Cajanus cajan*) meals for growing pigs

(Received 31st May 2006; Accepted 8th Feb., 2007)