



WBC = White blood cell, RBC = Red blood cell, PVC = Pack cell volume, HB = Haemoglobin, EOS = Eosinophils, Mono = Monocytes, Lymph = Lymphocytes, Neutro= Neutrophil

Conclusion

It could be concluded that cashew nut meal can replace soyabean meal up to 20% replacement level without any adverse effect on the haematological indices of weaner rabbits

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EFFECT OF COTTONSEED MEAL SUPPLEMENTED WITH LYSINE ON GROWTH PERFORMANCE OF RABBIT BUCKS



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Abstract

The study was conducted to evaluate the effects of cottonseed meal supplemented with lysine on growth performance of rabbit bucks. Twenty five (25) mixed breeds of rabbit bucks, 6 – 7 weeks old, were weighed and randomly assigned to five (5) dietary treatments consisted five animals per treatment in a Completely Randomized Design. Treatment 1 served as the reference diet (control) with neither cottonseed meal nor lysine, while T2, T3, T4 and T5 each contained 25% CSM with varying inclusion levels of lysine (0.00, 0.60, 0.80 and 1.00), respectively. The results obtained showed that the inclusion of lysine had positive significant effect ($P < 0.05$) on all the growth parameters studied namely final weight, average daily weight gain (ADWG), average daily feed intake (ADFI) and feed conversion ratio (FCR). The final weight values observed ranged between 1111.66 g (T2) and 1395.05 g (T1). The mean FCR values obtained indicated better records (5.59) in rabbit bucks on T1, but indicated poorest records (8.79) in rabbit bucks on T2. The results of this research show that cottonseed meal with different levels of lysine supplements have significant effects on growth performance of rabbit bucks.

Key words: Cottonseed meal, Growth Performance, Lysine, Rabbit Bucks

Introduction

Rabbits have been known to possess the potentials to bridge the gap in the supply of animal protein to humans, especially in the developing and underdeveloped countries. They are efficient converters of feed to meat and can utilize up to 30% crude fibre as against 10% by most poultry species (Amao and Showunmi, 2016). In recent years, the cost of conventional protein sources (soybean meal, groundnut cake) for livestock production has increased by 60%. Cottonseed meal (CSM) has been used as a cheaper alternative to reduce the cost of animal production. However, the limitation or rather main challenge in feeding CSM to monogastric animals is the presence of gossypol, a toxic polyphenolic compound that is naturally found in the pigment glands of the cottonseed (Thirumalaisamy *et al.*, 2016).

Gossypol has been shown to negatively affect the growth performance, digestive health and reproduction in animals (Saki *et al.*, 2012; Thirumalaisamy *et al.*, 2016). Gossypol readily binds with a free epsilon amino group of lysine during processing, thereby reducing proteolytic action (Saki *et al.*, 2012). Hence, the use of this CSM is limited. Supplementation with lysine is likely to ameliorate the negative effect of the toxic principle (Amao and Showunmi, 2016). The objective of the present study was to evaluate the growth performance of rabbit bucks fed cottonseed meal based diet supplemented with lysine.

Materials and Methods

Study Area

The study was conducted at the Rabbit Research Unit of the Department of Animal Science, Faculty of Agriculture, Ahmadu Bello University, Samaru-Zaria, Nigeria. Zaria lies within the Northern Guinea Savannah region of Nigeria. It is located on latitude 11° 12' N and longitude 7° 33' E at an altitude of 610m above sea level (Ovimaps, 2018). The mean maximum temperature shows a major peak in April (39° C) with a minimum daily temperature of 26.60° C. The annual average rainfall is about 1100 – 1200mm (IAR, 2018).

Experimental Animals and Design



Twenty five (25) mixed breeds of rabbit bucks (6 – 7 weeks old), with mean body weight of 853.66 ± 0.34 g were used for the experiment. The rabbits were sourced from rabbit farm in Samaru, Zaria, Kaduna State. The rabbit bucks were kept in individual cages equipped with feeding troughs and drinkers, and allowed to acclimatize to the experimental site for two weeks. During the adaptation period, the animals were given enrofloxacin, wormazine and enbazin forte (coccidiostat). The rabbit bucks were randomly assigned to five (5) dietary treatments with five animals per treatment in a Completely Randomized Design.

Experimental Diets

The experimental diets were manufactured using conventional feedstuffs, the diets identified as T1, T2, T3, T4 and T5 were offered to the experimental animals in treatments 1, 2, 3, 4 and 5, respectively. Treatment 1 served as the reference diet (control) with neither cottonseed meal nor lysine, while T2, T3, T4 and T5 each contained 25% CSM with varying inclusion levels of lysine (0.00, 0.60, 0.80 and 1.00), respectively. The experimental diet composition is presented in Table 1.

Experimental Procedure and Management

The weights of the rabbit bucks were measured on the day of commencement of the experiment. During the experimental period, the animals were weighed on a weekly basis to determine the weekly weight gain. Amount of feed was weighed each morning before given to the animals and the leftover was weighed the next morning; the differences of feed consumed by each animal were subsequently determined. The drinkers and feeders for the rabbits were made of plastics with narrow but blunt mouth to discourage feed wastage and injuries. The parameters that were measured weekly included feed intake and weight gain. The experimental duration lasted for a period of twelve weeks.

Growth Performance

The initial body weight of the rabbit bucks was taken at the commencement of the experiment while the final weight of the animals was taken with the aid of a precision digital weighing scale. The weight gain was deduced using the difference between the final weight and initial weight. The feed conversion ratio (FCR) was determined by the ratio between total feed consumed and total weight gain.

Statistical Analysis

Data collected was subjected to Analysis of Variance (ANOVA) using the General Linear Model (GLM) procedure of SAS (2002). Significant differences among the treatment means were separated using Duncan's Multiple Range Test (DMRT) in the SAS package.

Table 1: Gross Composition of the Experimental Diets Fed to Rabbit Bucks Containing Varying Inclusion Levels of Lysine

Ingredients (%)	Inclusion Levels of Lysine				
	T1 (Control)	T2 (0.00)	T3 (0.60)	T4 (0.80)	T5 (1.00)
Maize Offals	33.00	35.00	34.00	34.20	34.00
Corn Cobs	25.00	10.00	10.00	10.00	10.00
Brewer's Dried Grain	10.00	10.00	10.00	10.00	10.00
Palm Kernel Meal	15.00	15.00	15.00	15.00	15.00
Groundnut Cake	15.00	3.00	3.00	3.00	3.00
Cottonseed Meal	0.00	25.00	25.00	25.00	25.00
Bone Meal	1.50	1.50	1.50	1.50	1.50
Common Salt	0.50	0.50	0.50	0.50	0.50
Lysine	0.00	0.00	0.60	0.80	1.00
Premix	0.20	0.20	0.20	0.20	0.20
Total	100.00	100.00	100.00	100.00	100.00

Results and Discussion



Growth Performance of Rabbit Bucks Fed Cottonseed Meal Based Diet Supplemented With Varying Inclusion Levels of Lysine

The growth performance of rabbit bucks fed cottonseed meal based diet supplemented with varying inclusion levels of lysine is presented in Table 2. The initial weight of the rabbit bucks was not significantly different ($P>0.05$) across the treatment levels. The initial weight values ranged from 853.00 to 854.00 g. The mean values obtained for final weight of the rabbit bucks were significantly affected ($P<0.05$) by the varying inclusion levels of lysine in the diet. The final weight of the rabbit bucks ranged between 1111.66 and 1395.05 g. The mean values obtained for final weight of the rabbit bucks did not follow a definite pattern across the treatment; however, rabbit bucks in T1 (control) had the highest final weight values (1395.05 g) while rabbit bucks in T2 had the least final weight value. The average daily weight gain (ADWG) of the rabbit bucks were statistically different ($P<0.05$) across the dietary treatments. The ADWG values of the rabbit bucks on T3 (6.35 g), T4 (6.37 g) and T5 (7.05 g) were statistically similar. Lysine had a positive effect on the average daily weight gain of the rabbit bucks as observed in T3, T4 and T5 indicating a better feed utilization as a result of lysine supplementation which reduced the negative effect of gossypol found in cottonseed meal as compared with T2 which had the least ADWG values (4.60 g). The average daily weight gain values obtained (4.60 to 9.66 g) were lower than (19.24 to 26.78 g) and (8.84 to 14.9g) reported by Selim *et al.* (2008) and Megbuwe *et al.* (2018), respectively who fed dietary vitamins E and C to growing rabbit bucks but the values obtained were higher than that reported (-1.75g to 0.67g) by Bisong (2015). The results obtained is in contrast with the report by Bisong (2015), who stated that graded levels of vitamin C at 100 mg/kg to 300 mg/kg diet does not improve growth of rabbit bucks during dry season.

Table 2: Growth Performance of Rabbit Bucks Fed Cottonseed Meal Based Diet Supplemented With Varying Inclusion Levels of Lysine

Parameters	Inclusion Levels of Lysine					SEM
	T1 (Control)	T2 (0.00)	T3 (0.60)	T4 (0.80)	T5 (1.00)	
Initial Weight (g)	853.80	854.00	853.00	853.50	854.00	12.34 ^{NS}
Final Weight (g)	1395.05 ^a	1111.66 ^c	1209.00 ^b	1210.32 ^b	1249.00 ^b	30.51
Total Weight Gain (g)	541.25 ^a	257.67 ^c	356.00 ^b	356.80 ^b	395.00 ^b	23.00
ADWG (g)	9.66 ^a	4.60 ^c	6.35 ^b	6.37 ^b	7.05 ^b	0.41
Total Feed Intake (g)	432.08 ^a	321.98 ^b	316.41 ^c	315.08 ^c	345.55 ^b	11.85
ADFI (g)	54.01 ^a	40.25 ^b	39.55 ^c	39.38 ^c	43.19 ^b	1.48
FCR	5.59 ^a	8.79 ^c	6.22 ^b	6.18 ^b	6.12 ^b	0.11

^{abc} means with different superscripts within the same row are significantly different at $P<0.05$;

SEM = Standard Error of Mean; ADWG = Average Daily Weight Gain; ADFI = Average Daily Feed Intake; FCR = Feed Conversion Ratio

The mean average daily feed intake (ADFI) values obtained were statistically different ($P<0.05$) across the dietary treatment. The ADFI value obtained for the rabbit bucks was highest (54.01 g) in T1 (the control), followed by T2 and T5 which had statistically similar values (40.25 and 43.19 g), respectively. The average daily feed intake of the rabbit bucks fed test diets with 1.00 mg lysine supplementation (T5) was statistically higher than those on T3 and T4 but lower to that reported (64.10 to 69.40 g) by Azza *et al.* (2008) who fed different types of organic acids to growing rabbits. The feed conversion ratio (FCR) values obtained for the rabbit bucks were significantly affected ($P<0.05$) by the varying inclusion levels of lysine. The FCR values ranged from 5.59 (T1) to 8.79 (T2). The results of FCR in this study agrees with the findings of Fitzsimmons *et al.* (1989) who reported that FCR was not detrimentally affected by cottonseed meal supplemented with lysine. The range of values for feed conversion ratio of the rabbit bucks (5.59 to 8.79) were within the (5.13 to 7.58) reported by Megbuwe *et al.* (2018) in rabbit bucks fed graded levels of vitamins C and E in the Guinea Savannah region of Nigeria but were higher and poorer than the range of values (2.75 to 3.68) reported by Selim *et al.* (2008). The range of values obtained for feed conversion ratio of rabbit bucks used in this study was also poorer and higher than that reported (3.02 to 3.52) by Abdel-Khalek *et al.* (2012).



The FCR values obtained were slightly higher than the values (4.67 to 6.33) obtained by Makinde (2016). However, the feed conversion ratio values obtained in this study were better for the rabbit bucks fed the control diet (T1) followed by rabbit bucks supplemented with lysine compared to that obtained for the rabbit bucks in T2 which had no lysine supplementation. The differences in feed conversion ratio value obtained in this study compared to that reported by Selim *et al.* (2008), Abdel-Khalek *et al.* (2012) and Makinde (2016) could be as a result of differences in age, sex, breed and nutrition. All growth parameters measured were significantly ($P < 0.05$) higher in rabbit bucks fed the control diet (T1). This is an indication that the inclusion of cottonseed meal in the diet decreased the weight gains of the rabbit bucks. However, lysine supplementation increased the feed utilization by the rabbit bucks. The improvement of the average daily weight gain and feed conversion ratio obtained for the rabbit bucks in T3, T4 and T5 is an indication that the varying inclusion levels of lysine in the diet aided growth of the rabbit bucks. It is also an indication that inclusion of lysine at higher level will improve feed intake of rabbit bucks.

Conclusion

It was concluded that cottonseed meal with different levels of lysine supplement have significant effects on growth performance of rabbit bucks. Further research is suggested to evaluate the effect of cottonseed meal based diets supplemented with lysine on blood profile and reproductive performance of rabbit bucks.

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COMPARATIVE ESTIMATION OF CHOLESTEROL CONTENT IN THE EGGS OF LOCAL BREED HEN, GUINEA FOWL, QUAIL, DUCK AND DOVE

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