

COST BENEFIT ANALYSIS OF PREGNANT RABBIT DOES SUBJECTED TO DIFFERENT LEVELS AND PERIODS OF CONCENTRATE FEED RESTRICTION

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Abstract

There has been increased interest in studying feed restriction in rabbits as a means of reducing the cost of production. This study evaluated the cost benefit of restrictive feeding on pregnant rabbit does reared in south-western Nigeria. A total of forty three (43) rabbits consisting of thirty six (36) 20 weeks old doe rabbits of mixed breeds with initial live weight of 1.7-2.0 kg and seven (7) mature bucks with live weight of 2.0-2.5 kg were used for the study. The does were divided into three groups of twelve rabbits each after balancing for weight. The does were placed on three levels of quantitative feed restriction (0, 15, 30 %) at three periods of gestation (15-19 days, 20-24 days and 25-29 days). Data collected were arranged in a 3 × 3 factorial layout. The interactive effect showed that there was no significant difference ($p > 0.05$) in the cost of feed across the dietary treatments. Highest ($p > 0.05$) feed cost was obtained for rabbit does on 30% restriction at 25-29 days of gestation. However, 15% restriction at 25-29 days of gestation resulted into increased ($p > 0.05$) average litter size at birth which competed favourably with the *ad libitum* groups. Therefore it can be concluded from the result obtained that feed restriction of pregnant does at 15% restriction at 25-29 days is cost effective, as this period resulted in increase in average litter size at birth compared to others.

Keywords: Maternal restriction, restriction periods and Cost benefit

Introduction

Feed restriction could be exploited in the feeding regimen of rabbits, especially in periods of inadequate supply of concentrates and forages (Yakubu *et al.*, 2007). The cost of feeding rabbits is however very high, a condition that also prevails for other Nigerian livestock species (Adeyemi *et al.*, 2008). Young rabbit does fed *ad libitum* diets often show parturition problems, (dystocia and abnormal presentation) with subsequent reduction of the number of kits per kindling, linked to excessive fat accumulation (Fortun-Lamothe and Lebas, 1996). In order to reduce the excessive fat in young does, restricted feeding during pregnancy is frequently applied to obtain uniformity in their body weights and to avoid high mortalities during kindling (Rommers *et al.*, 2001) and to allow a long productive life of these does (Partridge *et al.*, 1986). Therefore, feed restriction could be a useful tool to improve economic performance of rabbit does (Tůmová *et al.*, 2006b), which in turn consequently reduces the costs of production (Yakubu *et al.*, 2007). Several studies demonstrated that, after a restricted feeding, the appetite of rabbits improves and a sharp increase of voluntary feed intake occurs (Rommers *et al.*, 1999). Moreover, rabbit can be used as an experimental model to elucidate the effects of anorexia during pregnancy on embryo-foetal development (Matsuoka *et al.*, 2006). Several studies have been done on cost of restrictive feeding in growing rabbits. However, details of the cost of restricted feeding on pregnant does are still obscure; hence, this study aims to examine the cost benefit analysis of restricted on pregnant rabbit does in south-western Nigeria.

Experimental Site

The experiment was carried out at the Rabbitary Unit of the Directorate of University Farms, Federal University of Agriculture, Abeokuta (FUNAAB), Ogun State. The site is located in the rain forest vegetation zone of South-Western Nigeria on latitude 7° 13' 49.46'' N, longitude 3° 26' 11.98E and altitude 76m above the sea level (Google Earth, 2018).

Experimental Animals and Management

A total of forty three (43) rabbits consisting of thirty six (36) 20 weeks old doe rabbits of mixed breeds with initial live weight of 1.7-2.0 kg and seven (7) mature bucks with live weight of 2.0-2.5 kg were used for the study. The does were divided into three groups of twelve rabbits each after balancing for weight.

Experimental Design

Treatments consist of three (3) levels of concentrate feed restriction fed at three (3) different periods during the latter half of the pregnancy period after ascertaining pregnancy by palpation. Percentage composition of concentrate diet consist of Maize 47.50; Fish meal 2.00; Soyabean meal 3.00; Wheat offal 23.00; Groundnut cake 12.00; Rice husk 7.00; Bone meal 3.00; Oyster shell 2.00; Salt 0.25; Vitamin and Mineral premix 0.25. The feeding regimen included: 0% Restriction (control) was fed (100 g/rabbit/day), 15% Restriction was fed (85 g/rabbit/day), 30% Restriction was fed (70 g/rabbit/day). Experimental animals were offered forage (100grams of wilted *Tridax procumbens*) once in a week across the dietary treatment.

Statistical Analysis

Data obtained were arranged in a 3×3 factorial experimental layout using (SAS, 1999). Significantly ($p<0.05$) different means were separated using Duncan's Multiple Range Test of the same statistical package.

Results and Discussion

The main effect of level of feed restriction and period of feed restriction on cost benefit of raising gestating does is shown on Table 1. There were no significant ($p>0.05$) difference in the cost of feed/kg and total cost of feed consumed. Gestating does on 30% level of feed restriction recorded the highest cost (₦204.07) for feed consumed numerically, while gestating does on 0% level of feed restriction recorded the lowest cost (₦199.91) for feed consumed numerically. The highest feed cost recorded for rabbit does on 30% restriction can be attributed to highest feed intake compared to others during the period of realimentation. The results corroborates with the findings of Rommers *et al* (1999) who reported increase in voluntary intake of rabbits at the end of feed restriction.

The periods of feed restriction had no significant ($p>0.05$) effect on the total cost of feed consumed and cost of feed per weight gain. Gestating does between 25-29 days period of feed restriction had the highest (₦205.06) cost. Higher cost obtained for does on 25-29days of gestation could be attributed to longer periods of days before the restriction started while, gestating does between 20-24 days period of feed restriction had the lowest (₦196.89) cost.

Table 2 shows the interactive effect between level and periods of feed restriction on cost benefit of raising gestating does. There was no significant ($p>0.05$) difference on the total cost of feed consumed per gestating doe. Gestating does on 30% level of feed restriction between 25-29 days had the highest cost (₦218.98) while gestating does on 30% level of feed restriction between 20-24 days recorded the lowest cost of feed consumed (₦195.44). Highest cost obtained for does on 30% restriction corroborates with the findings of Rommers *et al.* (1999) who reported that after a restricted feeding, the appetite of rabbits improves and a sharp increase in voluntary feed intake occurs. Moreover, leptin a key hormone involved in the regulation of body weight either suppressing appetite or increasing metabolic rate can also be attributed to the increase in feed intake which will in turn increase feed cost (Friedman and Halaas, 1998).

Conclusion: Based on the results of this study it can be concluded that 15% level of feed restriction of pregnant does at 25-29 days of gestation is cost effective because it was at this level better cost of feed to weight was achieved likewise higher average litter size was obtained for the does compared to the control groups.

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Table 1: Main effect of level and period of feed restriction during breeding on cost benefit of raising gestating does

Parameters	Level of feed restriction				Period of feed restriction		
	0%	15%	30%	SEM	15-19 days	20-24 days	25-29 days
Total feed intake (g)	2379.96	2395.96	2429.42	45.24	2420.16	2343.94	2441.25
Cost of feed/kg (₦)	84	84	84	–	84	84	84
Total cost of feed consumed (₦)	199.91	201.26	204.07	3.88	203.29	196.89	205.06
Weight gain (g)	397.67 ^c	530.00 ^a	410.00 ^b	23.06	447.50	455.00	435.16
Cost of feed/weight gain (₦)	0.50 ^a	0.37 ^b	0.49 ^a	0.02	0.45	0.43	0.47
Gestation Length (Days)	29.00 ^c	30.00 ^b	31.08 ^a	0.48	29.66	29.66	30.75
Average litter size at birth/doe	5.50	5.16	4.83	0.37	5.00	5.33	5.25
							0.40

^{a, b, c}: Means in the same row with different superscripts differ significantly (p<0.05)

SEM: Standard error of mean

Table 2: Interaction between level and period of feed restriction during breeding on cost benefit of raising gestating does

Level of feed restriction	0%			15%			30%			SEM
Period of feed restriction	15-19 days	20-24 days	25-29 days	15-19 days	20-24 days	25-29 days	15-19 days	20-24 days	25-29 days	
Parameters										
Total feed intake (g)	2442.63 ^{ab}	2347.38 ^b	2349.88 ^b	2463.22 ^{ab}	2357.72 ^b	2366.96 ^{ab}	2354.64 ^b	2326.72 ^b	2606.91 ^a	53.40
Cost of feed/kg (₦)	84	84	84	84	84	84	84	84	84	–
Total cost of feed consumed (₦)/rabbit	205.18	197.71	197.38	206.91	198.04	198.82	197.78	195.44	218.98	7.89
Weight gain(g)	395.00 ^{ab}	400.00 ^{ab}	398.00 ^{ab}	545.00 ^a	555.00 ^a	490.00 ^a	402.50 ^{ab}	410.00 ^{ab}	417.50 ^{ab}	55.21
Cost of feed/weight (₦)	0.51 ^a	0.49 ^a	0.49 ^a	0.37 ^c	0.35 ^c	0.40 ^b	0.49 ^a	0.47 ^a	0.52 ^a	0.09
Gestation Length(days)	29.00 ^c	29.00 ^c	29.00 ^c	30.00 ^b	30.00 ^b	30.00 ^b	30.00 ^b	30.00 ^b	33.25 ^a	1.61
Average litter size at birth	5.50	5.50	5.50	4.75	5.25	5.50	4.50	5.25	4.75	0.77

^{a, b, c}. Means in the same row with different superscripts differ significantly (p<0.05)
SEM: Standard error of mean