Journal of Agriculture and Veterinary Sciences
Volume 6, Number 1, 2014
ISSN: 2277-0062

Seasonal Effect of a Comparative Study on Growth and Reproductive Performance of Three Breeds of Rabbit

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ABSTRACT

The experiment was carried out to find out the effect of season on growth and reproduction of rabbits in Nigeria. The rabbits used in this experiment consist of ten (10) Does and three (3) Bucks from each breed of rabbits. The three breeds used were New Zealand White, Chinchilla and California. Water and concentrate were readily available *ad libitum* with forage like guinea grass- *Panicum maximum* and elephant grass- *Pennisetum purpurem* which was supplied two (2) to three (3) times a week for fiber requirement. The experiment lasted for five (5) months; between November to March, at the peak of the dry season. One way classification and Analysis of Variance (ANOVA) with equal replication; while the Duncan's New Multiple Range Test was used to compare mean among the three breeds of rabbits, as described by Steel and Torrie (1960). Results showed that there were significant difference ($P<0.05$) in number of kids born alive, litter birth weight and doe weight change between kindling and weaning. It further shows that there were no significant differences ($P>0.05$) in the other characteristics. The result of the study showed that New Zealand White kindled more kids alive than either of the two breeds. The change in does weight at kindling and weaning also showed that New Zealand White was heaviest than either of the two breeds ($p<0.05$). Chinchilla delivered the heaviest kids among the breeds tested ($P<0.05$).

Keywords: Rabbit Breeds, Reproductive Traits, Feeding and Seasonal Effect.

Introduction

Animal protein consumption has become almost unaffordable in many parts of undeveloped Countries including Nigeria where economic recession of the last decade has further compounded the problem (Esonu, 1991). In Nigeria, the

animal protein intake of an adult human being is estimated at 15% of the total protein intake when compared with an average intake of 55% for the developed Countries (FAO, 2005).This problem is traceable to the mid 80's when the commercial livestock industry started to decline with most of the grains in size and structure made prior to this period were lost due to high production cost, arising from shortages and high feed prices. This has been blamed on competition between man, livestock and industry (Akinmutimi, 2004). In order to meet the animal protein requirements of the people, efforts should be directed to animals that are prolific like rabbit, with short generation interval and less capital intensive as an interim measure (Iheukwumere *et al.*, 2005).One of such species of livestock is the rabbit, which has a gestation period of about 30days. Apart from its short generation interval, rabbit has been found to exhibit some features such as the ability to convert forages into meat more efficiently than other classes of monogastric animals, fast growth rate, early sexual maturity (4-6months), high reproductive potential, and ability to re-breed shortly after kindling (Aduku and Olukosi, 1990). In view of these features, farmers are encouraged to produce rabbits to enable them meet up the protein requirements of their families.

Profitable rabbit production depends to a large extent, on litter size per kindling per year, coupled with high weaning weights, litter or no mortality, early sexual maturity, high prolificacy and ability to rebase shortly after parturition (Dim et al, 1990). A commercial rabbit production target of 43 young reared per doe per year was reported by (Odubote and akinokun). Dodd (1994) reported that is possible to raise upto 60 young kittens in seven or more litters per doe per year. Cheeke (1987) showed that rabbits could be mated within 24 hours after kindling since rabbit is an induced ovulator.

Several vegetable species (i.e., forage) abound in Nigeria during the dry and rainy seasons which could be utilized as supplementary feeds to livestock. The presence of inherent toxic factors or anti-nutritional components in plants especially when fed fresh has been implicated as one of the variables affecting the nutrient value of foods and feeds (Aletor and Adeogun, 1994; Iheukwumere *et al.*, 2005). The stage of harvesting vegetables or forages and the quantity fed to both man and animals should be guided to prevent it from being toxic due to the presence of anti-nutritional factors and from becoming unacceptable due to the presence of high fibre content. The use of forage and other feed stuffs like agro-industrial by-products, farm waste, etc; have become an area of interest to many researchers because of the challenges posed by the high cost of the conventional feeding stuffs (Iheukwumere *et al.*, 2004).

Materials and Methods

The experiment was carried out at the livestock farm (Rabbitary Unit) of National Root Crops Research Institute, Umudike in Abia State, Nigeria. The experimental animals consisted of ten (10) does and three (3) bucks per breed, the does and bucks age ranged from one to three years. The rabbits were housed in cages with a dimension of 76cm×60cm×42cm, the cages were raised to a height of 90cm above the cemented floor and it was housed intensively. The rabbits were fed a pelleted 2955kcal digestible energy supplemented with commercial vitamin and minerals mixtures. Feed and water were readily available *ad libitum* with *Panicum maximum and Pennisetum purpurem* as supplement, given to them two to three times a week for fibre requirement. The rabbits (does) were divided into five (5) treatments, each treatment having three (3) replicate with one (1) buck from the same breed. The nest boxes were lined with cotton wools to help does that did not pull enough hair. The rabbits were mated between November 2012 to March 2013; at the peak of the dry season. All the does were tested morning and afternoon for mating with a fertile buck of the same breed.

After successful mating procedures, the does were weighed and data recorded. Does that did not mate were tried every day until mating occurred. Those that were pregnant were weighed weekly to get the weight change which was recorded also. Approximately, four to five days to the expected kindling date, on kindling, doe weight and individual birth weight of kids were recorded. The same data was collected on each breed of rabbits in this study. Data collected in this study were analyzed using the One-Way classification of Analysis of Variance with equal replication while the Duncan's New Multiple Range Test was used to compare means among the three breeds of rabbits, as described by Steel and Torrie (1960).

Results and Discussion

Observation is, it was difficult to get the does pregnant (failure to respond to the bucks advances) because of the very hot temperature encountered during the mating period. But once pregnant they stay throughout the gestation period, expect in few cases were abortion were noted. Abortion incidences were noted thrice for New Zealand White and once for both Chinchilla California breeds.

The reproductive performance of all the treatment is as shown in table 1. The kids born alive had significant difference ($P<0.05$) as New Zealand White, Chinchilla and California delivered mean of 6.2±2, 4±2.2 and 3.9±1.5 kids respectively. This is not surprising as 6.2±2, 4±2.2 and 3.9 ±1.5 kids respectively.

This is not surprising as Rao (1977), reported that a litter size of seven occurred more frequently than any other size using two hundred and seventy New Zealand white. However, the relatively low number of kids born alive can be attributed to the high ambient temperature prevalence during the period this experiment was in progress. Somade (1982) reported that in the tropical environment like Northern Nigeria, the dry season has an effect on the reproduction in rabbits especially in terms of numbers of young born alive.

Still birth, from table 1: the mean and standard error of number of still births for the three breeds were not significantly affected (P>0.05) as the mean number of stillbirth were 0.1±0.01, 0-5±0.02 and 0.3±0.07 for New Zealand white, Chinchilla and California respectively. This shows that incidence of still birth was no rampant among breeds. It also means that though the pregnant does suffered from heat stress, it did not lead to high incidence of stillbirths among breeds.

Litter birth weight were significantly different (P<0.05), were Chinchilla had the highest litter weight size followed by California and then New Zealand white respectively. Chinchilla kids were on the average of 15grams heavier than those of New Zealand white and a 5grams heavier than California kids. Chinchilla breed and California breed had fewer kids, and this means larger kids compared to New Zealand white with larger litter sizes.

Weaning weight at six weeks of age, which was also the weaning weight, the mean and standard error were 525±53, 530±79 and 510±62 grams for New Zealand white, Chinchilla and California respectively which had no significant differences (P>0.05). The result showed that New Zealand white gained 478grams while Chinchilla breed gained 468 grams followed by California with 453grams. This corresponds to an average daily gain (g/day /rabbit) of 11.4, 11.1 and 10.8brams for New Zealand white, Chinchilla and California breeds.

Weight at 8 weeks shows that the mean and standard error of weigh for the three breeds tested in his study presented in Table 1, were 650±38,660±94 and 552±68grams for New Zealand white, Chinchilla and California respectively. The weight gained at 8weeks for New Zealand white was 603grams,for Chinchilla weight gained was 658 grams and weight gained by California stood at 405 grams, from observed weight gain there was no significant difference (P>0.05) between New Zealand white and Chinchilla but with significant difference (P<0.05) in California.

This corresponds to an average daily gain (g/day/rabbit) to f 11, 11.8 and 9 grams for New Zealand which, Chinchilla and California and California breed respectively. It was reported that the average daily weight of rabbits gain was 28.8g and is comparable to the growth of chicken, (Rao, 1977) in a separate experiment observed that in 8 weeks, broiler chicken gained an average weight of 31.6g/day).

Weight at 12 weeks shows that the mean and standard error for the three breeds tested in this study were 952±18, 812±68 and 790±7 grams for New Zealand white, Chinchilla and California breeds respectively and there was no significant difference ($P>0.05$).

However, it was evident that growing bunnies suffered from heat exhaustion, (many fryers went off feed and lost weight) and morality was high among the breeds from weaning to 8weeks old. Those that survived to 12 weeks did so under adverse condition of very high ambient temperature. The performance of New Zealand white was in agreement with reports from the temperate region which describes the New Zealand white as the principal breed, having a number of desirable traits including a rapid growth rate, good carcass quality and above all a good mothering ability (Cheeke, Patton and Templeton, 1982).

Doe weight change between kindling and weaning from table 1 shows that change between kindling and weaning for the three breeds tested in this study is as follows using the mean and standard error, 170±82, 50±4 and 60±s grams for New Zealand White, Chinchilla and California respectively and the analysis of variance (on table 5a) shows that there was significant difference in doe weight change between kindling and weaning among the three breeds ($P<0.05$). The change in does weight at kindling and weaning shows that New Zealand White was heaviest and there was no difference in weight between Chinchilla and California. The fall in weight at kindling is what should be expected as there may have been loss in weight in the maintenance of the pregnancy and stress of kindling. However, the weight increase at weaning may be due to recovery from these stresses.

Gestation length from table 1 shows there was no statistical difference in gestation length as the mean and standard error was 32±1.3, 32±1.25 and 32±1.3 for New Zealand White, Chinchilla and California respectively. The gestation length was constant among the breeds because it is a genetic attribute of the rabbits, and in the absence of physiological abnormalities, gestation length should not differ.

Conclusion

It can be concluded from this study that New Zealand White is best suited to the tropical environment in terms of number of kids born alive, and it exhibited a superior conception rate. Also, the fact that New-Zealand White recorded the greatest increase in weight between kindling and weaning, this means that it was able to recover quickly from the stress of pregnancy maintenance and the stress of kindling. This study also indicated that the Chinchilla delivered the heaviest kids.

The major problem encountered during this study was the constant rejection of the buck by the doe, even after bring mounted. Mating procedure was least difficult for New-Zealand White and most difficult for Chinchilla. The bucks were active throughout the period, thus their libido were not influenced by the heat stress. Therefore, if mating is to be carried out during the dry season, forced mating may be advisable.

References

Aduku, O. and Olukosi, J.O. (1990). Rabbit Management in the Tropics. Macmillian Publishers, pp: 1, 33- 44

Akinmutimi, A.H. (2004). Evaluation of Sword Bean (*Canavalia gladiata*) as an Alternative Feed Resource for Broiler Birds. PhD. Thesis, College of Animal Sc. and Animal Health. MOUA, Umudike, pp: 4-17.

Aletor, V.A and Adeogun, O.A. (1994). Nutrient and Anti-Nutrient Components of Some Tropical Leafy Vegetables. *Food Chem.* 53 Elseveir Science Ltd. Pub. In Great Britain pp: 357-379.

Cheeke, P.R. (1987). Rabbit Feeding and Nutrition. Summary of a United Kingdom Rabbit Conf. *J. Appl. Rabbit Res.* 6:86-87.

Cheeke, P.R., Patton, N.M. and Templeton, G.S. (1982). Rabbit Production, 5th ed. The Inter State Printers and Publishers Inc. Danville Illinois pp:232-252.

Dim, N.E., Unom, Y., Aduku, A.O. and Balagun, T.F. (1990). Effects of Morning and Evening Mating and Frequency of Mating on Litter Size in Dutch Breed of Rabbits. *Nig. Agric. Journ.* 25: 95-99.

Dodd, P. (1994). Co-op Selling and Increase Rabbit Rewards Farmers Weekly February 8: 25-30.

Esonu, B.O. (1991). Evaluation of Graded Levels of Maize/Sorghum Based Brewer's Dried Grains as Substitute for Maize on the Performance and Carcass Characteristics of Broiler Chickens. *Appl. Trop. Agric.* 4(1):1-7.

FAO. (2005). Chemical Composition of Feeds Suitable for Rabbits. *Production Year Book 1981*. National Root Crops Research Institute, Umudike.

Iheukwumere, F.C., Esonu, B.O. and Ogbuji, L.A. (2004). Effect of quantItative Feed Restriction on the Performance Organ Weight and Meat Quality of Broiler Finisher Birds. *Niger. Agric. J.* 35:127-133.

Iheukwumere, F.C., Okoli, I.C., Anyanwu, G.A. and Esonu, B.O. (2005). Growth Performance, Haematological and Serum Biochemical Constituents of Grower Rabbits Fed *Microdermis puuberula* Leaf Meal. *Animal Prod. Research Advances* 1(1)|: 24-31.

Odubote, I.K. and Akinokun, J.O. (1991). Reproductive and Body Weight Perf. of the New-Zealand White Rabbits. *J. Ani. Prod.* Pp: 61-65.

Rao, D.R., Chew, C.P., Sunki, G.R. and Johnson, U.M. (1977). Post Natal Growth of New-Zealand White Rabbit. *J. Anim. Sci.,* Vol. 44 No.6 pp: 1021-1025.

Somade, B. (1982). Influence of Two Environments on the Reproductive Performance of New-Zealand White rabbits. *J. Anim. Prod. Res.* (2) pp:113-122.

Steel, R.G. and Torrie, J.H. (1960). *Principles and Procedures of Statistics.* 1st Edition. McGraw Hill Book Co. Inc. New York, Toronto and London.

Table 1: Mean + Standard Error of Growth and Reproductive Characteristics

Parameters	New-Zealand White	Chinchilla	California
Kids born alive (number)	6.2±2[a]	4±2.2[b]	3.9±1.5[b]
Still births (number)	0.1±0.01	0.5±0.02	0.3±0.07
Litter birth weight (grams)	47±8[b]	62±6[a]	57±9[b]
Weaning weight (grams)	525±53	530±79	510±62
Weight at 8 weeks (grams)	650±38	660±94	552±68
Weight at 12 weeks (grams)	952±18	810±68	790±7
Doe weight change between Kindling/Weaning (grams)	170±82[a]	50±4[b]	60±5[b]
Gestation length (days)	32±1.3	32±1.25	32±1.3

Mean with the same superscript are not significantly different (P>0.05).

Table 2: Analysis of Variance Table for Kids Born Alive

Source of Variation	df	ss	ms	f
Among breeds	2	33.8	16.9	14.63
Within breeds	27	98.5	3.65	
Total	**29**	**132.3**		

Table 2b: Analysis of Variance Table for Still Births

Source of Variation	df	ss	ms	f
Among breeds	2	8	.4	.55
Within breeds	27	19.5	.75	
Total	**29**	**20.3**		

Table 3: Analysis of Variance Table for Kids Litter Birth Weight

Source of Variation	df	ss	ms	f
Among breeds	2	.011	.0055	11
Within breeds	27	.014	.0005	
Total	**29**	**.025**		

Table 3b: Analysis of Variance Table for Kids Weaning Weight

Source of Variation	df	ss	ms	f
Among breeds	2	.11	.052	1.18
Within breeds	27	1.2	.044	
Total	**29**	**1.31**		

Table 4: Analysis of Variance for Kids Weight at 8 Weeks

Source of Variation	df	ss	ms	f
Among breeds	2	.10	.05	.912
Within breeds	27	1.48	.0548	
Total	**29**	**1.55**		

Table 4b: Analysis of Variance Table for Kids Weight at 12 Weeks

Source of Variation	df	ss	ms	f
Among breeds	2	0.4	0.2	1.61
Within breeds	27	3.36	0.124	
Total	**29**	**3.76**		

Table 5: Analysis of Variance Table for Doe Weight Change between Kindling/Weaning

Source of Variation	df	ss	ms	f
Among breeds	2	.091	.0455	6.9
Within breeds	27	.179	.0066	
Total	**29**	**.27**		

Table 5b: Analysis of Variance Table for Doe Gestation Length

Source of Variation	df	ss	ms	f
Among breeds	2	.2	.1	.0709
Within breeds	27	38.1	1.4	
Total	**29**	**38.3**		

References to this paper should be made as follows: Okiyi, P.C. And Edoh, H.C. (2014), Seasonal Effect of a Comparative Study on Growth and Reproductive Performance of Three Breeds of Rabbit. *J. of Agriculture and Veterinary Sciences,* Vol. 6, No. 1, Pp. 84 – 92.