STUDIES ON THE PRODUCTIVE AND REPRODUCTIVE PERFORMANCES OF SOVIET CHINCHILLA AND NEW ZEALAND WHITE BREEDS OF RABBIT UNDER THE SUBTROPICAL CONDITION OF TRIPURA

GHOSH S. K.[1], DAS A.[2],BUJARBARUAH K. M.[3],DAS ASIT[4], DHIMAN K. R.[5],SINGH N. P.[6]

[1]Department of Animal Reproduction, ICAR, Lembucherra,Tripura-799 210.India
[2]Department of Animal Production, ICAR, Umiam, Meghalaya. India
[3]Director, ICAR , Umiam, Meghalaya. India
[4]Department of Animal Nutrition, IVRI, Izatnagar, Bareilly. UP 243 122.India
[5]Department of Plant Breeding, ICAR , Umiam, Meghalaya. India
[6]Joint Director, ICAR, Lembucherra,Tripura-799 210.India
subrata_kghosh@yahoo.co.in

ABSTRACT

Productive and reproductive performances of New Zealand White and Soviet Chinchilla breeds of rabbit were studied under the sub-tropical climate of Tripura in India. Data from 261 litters were collected and studied. Both the breeds under study performed equally well. Only the number of service per conception and inter kindling interval were significantly ($p<0.01$) higher in New Zealand White than Soviet Chinchilla. Both the breed and sex of the rabbit had no significant effect on individual body weight at weaning (d-42) as well as at day of slaughter (d-90). Season of kindling exerted highly significant ($p<0.01$) effect on service period, kindling interval, and individual weight at weaning (d-42) and at slaughtering age (d-90). Winter season (November-March) was the most favourable season for kindling in terms of both their productive as well as reproductive efficiency where as summer season (April-June) turned to be the most unfavourable season. Age at first fertile service, age at first kindling, gestation period, litter size at birth did not influence by the season of kindling.

Key words: new zealand white, soviet chinchilla, rabbit, season, production, reproduction.

INTRODUCTION

North-Eastern India is mostly inhabited by tribal and meat is one of the major protein sources of the tribal population of entire north eastern India in general and Tripura in particular. There is minimum taboo attached among the population of this region for the consumption of meat from domesticated or wild animal. But there is a wide gap between demand and production of meat in this particular area. Moreover, the cost of feed is very high due to the land-lock situation of this area and there by cost of production is also high. In this context, broiler rabbit would provide a new avenue for meat production and could play a major role in augmenting the animal protein supplies mainly because of its small size, low space requirement, rapid growth rate, high reproductive efficiency and

ability to utilize non-competitive feed. Also one of the major advantages of rabbit farming in this area is that they can be fed forages and agricultural by-product that are not suitable for human consumption leads to low production cost. The rabbit meat is delicious, tender, juicy and high in protein content with little fat and hence would be suitable for all categories of people. No study has been done on the adaptability of any breeds of broiler rabbits in Tripura for the profitable meat production. Therefore, the present investigation was undertaken to study the both productive and reproductive performances under this climatic condition and their adaptability involving Soviet Chinchilla and New Zealand White as broiler breeds.

MATERIALS AND METHODS

Data on 261 litters belonging to two breeds of broiler rabbit *viz.* Soviet Chinchilla (158) and New Zealand White (103) during the year 1998-2003 maintained at the ICAR Tripura Centre were collected and analysed. These two breeds only were selected due to their easy availability as broiler breed from the nearby region. The place of study was located at $22^{o}56'$ to $24^{0}32'$ north latitude and $91^{o}10'$ to $92^{o}21'$ east longitude and characterized by a warm and humid subtropical climate with 3 distinct seasons such as summer (April-June), rainy (July-October) and winter (November-March). The maximum and minimum air temperature are generally found to vary from 24.2-35.1^{0}C and 8.4-24.5^{0}C, respectively with an average rainfall is 2065 mm. Animals were kept in individual cages made by galvanized welded wire (size: 45 cm $\times$ 55 cm $\times$ 42 cm) from 42 days onward (after weaning). These cages were constructed as single row in a well-ventilated concrete house. Commercial pellets and green fodder (leaves of cauliflower, cabbage, radish, cow pea maize, mulberry, spinach) grown at rabbit farm (25-30: 70-75) were used as their feed. Feeding and management practices were uniform throughout the period. Females and males were allowed for mating at the age of six and seven months, respectively. Female used to bring to the male's cage for breeding. In case of unsuccessful mating, the same procedures were followed after 4 days of unsuccessful mating. Diagnosis of pregnancy was performed between the 15th and 17th day of mating. In positive case, the doe had been managed and fed accordingly. If the doe found non-pregnant, allowed for mating immediately. Kits were weaned at the age of 42 days. Females were allowed to rebreed immediately after weaning.

Data on both productive and reproductive performances were recorded. The productive and reproductive traits included in this study were age at first fertile service, age at first kindling, gestation period, litter size at birth and at weaning, litter weight at birth, and individual weight at weaning (day 42) and at day of slaughter (day 90). To see the effect of seasons of kindling on the productive and reproductive traits, least-squares analysis were carried out (HARVEY, 1975). For pair mean comparison, Duncan's multiple range test (DMRT) as modified by KRAMER (1957) was used.

RESULTS AND DISCUSSION

Age at first kindling (219.05 ± 7.02 to 224.90 ± 5.15 days) for both Soviet Chinchilla (SC) and New Zealand White (NZW) breeds did not differ significantly (Table 1). But, significantly younger age at first kindling was reported in NZW than SC breeds by the BUJARBARUAH *et al*. (1989) which might be due to the different agro climatic conditions. Duncan's multiple range test revealed that NZW breed required significantly ($p<0.01$) more number of services per conception and higher ($p<0.01$) inter kindling intervals than SC breed. In both the parameters, BUJARBARUAH *et al*. (1989) reported the opposite findings which could be due to the environmental effect on the breeds as the work conducted under cold and dry climate. Other reproductive and productive parameters like gestation period, litter size at birth and litter weight at birth did not differ significantly between the two breeds. Both the breeds and sex of the animal had no significant effect on individual body weight at weaning (day-42) as well as at day of slaughter (day-90) which supports the observations of DAMODAR and JATKAR (1985) under sub-tropical climate and KUMAR *et al.* (2001) at semiarid region in India. In this study, both the breeds attained individual body weight at day-42 and day-90 were comparatively higher than the other reports from the different agro-climatic parts of India (KUMAR *et al*.,2001 and GUPTA *et al*.,2002. The results indicated the influence of the climate and the quality of the feed and fodder available to the rabbits during study for higher growth rate. Therefore, the data on productivity indicates that both the breeds were performed equally well in Tripura condition and could be used for profitable meat producing animal.

Season of birth had highly significant ($p<0.01$) effect on individual body weights at weaning as well as at the day of slaughter. Animal born during the winter, attained significantly ($p<0.01$) higher body weight than animal born during summer season but had no significant effect when kits born in rainy season (Table 2). Seasonal effect on early growth of rabbit had also reported by KHALIL *et al.* (1987) and KUMAR *et al.* (2001). The difference associated with season of kindling can be attributed to prevalent environmental condition and associated stress factors affecting feed intake is reported as decline in pelleted feed intake (EBERHART, 1980). The higher growth rate also could be due to the availability of plenty of green forages in winter as well as in rainy season.

The overall means for the age at first fertile service, age at first kindling and gestation period of rabbit under study were 191.67±6.18, 221.98±6.20 and 30.31±0.45 days, respectively (Table 2). Variation in these traits due to season of kindling were not significant. The mean age at first fertile service was found comparable of reports of Das and NAYAK (1991) and CHOUDHARY *et al*. (2001) under hot and humid conditions. Service period and kindling interval were effected significantly ($p<0.01$) by season of kindling. Winter season was found as the best season for kindling with shortest service period and kindling interval. Seasonal effect on service period and kindling interval were also reported by HOFFMAN *et al*. (1989) and CHOUDHARY *et al*. (2001). Season had no significant effect on litter size at birth (mean: 6.30±0.58) as well as at weaning (mean: 5.38±0.60). Although litter weight at birth did not influence by season (mean: 335.98±9.80 gram) but individual weight at weaning and at day 90 had significant ($p<0.01$) effect on season. It might due to the environmental stress as well as availability of forages. It has also been observed that the maximum kindling took place during the

winter season (134) followed by rainy (67) and summer (60) seasons indicating that the winter is the most favourable season for the conception, kindling and after-birth care of newborns.

Table 1. Mean ± SE of some of the productive and reproductive traits in rabbits.

Characters		Breeds	
		NZW	SC
Age at first kindling (days)		224.90 ± 5.15 (42)	219.05±7.02 (48)
Gestation period (days)		30.43 ± 0.51 (103)	30.20± 0.41 (158)
Litter size at birth (No.)		6.08 ± 0.50 (103)	6.52± 0.69 (158)
Litter wt. at birth (g)		318.35±14.10 (103)	354.35±11.64 (158)
Number of Services per conception		2.10 ± 0.11[a] (103)	1.82± 0.20[b] (158)
Inter kindling interval (days)		99.58 ± 3.19[a] (90)	87.10 ± 2.10[b] (138)
Individual wt. at weaning (kg)	Male	0.686± 0.05	0.720± 0.07
	Female	0.691± 0.09	0.699± 0.11
Individual wt. at day 90 (kg)	Male	1.94 ± 0.09	1.98 ± 0.03
	Female	1.88 ± 0.01	1.89 ± 0.07

Figures in parenthesis indicate number of observations. Figures with superscripts common in rows do not differ significantly. g: gram, kg: kilogram
(p< 0 .01)

CONCLUSIONS

From the results of the above study it may be concluded that both the breeds under study for early growth and reproduction performed equally well under Tripura climate and could be used for profitable meat producing animal. It has, also been observed that season of birth affected the individual weight at weaning (d-42) as well as at marketable age or slaughter age (d-90). Winter season was found to be the best and summer season was the poorest in respect of all productive traits studied. Winter season also was found as the best season for kindling with the shortest service period and kindling interval. However, more work is necessary to develop a suitable package of practices for the establishment of economically viable rabbit farming in this region.

Table 2. Least square means ± SE for different productive and reproductive traits according to season of kindling

Subclass	AFFS (days)	AFK (days)	GP (days)	SP (days)	KI (days)	LZ-O (No.)	LZ-6 (No.)	LW-O (g)	42-day individual wt. (kg)	90-day individual wt. (kg)
Overall	191.67 ± 6.18	221.98 ± 6.20	30.31 ± 0.45	63.05 ± 2.54	93.34 ± 2.81	6.30 ± 0.58	5.38 ± 0.60	335.98 ± 9.80	0.699 ± 0.08	1.923 ± 0.07
	(90)	(90)	(261)	(228)	(228)	(261)	(240)	(261)	(1298)	(1205)
Season of kindling										
summer	201.50±7.15	231.40 ±8.20	30.42 ± 0.48	69.24 ± 2.16[a]	99.66 ± 2.21[a]	5.97 ± 0.61	5.01 ± 0.58	381.39±15.10	0.679± 0.07 [a]	1.81± 0.07[a]
	(21)	(20)	(60)	(51)	(51)	(60)	(54)	(60)	(265)	(248)
winter	186.85 ± 5.05	218.02± 5.15	30.20 ± 0.61	57.05 ± 2.11[b]	87.25± 2.20[b]	6.53±0.30	5.65± 0.34	348.23± 9.10	0.716±0. 4 [b]	2.002± 0.03[b]
	(46)	(45)	(134)	(122)	(122)	(134)	(124)	(134)	(693)	(637)
rainy	186.66±6.17	217.52± 6.22	30.31 ± 0.50	62.86 ± 2.26[b]	93.17 ± 3.37[b]	6.40±0.44	5.48 ± 0.51	341.32±10.10	0.702± 0.04 [b]	1.951± 0.05 [b]
	(23)	(25)	(6)	(55)	(55)	(67)	(62)	(67)	(340)	(320)

Figures in parenthesis indicate number of observations.
Figures with at least one superscript in common do not differ significantly ($p<0.01$)
AFFS: age at first fertile service, AFK: age at first kindling, GP: gestation period, SP: service period
KI: kindling interval, LZ-0: litter size at birth, LZ-6: litter size at weaning, LW-0: litter weight at birth
g: gram, kg: kilogram

REFERENCES

BUJARBARUAH, K.M., SAXENA, S.C., BORDOLOI, B.K., SINGH, L.P. 1989. Reproductive behaviour of rabbits. *Indian J. Anim. Sci.* **59**:739-741.

CHOUDHARY.H., GOSWAMI, R.N., DAS, D., DAS,A., ROYCHOUDHURY,R. 2001 Genetic studies on the reproductive performances of Soviet Chinchilla breed of rabbit under the agroclimatic conditions of North Eastern region. *Indian J. Anim. Sci.* **71**:946-949.

DAMODAR, N., JATKAR, V.D. 1985.Adaptability of broiler rabbits under sub-tropical climates. *Indian J. Anim. Sci.* **55**:610-611.

DAS, R.K., NAYAK, J.B.1991. Performance of broiler rabbits under hot and humid conditions. *Indian J. Anim. Prod. Management*. **7**: 219-224.

GUPTA, B.R., RAO, V.P., REDDY, C.E., STAYANARAYANA, A., REDDY, P.P. 2002. Effect of genetic and non-genetic factors on post-weaning body weights and carcass traits of broiler rabbits. *Indian J. Anim. Sci.* ***72:*** 70-74.

EBERHART, S. 1980. The influence of environmental temperature on meat rabbits of different breeds. Second World Rabbit Congress. Vol. 1 pp. 399-400. Barcelona.

HARVEY, W.R. 1975. Least-squares analysis of data with unequal subclass numbers. A.R.S. (U.S.D.A.).

HOFFMAN, I., STIER, C.H., PETERS, K. J. 1989. Seasonal effects on fertility in rabbits in the tropics. *J. Applied Res*. **61**:17-318 (find: Animal Breeding Abstract **58**:3896).

KHALIL, M.H., AFIFI, E.A., OWEN, J.B.1987. A genetic analysis of body weight traits in young Bouscat and Giza White rabbits. *Anim. Prod*.**45**: 135-144.

KRAMER, C.Y.1957. Extension of multiple range tests to group corrected adjusted means. *Biometrics*. **13**: 13-18.

KUMAR, S., GULYANI, R., KUMAR, V., SINGH, R.N. 2001. Effect of genetic and non-genetic factors on weekly body weight of broiler rabbits in semi arid region of Rajasthan. *Indian J. Anim. Sci.* **71**:1075-1077.