

Effect of housing systems on the reproductive performance of broiler rabbits

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In the modern production systems of livestock, rabbit rearing is still kept under conventional pattern. The major constraints of this system are low reproduction due to high temperature in summer (30° to 35°C) and high mortality of the offspring due to cold (12° to 15°C) and wet weather in winter (Nguyen Quang Suc 1985). In India, reports on the influences of different housing systems on rabbit production are scanty. Hence, the present study aims to have a comprehensive knowledge on the effect of microclimate on reproductive performance of rabbits.

The study was conducted at the rabbit unit of Livestock Farm, Department of Livestock Production and Management, Veterinary College and Research Institute, Namakkal. White Giant and Soviet Chinchilla weaned rabbits (16) in the age group of 6 to 8 weeks were selected and randomly divided into 4 groups consisting of 8 animals each. Among these, 2 groups were reared under modern raised platform shed (H₁) and 2 groups under conventional tile roofed shed (H₂). Rabbits in the experimental group were housed individually in cages from 7 weeks of age to 4 days prior to expected date of kindling. All the rabbits were fed in accordance with the standard feeding schedule in the farm. The climatic variables and reproductive performance were recorded during the experimental period in both the sheds. The data collected during the course of the study were analysed as per Snedecor and Cochran (1989).

Microclimatic variables like maximum and minimum temperature in modern raised platform shed were significantly ($P<0.05$) lower, whereas the light intensity both in the morning and evening was significantly ($P<0.01$) higher than in conventional tile roofed shed. The higher temperature and relative humidity observed in the conventional tile roofed shed in comparison to the modern raised platform might be

due to the low roof height, less air flow and more radiation heat from the tile roof and concrete floor.

In this study, the age at first mating was delayed (Table 1) in both White Giant and Soviet Chinchilla breeds housed in conventional tile roofed shed (H₂) compared to those in modern raised platform shed (H₁). The 10 days reduction in age at first mating observed in rabbits under modern raised platform shed (H₁) has obvious economic benefits. This might be due to congenial atmosphere prevailed to the rabbits in terms of lowered maximum and minimum air temperature, relative humidity and increased air velocity. This finding was supported by Daader and Saleem (1999) who stated that age at first mating was increased and the body weight decreased in heat stressed rabbits. The percentage of successful breeding at first service was higher and the number of services required per conception was lower in both the breeds in H₁ when compared to rabbits under H₂. This might be due to higher temperature and relative humidity prevailed in the conventional tile roofed shed resulting in elevated corticosteroid levels after mating, which might have been the cause for decrease in the conception rate. Further, more chronic stress affects the pituitary ovarian activity due to the suppression of gonadotrophin secretion with resultant decrease in estrogen and progesterone activity required for increased ova release and maintenance of fertilized ova. It was consistent with the findings of Matassino *et al.* (1970) who found that when the female rabbits were housed under severe sustained heat stress of 35°C, conception rate reduced from 66% in the first parity to 33% in the second parity.

Housing had no significant influence on body weight of does during different stages of reproduction rather than breed effect. Weight loss during lactation was more in modern raised platform shed than conventional tile roofed shed. This might be a reflection of higher nutrient drain through milk due to raising more number of litters and greater weaning weight of litters in H₁.

The litter size at weaning was significantly ($P<0.01$) higher (4.62 ± 0.37 in White Giant and 4.62 ± 0.56 in Soviet Chinchilla) in modern raised platform shed (H₁) against

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Table 1. Mean ($\pm$ SE) Reproductive performance of rabbits under different housing system

Litter performance at birth	Breeds	Housing		Mean	Statistical analysis	
		H ₁	H ₂		Source of variation	'F' value
Age at first mating (days)	White Giant	161.00 $\pm$ 3.79	179.62 $\pm$ 12.05	170.31 $\pm$ 6.56	Housing	2.19 ^{NS}
	Soviet Chinchilla	158.75 $\pm$ 3.49	160.87 $\pm$ 4.91	159.81 $\pm$ 2.92	Breeds	2.24 ^{NS}
	Mean	159.87 $\pm$ 2.50	170.25 $\pm$ 6.73	165.06 $\pm$ 3.65	Housing $\times$ Breeds	1.38 ^{NS}
Litter size at birth (Nos)	White Giant	5.12 $\pm$ 0.61	4.00 $\pm$ 0.42	4.56 $\pm$ 0.38	Housing	1.78 ^{NS}
	Soviet Chinchilla	5.00 $\pm$ 0.56	4.50 $\pm$ 0.77	4.75 $\pm$ 0.46	Breeds	0.09 ^{NS}
	Mean	5.06 $\pm$ 0.40	4.25 $\pm$ 0.43	4.65 $\pm$ 0.29	Housing $\times$ Breeds	0.26 ^{NS}
Litter weight at birth (g)	White Giant	253.25 $\pm$ 22.67	194.12 $\pm$ 13.61	223.68 $\pm$ 14.88	Housing	7.76 ^{**}
	Sovient Chinchilla	251.50 $\pm$ 29.34	184.37 $\pm$ 22.14	217.93 $\pm$ 19.76	Breeds	0.06 ^{NS}
	Mean	252.37 $\pm$ 17.91	189.25 $\pm$ 12.61	220.81 $\pm$ 12.17	Housing $\times$ Breeds	0.03 ^{NS}
Average individual weight at birth (g)	White Giant	50.35 $\pm$ 2.26	50.35 $\pm$ 3.57	50.48 $\pm$ 2.04	Housing	0.77 ^{NS}
	Soviet Chinchilla	50.82 $\pm$ 3.35	45.12 $\pm$ 4.08	47.97 $\pm$ 2.65	Breeds	0.55 ^{NS}
	Mean	50.72 $\pm$ 1.95	47.73 $\pm$ 2.70	49.23 $\pm$ 1.66	Housing $\times$ Breeds	0.64 ^{NS}
Litter size at weaning (g)	White Giant	4.62 $\pm$ 0.37	2.87 $\pm$ 0.44	3.75 $\pm$ 0.35	Housing	18.84 ^{**}
	Soviet Chinchilla	4.62 $\pm$ 0.56	2.50 $\pm$ 0.37	3.56 $\pm$ 0.42	Breeds	0.17 ^{NS}
	Mean	4.65 $\pm$ 0.32	2.68 $\pm$ 0.28	3.65 $\pm$ 0.27	Housing $\times$ Breeds	0.17 ^{NS}
Litter weight at weaning (g)	White Giant	2608.0 $\pm$ 194.49	1362.87 $\pm$ 232.77	1985.43 $\pm$ 217.50	Housing	38.70 ^{**}
	Soviet Chinchilla	2771.12 $\pm$ 171.63	1511.35 $\pm$ 201.51	2141.31 $\pm$ 206.86	Breeds	0.59 ^{NS}
	Mean	2689.56 $\pm$ 127.05	1437.18 $\pm$ 149.95	2063.37 $\pm$ 148.30	Housing $\times$ Breeds	0.00 ^{NS}
Average individual weight at weaning (g)	White Giant	574.31 $\pm$ 36.93	419.26 $\pm$ 73.88	496.78 $\pm$ 44.64	Housing	1.02 ^{NS}
	Soviet Chinchilla	646.83 $\pm$ 66.75	662.89 $\pm$ 87.26	654.86 $\pm$ 53.11	Breeds	5.29 [*]
	Mean	610.57 $\pm$ 38.02	541.07 $\pm$ 63.55	575.82 $\pm$ 36.96	Housing $\times$ Breeds	1.54 ^{NS}
Percentage of pre-weaning mortality	White Giant	6.47 $\pm$ 4.77	21.25 $\pm$ 12.87	13.86 $\pm$ 6.90	Housing	4.00 ^{NS}
	Soviet Chinchilla	7.41 $\pm$ 3.75	34.16 $\pm$ 10.94	20.78 $\pm$ 6.56	Breeds	0.20 ^{NS}
	Mean	6.94 $\pm$ 2.93	27.70 $\pm$ 8.33	17.32 $\pm$ 4.72	Housing $\times$ Breeds	0.55 ^{NS}

*Significant (P<0.05); **significant (P<0.01); NS, nonsignificant.

conventional tile roofed shed (2.87 $\pm$ 0.44 and 2.50 $\pm$ 0.37). The higher litter weight at birth and weaning both in White Giant and Soviet Chinchilla rabbits under modern raised platform shed (H₁) might be due to the carry over effect of congenial microclimate condition prevailed in H₁ on mothering ability, increased milk production and health status of rabbits and resultant improvement of litter weight. Simillar observations were made by Farghaly *et al.* (1994) that microclimate had a significant effect on litter size at weaning (3.8 kits during summer against 5.3 kits during winter). The effect of microclimate on the litter performance was also reported by Patial *et al.* (1991) and Ayyat and Marai (1998).

The kit mortality was higher in H₂ (27.70 $\pm$ 8.33) than H₁ (6.94 $\pm$ 2.93) irrespective of breeds. Majority of deaths were due to combined crushing, chilling and starvation (31.2%) followed by enteritis (9.3%), pneumonia (6.2%) and other reasons (3.1%) in Soviet Chinchilla of H₂.

SUMMARY

The reproductive performance of both White Giant and Soviet Chinchilla rabbits housed in modern raised platform shed was superior than that of rabbits housed in conventional tile roofed shed. The improvement of microclimate in modern raised platform shed increased the percentage of oestrus

occurrence, breeding success, litter size and weight at birth and weaning.

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