

PRODUCTION PERFORMANCE OF DOMESTIC RABBITS IN SEMI-ARID ZONE OF NIGERIA

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Abstract - Thirteen backyard rabbitries were monitored in Sokoto, Nigeria between January and April 1991. The aim was to assess the production performance of the rabbits. Information on husbandry practices and performance data were collected during fortnightly visits to the study herds. Average herd size was 10 rabbits (1 male : 3 females). Five different patterns of housing (cage, living-room, garage, open-yard and shed) were identified. Housing pattern had significant effect on body weights up to 70 days ($P < 0.05$) and litter size at weaning (28 days). Greens formed the bulk of feedstuffs for the rabbits. Stock offtake for household meat supply was high. The study herds exhibited low reproduction and growth rate. Adoption of improved husbandry practices would help to raise the production performance of rabbits in the study area.

INTRODUCTION

The potential of the domestic rabbit (*Oryctolagus cuniculus*) as a source of cheap meat for humans in Nigeria has been well documented (SONAIYA, 1988 ; DIM, 1988). Evidence of small scale rabbit raising at backyards abounds in Nigerian cities. This is also true of Sokoto Metropolis (HASSAN *et al.*, 1988). However, no report is available on the production performance of rabbits kept under such production system, a fact that underscores the need for the study being reported. The study was carried out to assess the reproduction and growth performance of family-managed rabbits, with a view to isolating and assessing husbandry variables and their effects on the production process. With a feedback to the participating herders, the study will help to stimulate higher interest and promote urban rabbit raising in the study area.

MATERIAL AND METHODS

Thirteen privately-owned backyard rabbitries at various locations in Sokoto Metropolis were monitored for four months (January to April 1991). Sokoto is located in North-western Nigeria. It has a semi-arid climate with a severe water deficit from October to June. Annual rainfall lasts for only three months (July to September), averaging slightly above 750 mm.

Visits were paid to the rabbitries at every other week. During the first of such visits, the rabbit keepers were interviewed with the aid of a questionnaire. Questions asked concerned breeds of rabbits kept, husbandry practices (housing, feeds and feeding, health management), breeding management mortality and offtake. Animals in each herd were identified using paint markings on the ears. Where there were few animals, the coat colour was used for identification. Stock inventory was taken and the rabbits were weighed. During subsequent visits, body weight of the rabbits was also taken. Data on reproduction and growth were entered on performance monitoring sheet at each visit. Analysis of the data collected was carried out using descriptive statistics and analysis of variance (GOMEZ and GOMEZ, 1984).

RESULTS AND DISCUSSION

The Stock

Rabbits found in the monitored herds showed varying grades of coloration depicting the Dutch, New Zealand White, Californian White, Simmonoire, Chinchilla and Flemish Giant (Table 1). The numerical superiority of the Dutch breed found in the present study confirms earlier report (HASSAN *et al.*, 1988) on the relative frequencies of rabbit breeds in Sokoto Metropolis. According to the majority of the keepers however, the New Zealand White rabbits were mostly preferred, owing to its high resistance to diseases and faster growth rate in the study area.

Table 1 : Distribution of rabbit breeds in the study herds

Herd	New Zealand white	Dutch	Simmonoire	Californian White	Chinchilla	Flemish Giant	Total
1	5	12	0	0	0	0	17
2	4	15	0	0	0	0	19
3	1	6	1	0	0	0	8
4	2	5	0	0	0	0	7
5	2	2	0	0	0	0	4
6	2	1	0	0	0	0	3
7	1	5	0	0	0	0	6
8	0	0	0	13	0	0	13
9	2	13	0	0	0	0	15
10	0	10	1	0	0	0	11
11	4	6	0	0	0	0	10
12	1	1	0	0	1	0	3
13	6	0	0	0	0	1	7
Total	30	76	2	13	1	1	123
%	24.4	61.8	1.6	10.6	0.8	0.8	100

Herd Size

Herd sizes ranged from three to nineteen rabbits (mean = 10) occurring in the ratio of 1 male : 3 females (Table 2). Sixty per cent of the herders had less than ten rabbits. The narrow genetic base in the herds as shown by the smallness of the foundation herd is noteworthy. Majority of the keepers got their replacement stock from within the herds. This practice could lead to inbreeding, resulting in lowered average performance of the rabbits in terms of reproduction, survival ability and growth.

Table 2 : Sex ratios in the study rabbit herds

Herd	Foundation stock			Present herd		Breeding animals		
	Male	Female	Total	Male	Female	Male	Female	Total
1	1	1	2	5	12	3	6	9
2	-	-	-	4	15	3	7	10
3	1	1	2	2	6	2	3	5
4	1	3	4	1	6	1	1	2
5	1	1	2	1	3	1	3	4
6	2	2	4	2	1	2	1	3
7	1	1	2	1	5	1	3	4
8	2	2	4	3	10	3	8	11
9	1	2	3	2	13	1	9	10
10	1	4	5	3	8	2	4	6
11	1	3	4	1	9	1	5	6
12	1	2	3	1	2	1	2	3
13	1	3	4	2	5	1	3	4
Total	14	25	39	28	95	22	55	77
Mean	1.2	2.1	3.3	2.2	7.3	1.7	4.2	5.9
Sex ratio	1 : 1.8			1 : 3.3		1 : 2.5		

Husbandry Practices

Housing - Patterns of housing in the monitored herds were cage, living-room, garage, open-yard, and shed. Floor type was either concrete or non-concrete without any litter material. Cages were placed on non-concrete floors. Cage sizes ranged from 1.04-2.74 m². The rabbits raised in the garage and living-room were kept on concrete floors. All the rabbits in each herd were housed together irrespective of age, sex or physiological state.

Sanitation of the various housing patterns was mainly by sweeping. This was done daily, weekly or fortnightly as the case may be. Additionally, about 40 % of the herders claimed that they used disinfectants such as dettol. Utensils found in the housing patterns included plastic bowls, clay pots and metal bowls. The costs of the utensils ranged from N5-30. Two prominent patterns of housing (cage and open-yard) were found in the monitored herds. These were earlier reported (MUHAMMED, 1988 ; MUSTAPHA, 1988). However, the cages found in this study were placed on non-concrete ground. This afforded the rabbits the opportunity to burrow, a practice the animals adopt for cooling down during the hot hours of the day (FINZI *et al.*, 1989). Housing rabbits in a shed is almost similar to the deep litter system described by MUHAMMED (1988) and MUSTAPHA (1988). The other forms of housing (garage and living-room) are unconventional. They can be seen as alternate housing patterns for rabbits in urban cities ! They should however be discouraged in view of their obvious short-comings. The claim by some keepers that they applied disinfectants for cleaning the houses was not reflected in the filthy conditions of the herds.

Problems associated with the housing patterns included loss of kittens to pests (tick) and predators (cat and dog), especially in the herds kept in open-yards. Predation of rabbits by cats and dogs was earlier reported in the study area (HASSAN *et al.*, 1988). This could be overcome by housing the rabbits properly.

Feeds and Feeding - Feedstuffs offered the rabbits included greens, kitchen waste, cereal grains and offals, legume-hay and food left-overs. Types of greens fed were *Amaranthus sp.*, lettuce, carrot leaves, spinach and some other leafy vegetables. They formed the bulk of the feedstuffs offered the rabbits. Greens were recognised as a principal component in rabbit feeding by many workers (SLADE and HINTZ, 1969 ; CHEEKE, 1983 ; ADUKU, 1988). Of all the greens offered, *Amaranthus sp.* was adjudged the most popular. This also was noted earlier in the study area (HASSAN *et al.*, 1988). The herders did not however take the rate of consumption of the various greens by the rabbits into consideration. ADUKU *et al.* (1989) reported low average daily consumption of various species of greens by rabbits in sub-humid zone of Nigeria. Evaluation studies need to be carried out on the identified greens to ascertain their level of acceptability by rabbits in semi-arid zone of Nigeria.

Methods of feeding differed from herd to herd depending on the type of feedstuffs fed. For instance, while the greens were mostly placed on the floor, cereal grains and offals were served in bowls. Problems associated with this feeding practice included contamination of feedstuffs with faeces and urine, and feed wastage. These would normally result in higher costs of feeding, particularly in the dry season when green vegetables are not readily available. These problems could be overcome by use of properly designed feeders and waterers. Daily feeding costs ranged from N3.00 to N20.0. Pipe-borne water was supplied *ad libitum* to all the studied rabbits.

Breeding management - Total number of breeding animals in the study herds was 77 (Table 2), with a mating ratio of 1 buck : 2.5 doe. DIM (1988) and ADUKU and OLUKOSI (1990) reported a mating ratio of one buck to 2-10 does. More than three-fourths of the herds had only one buck each. Age at first breeding was found to be 5.7 months. This falls into the range reported for medium breeds such as New Zealand White and Dutch (SANDFORD and WOODGATE, 1979). Two methods of mating were found in the study herds confined mating and group mating. The former was practised by majority of the keepers. Mating occurred at any time of the day but most preferably in the morning and evening. About 38 % of the raisers reported night mating. The identified methods of mating were more or less random as the mating partners were seldom selected or identified.

Pregnancy detection by palpation as practical by a few experienced keepers conforms with the practice on-station. Signs of pregnancy mentioned were increase in body weight, quietness, non-acceptance of males, and swelling of teats. Reported signs of approaching kindling included fur removal from the ventral region of the body, self isolation, and collection of rags and any other materials that can be used for nest-making. Preparations made for kindling by the keepers were placement of pots in the hutch, placement of rags and grasses near burrows and lining pots with cotton wool. The gestation period reported by the keepers ranged from 30 to 42 days. This wide range can be attributed to lack of proper record keeping.

Health management - Disease conditions found in the study herds included mange, skin inflammation and catarrh. Mange was the most common disease problem particularly in the herds raised in open yards. The keepers attributed the condition to poor sanitation and poor feeding. It was treated by use of any type of oil, especially, engine oil. The oil is applied topically on the affected part and left for sometime to dry. The treatment area is later scrapped using razor blade or bare fingers. Treatment of mange in this manner sounds novel. It could be seen as an aspect of traditional knowledge in animal husbandry that could be further investigated.

Skin inflammation was associated with contact of the eye with earth in the hole during burrowing. Viewed from another angle, it could also be due to poor sanitary conditions of the affected herds. Tick, cat and dog were the pest and predators encountered. Incidence of flies was also high.

Mortality and offtake - Mortality was found to be higher at the pre-weaning stage compared to post-weaning stager. Apart from deaths caused by diseases (1-2 cases per month), exposure of kittens to cold also contributed to losses in the herds. Mature rabbits were routinely taken from the herds to meet family meat need. Other reasons for offtake were herd size maintenance, especially the male animals, and fear of theft. Mean age at disposal was 5.29 months.

Production performance

Reproduction - Table 3 summarises the reproduction performance of the study rabbit herds. Litter size differed significantly at birth ($P < 0.05$) and at weaning ($P < 0.01$) among some selected herds (Table 4). Rabbits raised in cages recorded a significantly higher litter size at weaning ($P < 0.05$). Weaning rate was nil in the rabbits kept in the garage.

Table 3 : Reproduction performance of the study herds

Herd	Housing pattern	Litter Birth	Size Weaning	Weaning weight (g)	Weaning rate (%)
1	Cage	4.3	3.9	965	90.0
2	Garage	4.2	0.0	-	0.0
3	Cage	7.0	6.0	2400	86.0
4	Open-yard	2.5	2.0	480	80.0
5	Open-yard	5.0	4.0	880	80.0
6	Living-room	10.0	7.0	1890	70.0
7	Shed	2.5	2.5	775	100.0
8	Open-yard	5.0	3.0	810	60.0
9	Living-room	5.0	1.2	-	24.0
10	Open-yard	3.5	3.5	910	100.0
13	Cage	2.7	1.3	440	50.0
Mean		4.7	3.1	1061	67.2

Table 4 : Analysis of variance for litter size

Source of variation	d.f.	Means squares for litter size	
		Birth	Weaning
Herd	6	3.98*	3.86**
Housing pattern	1	0.04 ^{NS}	2.02*
Residual		0.82 (11) ^a	0.33 (10) ^a

Growth - Data for body weights of rabbits in the study herds were classified according to the patterns of housing (living-room exclusive for lack of sufficient data) and illustrated in Figure 1. Analysis of variance for effect of the two prominent housing patterns (cage and open-yard) on body weight of kittens (Table 5) showed that kittens raised in cages were significantly heavier than their counterparts raised on open-yard at 28 and 70 days ($P < 0.05$) and at 42 and 56 days of age ($P < 0.01$) (Table 5). This can be attributed to the opportunity for better husbandry practices offered by the cage. Rabbits kept in the garage recorded the lowest mean body weight at the various ages except at 14 days. Low rate of gain shown by this group can easily be explained by the non-suitability of the housing pattern ; the garage was poorly ventilated and filthy.

Table 5 : Analysis of variance for kitten weight, g

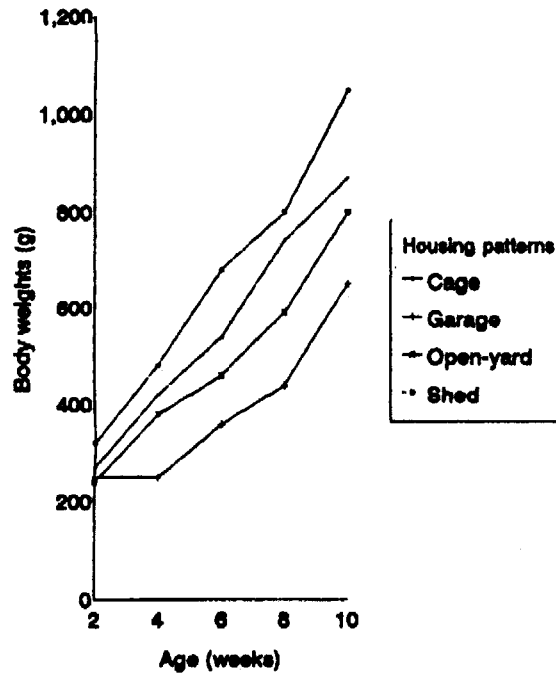
Source of variation	d.f.	Means squares of weights at different age (days)				
		14	28	42	56	70
Herd	7	0.008 ^{NS}	0.021*	0.067**	0.084**	0.048*
Housing pattern	1	0.009 ^{NS}	0.023*	0.061**	0.154**	0.030*
Residual		0.004 (41) ^a	0.005 (41) ^a	0.005 (33) ^a	0.002 (20) ^a	0.012 (15) ^a

* = $P < 0.05$

** = $P < 0.01$

a = degree of freedom

Figure 1 : Mean body weights (g) of kittens at different ages



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