SOME PRODUCTION PARAMETERS OF FOUR BREEDS OF GOATS REARED IN TRINIDAD AND TOBAGO

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SUMMARY

Data on some production parameters were collected from four breeds of goats reared intensively on the Government Farm, St. Joseph, Trinidad.

All animals were raised indoors. Kids were weaned from their dams within 24 hours of birth, followed by bucket-feeding of whole goats' milk up to 12 weeks of age. In addition, the kids were fed on a commercial dairy ration and forages.

The parameters determined for each breed were birth weight, weight at 12 weeks of age, average daily gain from birth to 12 weeks of age, sex ratios, prolificacy, breeding efficiency and mortality rates.

The mean birth weight of Anglo Nubian, Saanen, Toggenburg, and British Alpine kids were 3.25, 2.88, 3.36 and 3.68 kg, respectively. Males weighed 3.37 kg and females 3.07 kg. The mean birth weight of singles, twins and triplets were 3.51, 3.14 and 2.90 kg, respectively.

The mean weight at 12 weeks of age were 10.72, 11.47, 11.89 and 13.81 kg for Anglo Nubian, Saanen, Toggenburg and British Alpine, respectively. At the same age, males weighed 12.89 kg and females 10.21 kg. The 12-week weights of singles, twins and triplets were 11.62, 11.32 and 10.90 kg, respectively.

The average daily gain from birth to 12 weeks of age was 96g.

The average number of kids born per doe per litter in the herd was 1.62. British Alpine females produced the smallest litters (1.42) and Toggenburgs the largest (1.66).

At 12 weeks of age, the average number of kids weaned per doe per litter was 1.06 with a range of 0.71 to 1.25 for the herd.

Kid mortality for the herd over the five-year period ranged from 8 to 53 per cent. The loss of kids in the herd averaged 32 per cent over the five-year period.

Statistical analysis of the data indicated that the sex ratio in the herd was not significantly different from a 1:1.

Introduction

Goats are raised primarily for meat in the tropics and to a lesser extent for milk. They are very adaptable to small farming enterprises and backyard farming conditions. These animals are good forages and can survive and produce under poor feeding and mangement conditions. When feeding and management are improved, the goat is a very productive animal.

Goat farming can be profitable when management of the animal is directed towards improvement of production traits such as milk yield,

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growth rate, litter size and towards a reduction in the mortality of kids and young adults. Unfortunately, there is very little published information on these production traits in goats in the Caribbean.

The present study was therefore undertaken to evaluate data collected from four breeds of goats so as to assess birth weight, weight at 12 weeks of age, average daily gain from birth to 12 weeks of age and prolificacy and breeding efficiency of the breeds. Mortality from birth to 12 weeks of age and the sex ratios of the species were also determined.

Materials and Methods

Data for the study was collected from a herd comprising four breeds of goats reared on the Government Farm at St. Joseph, Trinidad, over a 5-year period from 1978 to 1982. During this period 280 kids were produced in 173 litters from Anglo-Nubian, Toggenburg, Saanen and British Alpine goats. These animals had been imported with a view to improving the production of meat and milk from the local Criollo breeds.

The animals were reared indoors throughout the year and were fed grass *ad libitum* and a commercial dairy ration. Kids were separated from their dams within 24 hours of birth and reared artificially in pens in groups of two or three animals per pen. Colostrum and whole goats' milk were bucket-fed to the kids until they were 12 weeks of age. Grass and a commercial dairy ration were offered from the fourth week of age. At 12 weeks of age, whole milk was totally withdrawn and concentrate ration was increased to 454g per day and grass was offered *ad libitum*.

The kids were dehorned when two weeks old and dewormed for the first time at 6 weeks of age. Deworming was repeated at regular intervals.

Birth weight of the kids was recorded within 24 hours of birth and they were weighed again at 12 weeks of age. The average daily gain was calculated from these weights. Type of birth (i.e. single or multiple), sex and mortality were also recorded.

Models using the available data on bodyweight and weight gain were developed and analysed according to the method described by Nelder and Wedderburn (1972) on the UWI ICL ME29 Computer using the GLIM system (Nelder, 1974). Chi square tests of significance were used in analyzing the remainder of the data.

Results and Discussion

The mean birth weight, 12 weeks weight, average daily gain from birth to 12 weeks of age, sex and type of birth by breed are presented in Table 1.

Birth weight: The mean birth weight of the 280 kids was found to be 3.21 ± 0.04 kg with a range for breeds of 2.88 to 3.68 kg. British Alpine kids were the heaviest and Saanen kids the lightest.

There were no significant ($P > .05$) differences in birthweight of the Anglo Nubian and Toggenburg kids.

Variations in birth weight between breeds are due mainly to genetic factors and differences in the birth weight of different breeds of goats have been reported by Keeping (1951) and Devendra (1962).

The results of Table 1 indicate that male kids at birth were significantly ($P < 0.01$) heavier than females by 0.30 kg. These results are similar to those reported by Keeping (1951) and Devendra (1962) for exotic breeds of goats in Malaysia. Sacker and Trail (1966) and Ali (1980) reported that the males of indigenous breeds of goats in Uganda and India were on an average significantly heavier than females at birth.

The differences in the birth weight of kids born as singles and those in larger litters (triplets) were significant. ($P < 0.01$) (Table 1). Single kids weighed 0.60 kg more than those born as triplets and 0.37

kg more than those born as triplets and 0.37 kg more than those born as twins. Differences in the birth weight of kids born in small and large litters have been reported by Epstein and Herz (1964) and Devendra and Burns (1970). The latter authors have summarised the results of a number of studies with similar findings.

Weight at 12 weeks of age: The mean 12 weeks weight of 184 kids was 11.30 ± 0.17 kg with a range of 10.72 to 13.81 kg (Table 1). British Alpine kids were significantly ($P < 0.05$) heavier than those of the other breeds. Anglo Nubian kids were the lightest. There were no significant ($P > 0.05$) differences in the 12 weeks weight of Saanen and Toggenburg kids. Devendra and Burns (1970) reported 12 weeks weight of indigenous breeds of goat in Malaysia to be lower than those found in the present study. In The Bahamas, Wilson *et al* (1980) observed that the 90-day weaning weight of Anglo Nubian and Anglo Nubian crossbred kids reared with their dams on pasture were similar to those observed in this study.

At 12 weeks of age male kids were significantly ($P < 0.01$) heavier than females by an average of 2.68 kg. Similar results have been reported by Wilson (1958) and Devendra (1966). In contrast, Ali (1980) observed that Black Bengal female kids were heavier than the males from eighth to the thirteenth week of age.

There was no significant ($P > .05$) differences in the bodyweight of the kids at 12 weeks of age with respect to the type of birth but there was a trend for kids born as singles to be heavier than those born as twins or triplets. Wijeratne (1968) found that for non-descript breeds of goats in South India, kids born as triplets were significantly lighter than kids born as singles when they were raised with their dams. This apparent conflict with the results obtained in the present study may be attributed to the fact that the kids in this study were reared artificially in pens and fed individually with approximately equal amounts of the same rations, thus eliminating any advantages to be gained from the milking ability of the individual does.

Average daily gain from birth to 12 weeks of age: The mean daily gain of the 184 kids from birth to 12 weeks was 96 ± 2g (Table 1).

British Alpine kids gained significantly ($P < .01$) faster than Anglo Nubian, Toggenburg and Saanen kids. The Anglo Nubian kids made the slowest rate of gain per day while the gain per day of Saanen and Toggenburg kids was similar.

The average daily gain of male kids was significantly ($P < 0.01$) greater when compared to females. Wilson (1958) reported similar findings. As with average weight at 12 weeks, type of birth had no significant ($P > 0.05$) effect on average daily gain of the kids. Kids born as singles had no advantage in average daily gain over those born as triplets. The differences observed by Sacker and Trail (1966) were not detectable in the present study because the kids were reared artificially thus eliminating the maternal effects of the individual does.

Prolificacy

Table 2 shows a distribution of the number of litters and the number of kids born to each breed in the herd. Multiple births were recorded for more than 50 per cent of the litters. Triplets were recorded for 8 per cent of the litters and were confined to Anglo Nubian and Saanen does only. Toggenburg does produced the most twins (67 per cent).

The average number of kids

born per litter was 1.62 with a range of 1.42 to 1.66. Litter sizes ranging from 1.27 to 2.45 kids per litter have been reported by Devendra and Burns (1970) for different breeds of goats reared in the tropics. Devendra (1962) observed that the prolifiacy of the indigenous goats in Malaysia increased as the proportion of exotic blood increased in the indigenous population.

Litter sizes in the present study are about average and may be increased with improved herd management.

Breading Efficiency

Breeding efficiency in the herd is measured by the number of kids weaned by the individual doe per litter or the number of kids weaned per doe per year. Survival of kids beyond weaning has a direct bearing on the number of kids available for sale after selection for herd replacements.

The survival of kids at 12 weeks of age is presented in Table 3. Only 68 per cent of the kids born in the herd reached 12 weeks of age. Survival rates for the different breeds were Saanen 77 per cent, Toggenburg 67 per cent, Anglo Nubian 63 per cent and British Alpine 50 per cent. The differences in survival rates between breeds were not significant ($P > .05$). The average litter size at 12 weeks was 1.06, with the range for the different breeds being 0.71 to 1.25. The number of kids weaned per doe in the present study is low when compared with results reported by Payne and Miles (1953) who reported that goats in Fiji weaned two or more kids per litter when reared with their dams from birth.

Kid Mortality

The mortality of kids from birth to 12 weeks old is presented in Table 4. Thirty-two per cent of the kids died before they were 12 weeks old. Losses varied from year to year being high in the earliest years and greatly reduced in 1981. The reduction in 1981 has been attributed to improved management. Chi square tests indicated that there were no significant differences ($P > 0.05$) in the losses according to breed, sex and type of birth.

Studies reported by Ahmed and Tantawy (1960), Sacker and Trail (1966) and Minett (1950) recorded mortality rates ranging from 24 to 55 per cent per annum. Sacker and Trail (1966) observed highest losses in litters with twins and triplets and found that 55 per cent of the triplets raised out doors with their dams died before they were 3 weeks old. They also observed a significant reduction in losses when kids were housed continuously for the first three weeks of life and allowed to suckle their dams in a controlled environment.

In the present study, the loss of singles, twins and triplets were 39, 35 and 24 per cent, respectively. The lower losses observed here among twins and triplets can be attributed to the fact that the kids were reared indoors in a controlled environment and fed individually.

Sex Ratio

Table 5 shows that there were more female kids (54 per cent) born in the herd than males. Anglo Nubian and British Alpine breeds produced more females than males while Saanen and Toggenburgs produced a higher percentage of male then female kids. However, the sex ratio in the whole herd was not significantly ($P > .05$) different from a 1:1 ratio. When analysed according to breed, there were no siginficant ($P < .05$) differences in the male:female ratio. The tendency for more females than males observed in the present study was also noted by Devendra and Burns (1970) from a review of 13 published studies.

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TABLE 1: Mean Birthweight, 12 Weeks Weight and Average Daily Gain of Four Breeds of Kids

Classification	Birthweight			12 Weeks Weight[1]			Average Daily Gain (birth to 12 weeks)		
	No. of Kids	Mean (kg)	SE±	No. of Kids	Mean (kg)	SE±	No. of Kids	Mean (kg)	SE±
ALL KIDS	280	3.21	0.04	184	11.30	0.17	184	96	2
Breed:									
Anglo Nubian	150	3.25	0.05	94	10.72	0.24	94	91	2
Saanen	65	2.88	0.07	50	11.47	0.33	50	102	3
Toggenburg	45	3.36	0.09	30	11.89	0.43	30	102	4
Br. Alpine	20	3.68 **	0.13	10	13.81 *	0.73	10	119 *	8
Sex:									
Males	130	3.37	0.05	90	12.89	0.23	90	107	2
Females	150	3.07 **	0.05	94	10.21 **	0.23	94	87 **	2
Type of Birth									
Singles	80	3.51	0.08	49	11.62	0.34	49	98	3
Twins	150	3.14	0.05	103	11.32	0.24	103	97	2
Triplets	42	2.90 **	0.09	32	10.90 ns	0.42	32	94 ns	4

Notes: [1] Kids weaned at day old and reared artificially in pens on whole milk, grass and concentrates up to 12 weeks of age.
* ($P < 0.05$)
** ($P < 0.01$)
ns Not significant

TABLE 2: Prolificacy of Four Breeds of Goats

Breed	No. of litters	Total No. of kids born	Per cent of litters			Average litter size at birth
			Singles	Twins	Triplets	
Anglo Nubian	92	150	48	41	11	1.63
Saanen	40	65	48	42	10	1.63
Toggenburg	27	45	33	67	0	1.66
Br. Alpine	14	20	57	43	0	1.42
ALL BREEDS	173	280	46	46	8	1.62

TABLE 3: Survival of Kids at 12 Weeks of Age

Breed	Survival at 12 weeks of age			Average No. of kids per litter at 12 weeks
	No. born	No. weaned	Per cent	
Anglo Nubian	150	94	63	1.02
Saanen	65	50	77	1.25
Toggenburg	45	30	67	1.11
Br. Alpine	20	10	50	0.71
ALL BREEDS	280	184	68	1.06

TABLE 4: Mortality of Kids from Birth to 12 Weeks of Age

Year	No. born	No. weaned	Per cent weaned	Per cent loss
1978	58	27	47	53
1979	58	36	65	35
1980	45	29	64	36
1981	47	43	92	8
1982	75	49	65	35
TOTAL	280	184	68	32

TABLE 5: Sex Ratio of Kids at Birth

Breed	No. of litters	No. of kids born	Per cent		Sex ratio
			Males	Females	
Anglo Nubian	92	150	42	58	.72
Saanen	40	65	51	49	.97
Toggenburg	27	45	55	45	.80
Br. Alpine	10	20	45	55	.82
ALL BREEDS	173	280	46	54	.87