

THE REPRODUCTIVE PERFORMANCE OF THE WEST AFRICAN DWARF
(FOUTA DJALLON) GOAT

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An analysis was carried out on the reproductive performance of 85 West African Dwarf (Fouta Djallon) goats (WAD) over an eight period (1972-79) under semi-intensive management at the University of Ibadan Farm, Nigeria. The work was undertaken in order to provide some basic information on the reproductive potential of WAD goats. A total of 176 kiddings involving 319 kids were analysed. The parameters used include: Age at first kidding, kidding intervals, annual kidding rate, birth weight and prolificacy. Seasonal effect and monthly distribution of kidding were also monitored.

The results showed the following means: age at first kidding was 19.8 months, kidding interval 242.3 days, annual kidding rate 1.68, birth weight 1.20 kg and prolificacy 181.30%. Kidding was all the year round, and there was no significant effect of season on the kidding pattern. Singles, twins and triplets were 19.4, 53.3 and 27.3%, respectively. Percentage incidence of 38.6, 7.4 and 5.7 was recorded for early mortality, stillbirths and abortions, respectively.

These results showed that the West African Dwarf goats are early maturing, prolific and non-seasonal breeders. It is suggested that with a proper breeding programme, including selection and improved system of management the West African Dwarf goat has great potential for increased productivity.

Key words: Age at first kidding, kidding interval, annual kidding rate, birth weight, prolificacy, season, West African Dwarf (Fouta Djallon) goat

Environmental and genetic differences have been associated with the differences observed in the reproductive performance of different breeds of goats (Maule 1949; Devendra 1962; Sacker and Trail 1966). There is a need therefore to study the reproductive performance of the West African Dwarf (WAD) goat in the humid tropical environment where information about the performance of these animals is scant. In Nigeria goat production is significant and large numbers are sold annually. Apart from being the major source of animal protein, the skins are of economic importance.

In spite of the importance of goats, comparatively little work on their production has been done, and practically none, in the area of breeding for improvement. It is important that an appraisal of the local goats should be made to assess their genetic value per se and as possible contributors to any breeding plans. Such information will be useful in recommending improvement programs with either the use of indigenous stock alone or as part of cross breeding schemes or substitution of native by exotic breeds.

This paper therefore is an attempt to evaluate the reproductive performance of the WAD does and to assess their reproductive potential. It is the full text of a paper presented at the third international conference on Goat Production and disease at Tucson, Arizona, USA 1982 (Osugwuh and Akpokodje 1982).

Materials and Methods

The data for this study were collected from a flock of original population of 85 goats under semi-intensive system of management at the University of Ibadan Farm, in a typical humid tropical zone in Southern Nigeria.

The animals were grazed in the morning and late afternoon and kept inside a barn with concrete floors and aluminium roofing during the hot hours of the day and at night. They were provided with a diet of cut Giant star grass/legume (*Cynodon nlemfuensis*/*Centrosema pubescens*), supplemented by a cereal concentrate feed, made up of the following percentage composition: yellow maize 62.5 brewer's grain 20.0, palm kernel cake 15.0 urea 1.5, mineral mix 0.5 and salt 0.5. The animals were fed the concentrates once a day at the rate of 0.5 - 0.6 kg per head. Health precautions included foot baths for all goats leaving and entering the house, routine deworming, dipping and vaccinations. The flock was bred all year round and thus provided animals for various experiments on the farm. Five bucks were allowed to run with the 85 does. There was no proper breeding or selection programs within the herd. Weaning was not practiced. Records of kiddings, type of birth, sex, birth weight, and reproductive wastage were kept.

Table 1:
Reproductive performance of West African Dwarf does

Trait	Values
Age at first kidding, months	19.82 ± 4.60
Kidding interval, d)	242.33 ± 50.63
Annual kidding rate	1.68 ± 0.25
Birth weight, g	1.20 ± 0.24
Prolificacy, %	181.30
Mortality, % (first three months)	38.60
Stillbirth, %	7.39
Abortions, %	5.70

± Standard deviation

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The present analysis covers an eight year period (1972-1979) involving 176 kiddings and 319 kids. The parameters studied include age at first kidding, kidding interval, annual kidding rate, birth weight, prolificacy and the type of birth (singles, twins, triplets etc). Seasonal effect and monthly distribution of kidding were also monitored. The expected seasonal kidding for the contingency table (Table 3) was calculated using the method described by Little and Hills (1975).

Results

The results for reproductive performance are shown in Table 1. An analysis of the age at first kidding, the kidding interval and birth weight showed that 71.0, 47.1 and 60.4 percent respectively were below the mean values.

Details of the kids born are shown in Table 2. The sex and birth weight of 52 kids were not recorded. Among the 267 kids whose sexes were recorded at the time of birth 50.9 and 49.1 percent were males and females respectively (Table 2).

There was no significant effect of season on the pattern of kidding (Table 3). Kidding occurred all the year round. There was a marked drop in the number of kiddings and kids during the month of March while November and December showed peak periods in the number of kidding and kids (Figure 1).

Table 2:
Type and sex of births of the West African Dwarf does

Parameters	Total borned	%
Kids	319	-
Singles	62	19.44
Twins	170	53.29
Triplets	87	27.27
Males	136	50.94*
Females	131	49.06*
Undetermined sex and weight	52**	16.30

* Based on a total of 267 kids

** Todos murieron el primer día de nacidos

Table 3:

Contingency table relating seasonal kidding pattern in West African Dwarf does (observed kiddings are the main entries, expectations in brackets)

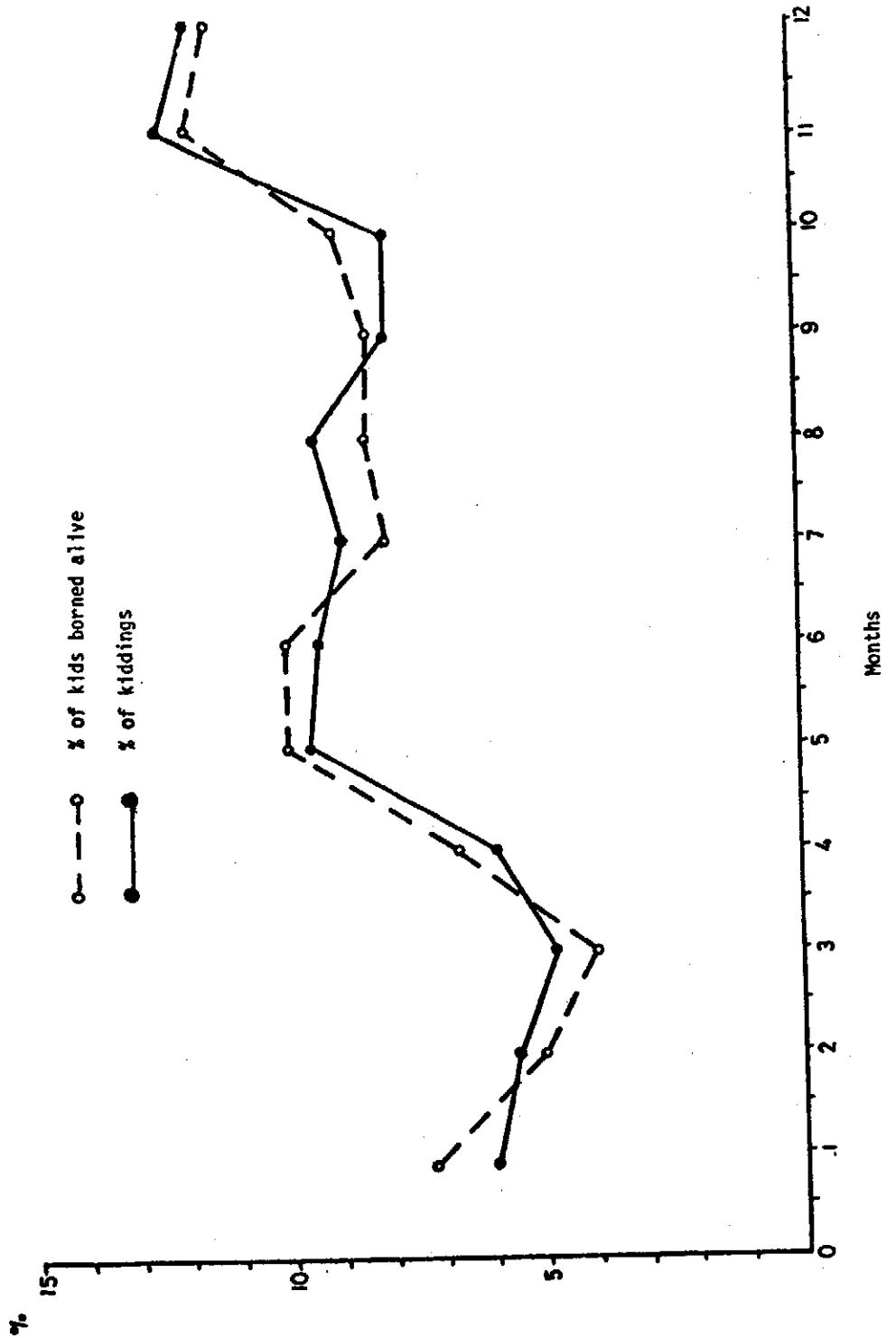
Year	Rainy season		Total
	Rainy (April-Oct)	Dry (Nov-Marzo)	
1972	11 (9.0)	4 (6)	15
1973	13 (12.6)	8 (8.4)	21
1974	17 (16.3)	10 (10.7)	27
1975	18 (19.3)	14 (12.7)	32
1976	14 (15.1)	11 (9.9)	25
1977	16 (19.3)	16 (12.7)	32
1978-1979	17 (10.2)	7 (9.5)	24
Total	106	70	176

* Calculated $\chi^2 = 8.81$
 Table χ^2 at 5% level = 12.592
 χ^2_2 - Value not significant, ($P > 0.05$)

Discussion

A close look at most of the reproductive traits of the WAD does presented in this study showed a better performance than has generally been described. Devendra and Burns (1970) noted that kidding at an early age ensures economic goat production, greater population turn-over and rapid genetic progress. The present work showed a range of 12.8 - 26.5 with a mean value of 19.8 months as the age at first kidding of the WAD does. The fact that 70 percent of these animals had their first parturition at an age less than the mean value given here support a recent publication by the International Livestock Centre for Africa (ILCA 1980). It was reported that 12 months was the age at first kidding of the WAD does at the village level in Southern Nigeria where the goats are monthly scavengers among human settlements and where mating is unrestricted. The WAD goat is therefore one of the breeds of goats that kid at a very early age comparing favourable with such breeds as Maltese, Negev, Syrian Mountain and Saanen in Israel whose ages at first kidding range from 12-24 months (Epstein and Herz 1964). The wide range observed here gives an indication of the great potential the WAD goats have for genetic improvement in a proper breeding and selection programme.

Figure 1:
Percentage monthly kiddings and kids borned alive in the West African Dwarf does



The mean kidding interval (KI) (period between two consecutive kiddings) in the WAD does was found to be 242.33 days with a range of 172-431. This compares favourably with 240-270 days given for native breeds of goats in India (Kantha 1937), 240 days for local breeds in Serdang and Malaysia (Devendra 1962) and the average value of 258 with a range of 175-310 days for dwarf goats in Ghana (reported by Vohradsky and Sada 1973, cited by ILCA 1979). However it was noted that about 53% of the WAD does had more than the mean value as their kidding interval. The high value may be due to among other factors, abortion which has been associated with prolonged KI; (Devendra and Burns 1970). Nonetheless, the mean KI of the WAD does was still better than for most does from other countries. For example, Devendra (1962) gave an average KI of 480 days for Anglo-Nubian goats and 328 days was reported for South Indian goats in Ceylon (Wijeratane 1968). The few WAD does with a KI as low as 172 days as reported here, may be due to the high rate of kids mortality (21.6%) at the first day of life and stillbirths (7.4%); consequently most of the does must have conceived within two months postpartum for oestrus within this period has been reported in most tropical breeds of does (Devendra and Burns 1970) and a range of one to two months in Barbari goat (Sahni and Roy 1967).

Information available on birth weight of various breeds of goats in the tropics show clearly that the mean birth weight (1.20 kg) of the WAD kids is about the lowest. Mean birth weights as high as 3.7 for single males, 3.5 for twin males, 3.3 for single females and 3.5 kg for twin females have been reported for Damascus breeds of goats in Israel (Epstein and Herz 1964). The lowest recorded mean birth weight was 1.3 for single male and 1.1 kg for single female Black Bengal goats in India (Guha *et al* 1968). It is a fact that there may be considerable differences in the birth weight of goats due to differences in breed and environment (Devendra and Burns 1970) but a situation where the birth weight has been shown to play a significant role in the early mortality of the WAD kids (Osugwuh and Akpokodje 1981) and where the birth weight ranges from 0.90 - 1.51 kg, as reported here, calls for urgent attention to both the genetic and environmental factors to ensure higher birth weight. This could be done through selective breeding, which has been associated with increased birth weight (Devendra and Burns 1970) and intensive research on the nutritional needs of the WAD does during gestation.

Unlike the annual kidding in European goats Maule (1949) and Devendra (1962), the WAD does had a mean annual kidding rate (KR) of 1.68 with a range of 1.0 - 2.0. The difference seemed to be mainly of genetic origin as French Alpine female goats coming from Europe but born and bred in a tropical climate, maintained their short, and once a year reproductive season (Cognie 1971 cited by Corteel 1973).

However, the mean value of 1.68 (KR) observed here supports earlier findings from several tropical countries such as East Africa (Lowe 1943), Fiji (Payne and Miles 1953) and Ghana (Oppong 1965 cited by Devendra and Burns 1970). The wide range of KR observed here showed that some of the does could kid up to two times in a year. A similar report has been made on Black Bengal goats in Pakistan by Masud (1964). The range again shows that the WAD does have great potential for improving their reproductive capacity.

Prolificacy of the WAD does (181.30%) compares well with other goats of the world. However percentage values as high as 245, 229 (Delaitre 1965 cited by Devendra and Burns 1970) and 204 (Moulick *et al* 1966) have been reported for Anglo-Nubian X Local, Anglo-Nubian and Black Bengal goat respectively. This shows that there may be breed differences among goats and that cross breeding may bring better performance presumably due to heterosis (Devendra and Burns 1970). The present finding in WAD does showed high rate of multiple births and therefore fast rate of population turnover.

It is interesting to note that at village level in Southern Nigeria the WAD does showed a prolificacy of 146% (ILCA 1980). The difference may be as a result of better management including good pasture, supplementary feed and disease control that existed in the University of Ibadan Farm than at the villages where the animals virtually take care of themselves. This shows the need for improved management in the overall economic goat production in Nigeria.

Multiple births especially twins were common in the WAD does (Table 2). Combined estimates for twin and triplets accounted for 80.6% of the 319 kids recorded. The WAD does compared favourably in prolificity with such prolific breeds as the dwarf goats in Ghana (Oppong 1965 cited by Devendra and Burns 1970), and the Black Bengal goats (Moulick *et al* 1966). The WAD does also showed a superior performance in terms of multiple births when compared with East African goats with 10.15% twining incidence (Mason and Maule 1960) and 30% twining estimate for Mubende goats in Uganda (Sacker and Trail 1966).

Even though more kiddings (60.2%) occurred during the rains (April - October) than during the dry season (November - March), the season of the year had no significant ($P > 0.05$) effect on the kidding rate (Table 3), indicating that kidding occurred all the year round. Similar observation has been made in Dwarf goats in Southern Ghana (Devendra and Burns 1970). However, a peak in kidding rate did occur in November and December.

Vohradsky and Sada (1973) observed a peak in kidding around April and a small peak around September in dwarf goats in Ghana. This would imply that while the Nigerian dwarf goats showed conception peaks in July and August those of Ghana occurred in November and May. It has been reported that most WAD kid died die during their first three months of life in Nigeria during the rains (Osuagwuh and Akpokodje 1981), it seems that increased goat production in Nigeria could be achieved by maximising the period of high kidding rate (November - December), provided there is an improved supply of pasture and supplementary feed to the dams because of the scarcity of grass at this time of the year.

Conclusion

The results obtained in this study showed that the WAD goats are early maturing, prolific and non seasonal breeders. They compare favourably, if not better, in most of the characteristics considered when compared with similar reports on tropical goats elsewhere. It is suggested that with a proper breeding programme, including selection and improved system of management the genetic potential in the West African Dwarf goat could be maximised to ensure increased productivity with increased birth weight and minimisation of reproductive wastage.

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References

- Corveel J M 1973 L'insemination artificielle caprine: bases physiologiques, etat actuel et perspectives d'avenir. World Review of Animal Production 9:73-99
- Devendra C 1962 Upgrading of local goats by the Anglo-Nubian at the Federal Experimental stations, Serdang Malaysia Agricultural Journal 43:265-280
- Devendra C & Burns M 1970 Goat production in the tropics. Tech Commun No 19, Commonwealth Bureaux of Animal Breeding Genetics Commonwealth Agricultural Bureaux XII + 184
- Epstein M & Herz A 1964 Fertility and birth weights of goats in subtropical environment Journal of Agricultural Sciences, Cambridge 62:237-244
- Guha H, Gupta S, Mukherjee A K, Moullick S K & Bhattacharya S 1968 Some causes of variation in the growth rates of Black Bengal goats Indian Journal of Veterinary Science 38:269-278
- ILCA 1979 Small ruminant production in the humid tropics Systems study No 3, Addis Ababa, Ethiopia, III + 122
- ILCA 1980 ILCA Bulletin 7 Addis Ababa, Ethiopia 8
- Kartha K P R 1937 A preliminary study of the influence of accessory factors on the production of milk by Indian goats. Indian Journal of Veterinary Science 7:113-132
- Little T M & Hills F J 1975 Statistical methods of Agricultural Research, University of California, Davis 1x + 242
- Lowie H J 1943 Goats as a source of milk in tsetse areas. East African Agricultural Journal 8:238-240
- Mason I L & Maule J P 1960 The indigenous livestock of Eastern and Southern Africa. Tech Commun Commonwealth Bureau and Animal Breeding Genetics. Edinburgh No 14 Farnham Royal Bucks Commonwealth Agricultural Bureaux XV + 151pp + 48 plates
- Masud M 1964 Black Bengal goats in East Pakistan Agriculture, Pakistan 15:230-235
- Maule J P 1949 Breeding for milk in a Mediterranean environment Pt II Goats Imperial Journal of Experimental Agriculture 17:37-47
- Moullick S K; Guha H, Gupta S, Mitra D K & Bhattacharya S 1966 Factors affecting multiple birth in Black Bengal goats Indian Journal of Veterinary Sciences 36:154-163
- Osuagwuh A I A & Akpokodje J U 1981 The West African Dwarf (Fouta Djallon) goat I. cause of early mortality. International goat and sheep research 1:303-309
- Osuagwuh A I A & Akpokodje J U 1982 The West African Dwarf (Fouta Djallon) goat II. Reproductive performance Proc 3rd Int Conf on Goat Production and Disease, Tucson, Arizona usa 368
- Payne W J A & Miles N S 1953 Goat-husbandry in Fiji. A report on the results from the Goat Breeding Project at Sigatoka for the period June 1950 - January 1953 Agricultural Journal, Department of Agriculture, Fiji, 24:11-17
- Sacker G D & Trail J C M 1966 Production characteristics of a herd of East African Bubende goats. Tropical Agriculture 43:43-51
- Sahni K L & Roy A 1967 A study of the sexual activity of the Babari goat (capra hircus L) and conception rate through artificial insemination. Indian Journal of Veterinary Science 37:269-276
- Wijeratana W V S 1968 The production trails of a non-descript breed of South Indian meat goats. Tropical Agriculture 45:39-45

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