

# OPTIMAL BREEDING AGE FOR THE WEST AFRICAN DWARF SHEEP IN IBADAN

L.O. NGERE, K.E. AKINULI & I.O. ADELEYE  
(University of Ibadan, Ibadan, Nigeria)

## ABSTRACT

Observations on the age at first breeding of West African Dwarf Sheep at the University of Ibadan, Nigeria showed that the optimal age and weight at 1st breeding of young ewes was not less than eleven months and at least 13kg respectively.

When mated earlier, the incidence of abortion increased and lambs tended to be smaller at birth. In ewes mated at older ages the lengthening of the generation interval was unacceptable.

The relationship between weight (Y) and age (X) from four to 56 weeks was estimated as:

$$Y \text{ (kg)} = 3.12 + 0.62X - 0.02X^2 + 0.0002X^3 \text{ for singles.}$$

or  $Y = 2.59 + 0.46X - 0.01X^2 + 0.0001X^3 \text{ for twins.}$

## INTRODUCTION

Generally, the sooner an animal is bred after birth, the shorter will be the generation interval and consequently the faster the genetic progress on account of the inverse relationship between the generation interval and the rate of genetic progress. But that an animal has attained puberty (i.e. is physiologically capable of conceiving) may not mean that she can optimally carry the heavy burden of pregnancy and birth. In fact, it has been observed that the first estrus in the West African Dwarf sheep (WAD) can occur as early as at four months (Blay-Mensah, 1973); but at four months most ewe lambs at the University of Ibadan farm weighed 9.2, 7.7 or 6.8 kg if they were born single, twins or triplets respectively (Akinuli, 1976). These weights were about 30% of the adult mature body weight, so it would

appear that these animals were still physically small for optimal child bearing functions. For these reasons, it was of interest to determine how soon, after puberty, the West African Dwarf sheep (WAD) are likely to be most fertile, when fertility was measured in terms of the proportion of ewes that became pregnant after exposure to fertile rams; the number that actually lambed; and the comparative birth weight of lambs in the different age group.

Because dates of birth are not usually available under the prevailing traditional systems, polynomial equation relating age to weight (which can be useful in predicting one variable from the other) were derived.

## MATERIALS AND METHODS

First, lambing records of 105 ewes collected on the farm from 1972 to 1975 inclusive were analysed with respect to the frequency distribution pattern of the age at first lambing. During that period, rams were run continuously with the ewes, and the ram — ewe ratio was about 1 to 15. Counting backwards five months for those ewes that lambed gave the most likely age at which they were conceived.

For experiment one, 42 gimmers aged from 6 to 12 months and which had not been exposed to rams were used. Their distribution with respect to age was as follows:

TABLE 1

Age and number of young ewes available for experiment one:

Age (months)	Number of animals
Less than 8	12
Less than 9	13
Less than 10	8
Less than 11	3
12 and over	6

Three rams aged 42, 35 and 29 months were joined to the ewes on December 3, 1975 and withdrawn January 31st 1976. The rams, penned separate from the ewes at night, were raddled with coloured markers before joining them to the ewes every morning of the experimental period. The sheep were let out daily to a 0.07 hectare paddock with pasture consisting mostly of *Cynodon* and *Stylosanthes* species. Supplementary concentrates were offered *Ad libitum* after grazing, in the afternoon. After they had been brought in, the ewes were checked for paint on their rumps—an indication that they had been bred. Records were kept on the breeding dates. Pregnancy diagnosis was carried out by a veterinary surgeon three months after withdrawal of the rams.

A chi-squared analysis was used to examine differences in the proportion of conceptions and successful lambings obtained in the different age group and was also used to test linear trend in these proportions (Snedecor 1967).

After analysis of the data from this experiment, a comparative examination was made of records of first lambing ewes (numbering 150) on the farm from 1972—77.

In experiment 2 a study of the relationship between age and weight from birth to breeding was carried out with 59 ewe lambs: 26 singles, 30 twins and 3 triplets. The lambs were weaned at three months. Their weights were taken monthly from one to 14 months. Polynomial regression techniques were used to study the changes of weight with age.

## RESULT AND DISCUSSION

Analysis of the past four years records gave a mean age at first lambing of 15.97 months with a range of 10—24 months. From figure 1 showing the age at first lambing, the modal age appeared to be between 11—17 months which were ages at which 70% of the 105 ewes lambed. It is generally accepted that the gestation period of the ewe (both temperate and tropical breeds) averages out to about 5 months (Asdell, 1964; Esminger, 1965; Terril, 1968; Williamson and Payne, 1968; Phillips, 1968). So by subtracting the assumed gestation period from the average age at first lambing, the average age at first breeding was estimated as 10.97 months with a spread, of 6 to 12 months. But this observed distribution, not being the result of a planned experiment, could be due to chance or some unidentified condition that might have resulted in differential opportunity for the ewes to be bred at differing ages. So the need for a more controlled study. This analysis of earlier records on the farm made it possible to concentrate on the more relevant age range in the actual experiment.

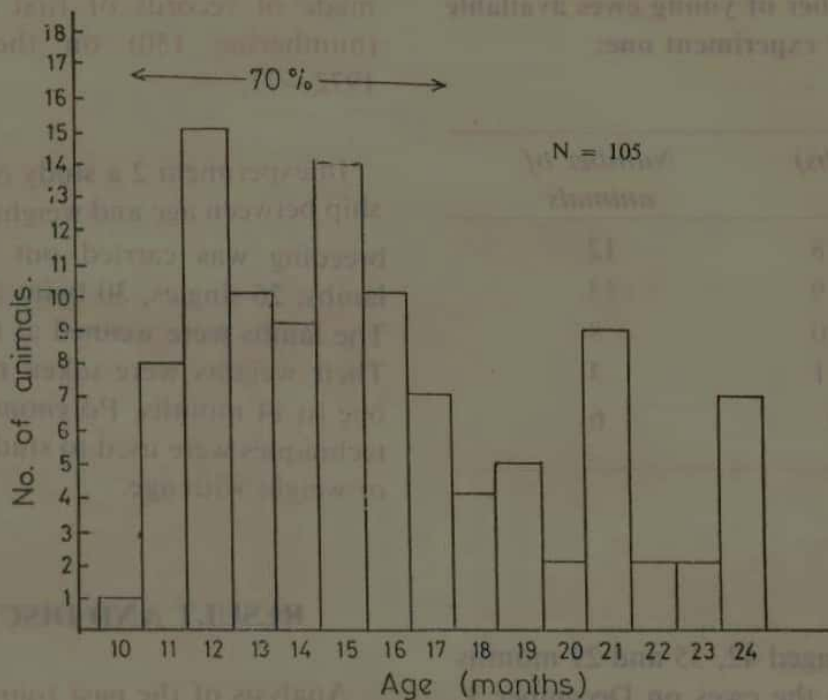


Fig.1 The relative frequency of age at first lambing in the W.A.D. ewes at the University Farm, 1972-1975.

Data summarised on Table 2 suggest that percentage pregnancy, successful birth, and average birthweights varied directly with the age groups. As there was no significant difference between the 11 and the 12 months and over age groups, the data for these were pooled in analysing and interpreting the results. After ex-

posure to the rams for two months all the ewes were deemed to have been bred. However, a check three months after breeding showed 58% of the ewes in the less than 8 months age group were open as against 25% for the 9 or 10 months group and none for the eleven months and over groups (Table 2).

TABLE 2

Percentage pregnancy, successful births, and average lamb weight of first lambing ewes in the different age groups.

Age (month)	No.	%			Average Birth Weight (kg)
		Open	Pregnant	Lambing	
Less than	8	58	48	17	1.6 ± 0.3
	9	23	77	54	1.7 ± 0.2
	10	8	25	75	38
11-3)		0	100	100	2.0 ± 0.4
	6)	9	0	100	100

The proportion of pregnancies in the various age groups were significantly different ( $P < .05$ ) and were tested by the chi-squared statistics as outlined by Snedecor and Cochran (1967). There was a strong linear trend, significant at  $P < .01$ , from the younger to the older age groups i.e. better conception rate and higher lambing percent as one moved from the younger to the older age groups. The animals that were open on examination were either never pregnant in the first place or were pregnant initially but lost the foetus through abortion. Of those that were confirmed pregnant in the younger age groups (i.e. under 10 months) only about half eventually lambed whereas all ewes confirmed pregnant in the 11 months and above group lambed successfully.

Lambs from older ewes tended to be heavier at birth. For example, the average birth weight of lambs from ewes bred at 8 months were about 0.4kg lighter than those bred at 11 months and older ages. However, the differences in the age groups with respect to birth weight, after correction had been made for sex and type of birth were not statistically significant ( $P < .05$ ). Of the 42 gimmers studied only 2 gave birth to twins and both were in the 11 months and age groups. The optimal age of 11 months in the actual experiment agreed with the value derived from the pre-experimental analysis of age at first lambing of 105 ewes. In that analysis, the average age of 1st lambing was 15.97 months and assuming a gestation period of five months would give an average age at breeding of 10.97 months which is very close to that 11 months from the experiment. As rams were always available to these ewes, age was apparently the only consistently variable factor and could be assumed to be responsible for differences observed for the ewes groups. This suggestion was further strengthened when additional information from 150 ewes at University of Ibadan flock from 1972—77

was considered, it was also observed that breeding the WAD at about 11 months of age resulted in the largest number of successful lambings. These findings suggest that the best age for first breeding of ewes, when managed as at the University of Ibadan Farm, was about 11 months.

For a growing animals, age and weight are closely related, the latter is in turn determined by hereditary and environmental factors including nutrition and climate, (Terril, 1968). It is therefore common to consider breeding age and weight of the animal together. Moreover, in most present tropical systems of management, especially under field conditions, an accurate record of the age of the animal is hard to come by so the weight of the animal (if available) could be a useful supplement to other methods of determining the age. As shown in Table 3, by 11 months all the ewes in experiment 2, irrespective of type of birth had exceed 40% of the average mature body weight which was estimated as the average weight of all open ewes three years and above. Therefore 11 months of age and at least 13kg liveweight would seem a useful practical guide. Regression analysis showed that weight of the young ewes increased in direct proportion to their age and that the phenotypic correlation between these 2 variables was high ( $r = 0.98$ ) and significant ( $P < .01$ ). Though this relationship could be approximated by linear regression, significant increases in accuracy were obtained by using higher degree polynomials. Fore example, with a third degree polynomial, the accuracy of predicting weight by age, as estimated by the coefficient of determination, was as high as 99.4%. Higher degrees (i.e. 4th or 5th degrees) gave increases in accuracy in the magnitude of fractions of one percent and so were not considered important. The prediction equations for ewe lambs born as singles or twins were estimated respectively as:

$$Y(\text{kg}) = 3.12 + 0.62x - 0.02x^2 + 0.0002x^3$$

$$Y(\text{kg}) = 2.59 + 0.46x - 0.01x^2 + 0.0001x^3$$

where Y designates weight for age x in weeks. The standard error of the estimates, the same in each case, was 0.45kg. The 3 records on triplets were considered too few deriving such general relationships. The standard errors for the x, x<sup>2</sup> and x<sup>3</sup> coefficients which again were similar for both singles and twins were 0.17, 0.0065 and 0.0007 respectively.

If weight alone were available, the age

of the young ewe could similarly be estimated by the following prediction equation:

$$Y(\text{weeks}) = 3.23 - 1.18x + .075x^2 - .001x^3 \text{ for singles}$$

$$Y = 2.25 - 0.72x + .080x^2 - .001x^3 \text{ for twins.}$$

The weight (x) being in kilogrammes.

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TABLE 3

Young ewe weight at fixed age as % of adult weight\*

Type of Birth	No. of Animals	Age (month)									
		4	6	7	8	9	10	11	12	13	14
Single	26	31	40	42	45	48	50	52	57	65	74
Twins	30	26	32	34	34	37	43	45	50	55	58
Triplets	3	23	31	31	31	33	40	43	40	48	—

\*Estimated as 29.16 kilos @ over 3 years.

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