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Effect of age at breeding on reproduction in Local Sheep.

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Abstract

Forty nulliparous West African Dwarf and Permer x West African Dwarf crossbred ewes were used in two separate experiments to study the effect of eight breeding groups (6, 7, 8, 9, 10, 11, 12 and 13 months) on weight at breeding, gestation length, frequency of twinning, birth weight, frequency of stillborn, placenta weight, frequency of milk ejection and weaning weight.

In the first experiment, four out of five West African Dwarf ewes in the six month age group showed heat. After breeding the estrous ewes, only one appeared pregnant but later returned to heat about 57 days post breeding. All the ewe in the 7 month age group showed heat and after breeding only one was pregnant which later aborted about 131 days post breeding. All West African Dwarf ewes bred between the ages of 8 - 13 months were pregnant and successfully went to term. There were significant differences in breeding weight and birth weight among the ewes in age group 8 - 13 months. On the whole breeding at 8 months of age appeared to have the same effect as breeding at a later age. Age and breeding weight were significantly correlated. One out of thirty fetuses (one fetus from group 10) was stillborn and there was 100% milk ejection.

In the second experiment, three out of five Permer x WAD ewes assigned to the 6 month age group showed heat but after breeding none became pregnant. All ewes in 7 month age group showed heat but after breeding all showed heat regularly except two which later returned to heat 43 and 47 days (respectively) post breeding. All Permer x WAS ewes bred between the ages 8 - 13 months were pregnant and successfully went to term. Of the age groups that went to term, there was no difference amongst them in all the variables studied except in placenta weight. There was no significant correlation between age and anyone of the variables measured.
Key words: West-African-Dwarf Ewe, Age, Reproduction.

Introduction

First estrus is usually taken to represent the onset of puberty in mammalian livestock. Edey *et al.* (1978) indicated that a more adequate definition of puberty must include both the requirement to ovulate and to stand sufficiently long enough to permit inse mination (or proper mounting intromission and ajaculation leading to semen deposition at the proper position in the genital tract). This means that the better the quality of estrus, the higher the chances of increased fertility through increased probability of egg sperm contact. Chiboka (197[illegible]) Edey *et al.* (1973) checked heat in a ewe by put[illegible] each selected ram in a pen with an estrous ewe fo[illegible] minutes within which the ram served the ewe. A ewe was not in heat if it failed to show standing heat during this period. Watson and Martin (1977) found that significantly more ewe came in estrus per unit time in the interval 7.00 a.m to 3.00 p.m than the other 16 hours of the day.

Age and body weight at the time of mating has been correlated to quality of estrus and fertility in Corriedale, Romney or Border Leicester x Merino ewes (Coop, 1962; Killean, 1967) and a less distinct relationship was observed for maiden merino ewes(Kennedy and Kennedy, 1968; Prud'hon *et al.* 1968). However, McInnes and Smith (1966) and Entwistle (1968) did not find a significant relationship between fertility and body weight of merino ewes. Watson and Martin (1977) concluded that neither a single measurement of body weight on the day of artificial insemination nor the age of merino ewes was correlated with non return rate to heat.

Dyrmundsson (1973), Edey *et al* (1978) found that puberal lambs when mated gave lower lambing performance (number of ewes born/number of ewe mated) than mature ewes. Bukowski *et al.* (1960) found no differences in age and reproductive efficiency. However, Desai and Winters (1951), Johansson and Hansson (1943) found that lambing percentage increased with age.

Position of implantation of the conceptus affects the weight of the fetus and placenta. Ibsen, 1928, Waldorf *et al.*, 1957, Eckstein *et al.* (1955) found that fetal and placenta weights tended to decrease from the ovarian end of a horn to the middle, with an increase again near the cervical end. Marais and Pretorius (1976) found that lambs' birth mass increased in weaning mass with increase in dam age.

The objective of the trials reported here was to determine whether any advantage is gained in breeding West African Dwarf and Permer x WAD ewes from the age when estrus was first observed as opposed to subsequent age groups when majority of them was successfully bred in University of Ife farm.

Materials and methods

First estrus was taken as the onset of pubert in this experiment. The age at which the first estrus was shown was the age at which the breeding trials started. Ewes were tested for first estrus beginning at three months of age. West African Dwarf (WAD) ewes were mated to WAD rams and Permer x WAD ewes were mated to Permer x WAD rams. Estrus detection and or mating consisted of the method used by Chiboka (1973), Edey *et al.* (1978). Five mature rams from each breed were selected (as stud rams) after a semen examination and a test of their mating activity. Five healthy three month old ewes from each breed were also selected and used to investigate the age at first esturs. Each selected ram was put in a pen (3.5m x 3.1m) with an estrous ewe for ten minutes within which the ram completed at least two services with the estrous ewe. A ewe was not in heat if it failed to show standing heat. Two inspections for heat were made twice daily between 7.30 A.M and 3.30 A.M. For mere heat detection a ram with the external genitalia covered with an apron was used in place of a vasectomized ram. The three month old ewes were checked for heat as described until each one showed heat for the first time. The age at which ewes of the two breeds first showed heat was about the sixth month. Breeding ages tested in the actual experiment were 6, 7, 8, 9, 10, 11, 12 and 13 months.

Each of two groups of sheep, forty nulliparous West African Dwarf ewes and forty Permer x WAD ewes used in a separate experiment was assigned randomly in five successive replicates to the following age groups: 6, 7, 8, 9, 10, 11, 12 and 13 months of age. A given ewe was randomly assigned to an age group at five months of age and bred when it reached the age group into which it falls by sheer chance. Statistically this is known as replication in term in which ewes in replicate one across all the age groups or within a given age group were not bred at the same time.

It is to be noted that Permer breed is a cross between Persian and Merino breeds of sheep. Ewes in each breed and age group were mated naturally. The ewes were housed fed and managed routinely at the University of Ife farm.

The sheep were housed in barns, each of which is about 22m x 4.11 m with a passage of about 1.07 m wide running rom one end of the centre of the barn to the other end of the same barn. On either side of the passage are pens of about 3.5m x 3.1m each. Each pen is provided with two receptacles, one for feed and the other for water. A corridor runs round each barn. On this corridor is a groove containing water to prevent ants such as soldier ants from entering each barn to menace the sheep. The barns are cleaned daily.

Everyday at about 7.30 a.m, the sheep are fed *ad libitum* basal diet consisting 34% corn, 20% groundnut cake, 40% Brewery dry grain, 3. Dicalcium phosphate, 2% Bone meal, .5% Agricare (Source of essential vitamin supplement), .5% common salt. The sheep after feeding on the concentrate are allowed out to graze in paddocks. Rotational paddock grazing is practised. By 5.00 p.m, the sheep returned to the barns where they are finally fed the same diet as they had in the morning. The sheep are treated for ectoparasites, drenched once every three months and given other veterinary attention when necessary.

From the day each ewe was assigned to a treatment, the ewe was observed every hour from 6.00 AM till 10.00 PM everyday till term. Any delivery between 10.00 PM and 6.00 A M was presumed, to have occurred midway, at 2.00 AM the following day and was recorded as such.The variables recorded were : 1) weight of ewes at breeding, 2) Gestation length, 3) Frequency of twinning 4) Birth weight, 5) Frequency of stillborn, 6) Placenta weight, 7) Milk ejection (determined by manually expressing milk from each of the two most caudal teats in each ewe), 8) Weaning weight at 14 weeks post partum.

In both experiments, length of gestation and weight data were analysed by analysis of variance and means were compared by Duncan's New Multiple range test (Snedeçor and Cochran, 1967 and Steel and Torrie, 1960).

Results

EXPERIMENT I. · Four out of the five West African Dwarf ewes assigned to the 6 month age group showed heat. The four ewes after breeding continued manifesting normal estrous cycle except one which appeared pregnant but later returned to heat about 57 days post breeding.All the five ewes assigned to the 7 month age group showed heat; and after breeding them, one out of the five ewes became pregnant and aborted on about day 131 post breeding. All West African Dwarf ewe bred between the ages of 8 - 13 months were pregnant and successfully went to but positive correlation between breeding weight and weaning weight. There were low frequencies of still-born, 1/30, twinning, 2/30, and high frequency of milk ejection 30/30 (Table 1). There was no significant (P .05) replicate effect in all the variables measured in both breeds in the age groups 8 - 13 months that carried their pregnancies to term.

In the second experiment, three of five Permer x WAD ewes assigned to the 6 month age group showed heat but after breeding none became pregnant. All the five ewes assigned to the 7 month age group showed heat;and after breeding all continued manifesting heat except two which later showed heat 43 and 47 day (respectively) post breeding. All the Permer x WAD between the ages of 8 - 13 months were pregnant and successfully went to term. Of those that went to term there was no detectable difference (P .05) in all the variables measured except in placenta weight (Table 2). Age and breeding weight were positively but not significantly (r = .42, P .05) correlated and about 18% of the breeding weight is accounted for by age. Breeding weight and weaning weight were positively but not significantly (r = .74, P .05) correlated and about 55% of the weaning weight is attributed to breeding weight. There was low frequencies of stillborn(3/30), Twinning, (2/30), and high frequency of milk ejection (30/30), (Table 2).

TABLE 6: THE LOANS REPAYMENT ABILITIES OF MAIZE GROUP FARMS IN 1976 BY AREA

Group No.	Amt. of Loans got (N)	Total Amt. repayable to Lender with interest (N)	Total Output value of crop (N)	Net Profit or Loss to Group	Group Size	Amt. of Profit or Loss to Individuals (N)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Derived Savanna Area						
1.	400.00	415.23	340.00	-75.23	8	-9.40
2.	790.00	820.12	1710.00	+889.88	5	+177.97
3.	400.00	415.23	319.50	+ 23.73	9	- 3.39
4.	400.00	415.23	1005.19	+589.96	9	+ 65.55
5.	400.00	415.23	472.50	+ 57.27	9	+ 6.36
6.	752.00	783.50	1800.00	+1016.50	7	+145.21
7.	800.00	830.64	337.50	- 493.14	5	- 98.62
8.	1205.00	1250.46	2158.00	+ 907.54	24	+ 37.81
9.	400.00	415.23	536.50	+ 121.27	7	+ 17.28
10.	752.00	755.80	800.00	+ 44.20	20	+ 2.21
11.	810.00	844.91	3120.00	+2275.09	10	+227.50
12.	640.00	674.70	300.00	- 374.70	5	- 74.94
13.	608.00	634.46	1120.00	+ 485.54	10	+ 48.55
14.	608.00	634.49	3600.00	+2965.51	11	+269.59
15.	960.00	1012.41	199.00	- 813.41	7	-116.20
16.	960.00	1015.94	310.00	- 905.94	9	- 78.43
17.	640.00	674.70	1800.00	+1125.30	8	+140.66
18.	608.00	634.46	2400.00	+1765.54	18	+ 98.08
19.	608.00	634.46	450.00	- 184.46	7	- 26.35
20.	405.00	422.69	336.00	- 86.69	10	- 8.69
Forest Area						
21.	730.00	756.43	945.00	+ 188.57	105	+ 1.79
22.	500.00	520.63	432.00	- 88.63	28	- 3.16
23.	379.00	379.75	252.00	- 145.95	9	- 16.21
24.	730.00	756.43	660.00	- 96.43	22	- 4.38
25.	730.00	756.43	841.00	+ 84.57	60	+ 1.40
26.	197.00	212.25	182.00	- 30.25	43	- 0.70
27.	455.66	476.57	750.00	+ 373.43	28	+ 13.33
28.	309.00	321.36	166.00	- 155.36	18	- 8.63
29.	550.00	573.07	560.00	- 13.07	20	- 0.65
30.	730.00	756.43	768.00	+ 11.57	50	- 0.23

Discussion

West African Dwarf ewes and PermerxWAD ewes are by nature light breeds and are genically unselected. In the Permerx WAD crosses used in this experiment, the WAD ewes were the dams. In both breeds, the ewes could not show heat before six months and pregnancy

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11.	810.00	844.91	3120.00	+2275.09	10	+227.50
12.	640.00	674.70	300.00	- 374.70	5	- 74.94
13.	608.00	634.46	1120.00	+ 485.54	10	+ 48.55
14.	608.00	634.49	3600.00	+2965.51	11	+269.59
15.	960.00	1012.41	199.00	- 813.41	7	-116.20
16.	960.00	1015.94	310.00	- 905.94	9	- 78.43
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Discussion

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There was no significant difference in body weight at breeding in ewes 6 - 8 months of age in both breeds. The reason for poor quality of heat and low conception rate in ewes 6 - 7 months old might be due to reduced or less endocrine-physiological maturation such that these ewes might not be normally competent to ovulate viable eggs and manifest good standing heat and eventually bear the burden of pregnancy to full term. In other words these 6 and 7 month old puberal ewes might not be sexually matured. Sexual maturation in these West African Dwarf ewes and their crosses may depend not only on body weight but principally on age (to allow for adequate endocrine-physiological maturation), and hereditory and environmental factors especially climate and nutrition. Hafez (1952) found this to be true in exotic breeds. By eight months and above, these ewes appear to have acquired more endocrine-physiological maturation and competence, besides some increase in body weight. The concomitant effect of these changes is increase in ovulation rate, quality of heat and conception rate. Allison and Davis(1976) found that the differences in ram seeking activity between young puberal and sexually matured lambs as well as effects of live weight indicated a higher estrogen threshold for ram seeking activity than for estrous behaviour. As also in other published reports, (Inkster 1957; Lindsay and Robinson, 1961a,b; Lindsay and Fletcher, 1972), the number of ewes mated by rams was substantially less than the expected incidence of estrous, Lindsay and Fletcher (1972) have shown the movement of estrous ewes to rams to be estrogen dependent with approximately more estrogen necessary to elicit ram-seeking activity than the display of estrous. In the trials reported here involving West African Dwarf ewes between 6 and 7 months of age, it is possible there was no adequate endocrine-physiological maturation to be able to produce more estrogen, above the titre necessary to manifest mere estrous, to elicit ram seeking activity. There observations are in accordance with the findings of Edey *et al.* (1979), Allison and Davis (1976), Keane (1976), Kopeikin and Tulupova (1940), Golovina (1941) and Belic (1958) which indicated that percentage non return to heat increased with increase in age and body weight. Under normal physiological processes, increase in body weight and was not possible, in a majority, until the ewes were 8 months.

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There was no difference in gestation length of ewes in both breeds in 8 - 13 month age groups that went to term. Theoretically, this could be explained by the fact that fetal development is very slow during the first three months of pregnancy and only speeds up at the beginning of the fourth month (Bukowski, 1960) when the ewes have respectively reached the ages of 11, 12, 13, 14, 15 and 16 months and can better withstand the physiological strain of pregnancy. The lack of significance in gestation length may also be genetic. It is also possible that these differences in age might not be physiologically significant.

The low frequency of twinning might be due to the fact that WAD and Permer x WAD are by nature light breeds and as such, of very limited uterine capacity to sustain multifetation. This explanation agrees with the work of Kopeikin and Tulupova (1940), Coop (1962), Allison and Davis (1976) who found that live weight has marked influence on twinning rate, within limits, the higher the body weight, the higher the rate of twinning.

Differences exist among the age groups in mean birth weights in WAD. These differences do not seem to depend on age groups in which ewes were bred. The differences in mean birth weight in WAD could be accounted for by genetic differences in uterine capacity and the fact that WAD is unselected. The lack of differences in birth weight in Permerx WAD may be due to the effect of the Persian and merino breeds which are improved (selected) breeds; and therefore more uniform in most traits.

Placenta weight in WAD did not show significant differences; again this might be due to limited uterine capacity in which both the fetus and the placenta have to occupy throughout the gestation period. The limited space in the uterine lumen might have limited the growth of these placenta to the same extent. But in Permerx WAD significant differences existed in placenta weight. The differences may be due to the contributing influence of Persian and Merino ewes through gene interaction. The differences could also depend on the position of implantation of the conceptus along the uterine horn. With regard to position of implantation, Ibsen (1928); using guinea pigs and Waldorf, *et al.* (1957), using pigs found that fetal and placenta weights tended to decrease from the ovarian end of a horn to the middle, with an increase again near the cerncal end. Contribution by other workers such as McLaren and Michie (1960), McLaren (1955b), Eckstein, McKeown and Record (1955) showed that there was a positive association between fetal and placenta weight, suggesting a casual dependence of fetal growth on placenta size. According to these workers, fetal growth was not directly affected by position in the uterine horn, but only as a result of the gradient in placenta growth. It was suggested that the effect of the position in the horn and of litter size (Monotocous or polytocous animals) on placenta and fetal growth was likely to be due to hemodynamic factors. The blood supplies to the fetuses or fetus closest to the upper and lower origins of the vascular arcade from the aorta were likely to be greatest except for the uppermost fetus which might share a single branch with the ovary, thus lowering the effective blood supply to and the growth of the placenta of such a fetus.

The lack of significance in weaning weight in the first and second experiments agrees with the findsing of Bukowski (1960) and Golovina (1941) who noted no appreciable difference in live weight at three months of age and the lambs subsequent development depended on conditions of feeding, care and management. However, Marais and Pretorius (1976) found that labs' birth mass increased with increase in dam age; there was also increase in weaning mass with increase in dam age. In both experiments reported here, there is very low frequency of stillborn and 100% milk ejection, indicating normal reproductive process Early mating in ewes, where possible, is very important from economic point of view for extending the reproductive life of the ewes. Absence of significance of replicate effect in all the variables measured in the two breeds in age grouns 8-13 months indicated that the duration of time within the replication was done did not affect the outcome of the trials.

West African Dwarf and Permerx WAD ewes can be successfully bred at 8 month of age. In both WAD and Permerx WAD ewes, breeding at 8 months (or at about 12.8 kg and 16.2 kg body weight respectively) is as good as breeding later. From economic point of view breeding at 8 months is recommended in both breeds. Permer xWAD crosses maintained significantly higher weaning weights. Mating WAD to improve exotic breeds is promising as a means of improving the WAD through heterosis.

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