OESTRUS SYNCHRONIZATION, ARTIFICIAL INSEMINATION AND EARLY REBREEDING IN YANKASA SHEEP

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SUMMARY

COMPONENTS of an intensive sheep production system including oestrus synchronization, artificial insemination and early rebreeding were investigated in two trials with Yankasa sheep.

Treatment of ewes with progrestagen pessaries for 12 days resulted in good synchronization of first and second post-treatment oestrus. In Trial I, (January — February, 1982) 33 ewes were treated, of which 81.8% showed oestrus within 4 days after the end of progrestagen treatment while 72.7% showed a second oestrus within 21 days. In Trial II, (August — September, 1982), 48 ewes were treated, of which 87.5 and 77.1% showed first and second oestrus respectively over the same periods as in Trial I. Mean interval (± s.e.m) between first and second induced oestrus in both trials was 16.4 ± 0.1 days (n = 61). About 90% of ewes exhibiting oestrus were detected 2 to 4 and 17 to 20 days after progrestagen treatment for first and second oestrus respectively.

Lambing reates of ewes to artificial insemination or natural mating at the second induced oestrus in Trial I were 50.0 and 91.7% respectively. Corresponding lambing rates in Trial II were 65.0 and 86.7%.

Rebreeding interval in ewes which lambed in Trial I was 59.1 ± 0.8 days following commencement of progestagen treatment approximately one month after lambing. Lambing rate in this group was 78.6%.

INTRODUCTION

Sheep breed throughout the year in the tropics due to the absence of an anoestrus season, in contrast to their marked seasonality of breeding in the temperate zone. An optimum of two lambings annually may be possible in the tropics provided the rebreeding interval (period between lambing and next conception) can be restricted to just 33 days. However, the annual lamb crop would still be increased by 50% if ewes are successfully rebred within 90 days of lambing.

Recent estimates of lambing intervals in some breeds of West African sheep range from 248 to 307 days (Dettmers *et al.*, 1976; Molokwu and Umunna, 1980; Fall *et al.*, 1982), equivalent to rebreeding intervals of from 98 to 157 days. Reasons for the long rebreeding intervals despite the absence of seasonally induced anoestrus are not known though a nutritional basis seem most likely. Factors influencing post-partum uterine involution and post-partum activity in sheep have been reviewed (van Niekerk, 1979). The major factors include season, lactation and level of nutrition. Provided all factors are favourable, normal conception can be expected in most ewes between 30 and 90 days after parturition.

The long term objective of the present study is to develop an intensive sheep production system involving synchronized breed, twice yearly lambings and feedlot fattening of lambs. This paper reports on oestrus synchronization, conception rates of synchronized ewes to natural mating or artificial insemination, and rebreeding intervals in synchronized ewes.

MATERIALS AND METHODS

The Yankasa sheep used in this study were 2 to 3 year-olds and were purchased in small batches from different markets within Kaduna State, Nigeria, in order to have a representative sample. The animals were taken out for grazing on improved pastures twice daily from 0700 to 1000 h and 1500 to 1800 h. They were housed at

night. In the dry season when forage was scarce, animals were fed hay *ad libitum* inbetween grazing periods. A concentrate supplement consisting of 25% cottonseed cake and 75% maize was fed throughout at the rate of 0.3 kg/head/day. Water and mineral salt licks were provided *ad libitum*. Animals were routinely dewormed and sprayed against ectoparasites.

Two trials (I and II) were conducted to examine oestrus synchronization with progestagen-impregnated vaginal sponges *(Veramix,* Upjohn Ltd.). Each sponge contained 60mg medroxy-progesterone acetate. Conception rates of synchronized ewes to natural mating or artificial insemination, and rebreeding interval were also examined. Trial I commenced in January and Trial II in August, 1982.

In both trials, progestagen-impregnated sponges were vaginally inserted in experimental ewes for 12 days and then withdrawn. Vasectomized rams fitted with crayon harnesses were run with the flock for oestrus detection. Ewes were examined twice daily to 0800 and 1600 h for crayon marks. Observations were over two oestrus periods.

Synchronized ewes were either naturally mated to rams or artificially inseminated at the second oestrus after sponage withdrawal. In the artificially inseminated, ewes detected in oestrus in the morning were inseminated in the evening and again the following morning, while ewes detected in the evening were inseminated in the morning and evening of the following day. Semen for artificial insemination was collected from fertile Yankasa rams by artificial vagina and extended in a Tris-Glucose-Yolk diluent at 30°C. It was stored at room temperature (22 — 20°C) and used within 8 h of collection. The diluent composition was

300mM Tris (hydroxymethly) methyl amine, 94.7mM citric acid, 27.75mM glucose and 15% v/v egg yolk. The insemination dose was 250×10^6 spermatozoa in 0.2ml, with a minimum of 50% motile cells. 20-day non-return rates were determined using vasectomized rams. The summary of the experimental schedule is shown in Table 1.

Rebreeding intervals were investigated in 17 experimental ewes which lambed in July, 1982. The lambs were not weaned until 3 months of age and were allowed to run with their dams. Progestagen treatment commenced 28.7 ± 1.0 days (mean ± s.e.m.) after lambing and ewes were bred at the second post-treatment oestrus.

RESULTS

Oestrus Synchronization:

Results of oestrus synchronization with progestagen-impregnated vaginal sponges are summarized in Table 2. Of 33 ewes

TABLE 1:

Schedule of oestrus synchronization and breeding of experimental ewes.

	1982 Trials	
ITEM	*I. JAN. — FEB.*	*II. AUG. — SEPT.*
Sponge *insertion, day 0	Jan. 13	Aug. 11
Sponge withdrawal, day 12	Jan. 25	Aug. 23
First induced oestrus, day 12-16	Jan. 25-29	Aug. 23-27
Second induced oestrus, day 26-32	Feb. 10-14	Sept. 6-12
AI or mating, day 27-33	Feb. 10-14	Sept. 7-13

**Progestagen impregnated vaginal pessaries (Veramix, Upjohn Ltd.)*

treated in Trial I, 81.8% were detected in oestrus within 4 days from the end of progestagen treatment, while 72.7% showed a second oestrus within 21 days. In Trial II, 48 ewes were treated, of which, 87.5 and 77.1% respectively were detected in frist and second oestrus over the same periods as before. Mean interval (± s.e.m.) between first and second post-treatment oestrus for both trials was 16.4 ± 0.1 days (n = 61). In general, about 90% of ewes exhibiting oestrus were detected 2 to 4 and 17 to 20 days after sponge withdrawal, for first and second oestrus respectively.

Conception and Lambing Rates:

Non-return and lambing rates for Trials I and II are presented in Table 3. Overall, natural mating resulted in higher lambing rates than artificial insemination (88.9 v 59.4% respectively). Of the 17 ewes which lambed in Trial I, 1 died and 2 were mising before next lambing in Trial II: Eleven out of the 14 remaining ewes (78.6%) in this group lambed.

Rebreeding Interval:

The mean interval (± s.e.m., n = 17) between lambing and rebreeding in the lactating ewes from Trial I was 59.1 ± 0.8 days.

DISCUSSION

The present study shows that oestrus synchronization of Yankasa ewes with progestagen impregnated vaginal pessaries is effective for both first and second induced oestrus after treatment. Furthermore, the clustering of oestrus periods has practical value since it enables breeding activities to be completed in about 4 days. Ewes were mated or inseminated at the second induced oestrus since it has been shown that fertility was better then than at the first induced oestrus (Robinson, 1979; Mauleon, 1979). The oestrus cycle length of 16.4 ± 0.1

TABLE 2:

Patterns of onset of oestrus in ewes after progestagen treatment.

	Interval to oestrus in days	*No. of ewes detected in oestrus*			*Frequency (%)*
		Trial I	*Trial II*	*Total*	
1st. Oestrus	1	1	4	5	7.2
	2	10	9	19	27.5
	3	14	22	36	52.2
	4	2	7	9	13.0
	1-4	27	42	69	100
2nd Oestrus	14	0	1	1	1.6
	15	0	0	0	0
	16	1	1	2	3.2
	17	3	4	7	11.1
	18	9	9	18	28.6
	19	10	12	22	34.9
	20	1	10	11	17.5
	21	0	2	2	3.2
	14-21	24	39	63	100

TABLE 3:

Non-return and lambing rates of synchronized Yankasa ewes naturally mated or artificially inseminated.

Breeding method	*No. of ewes bred*	*% Non-returns*	*% Ewes lambing*
	Trial I — January/February 1982		
Natural mating	12	83.3(10/12)	91.7(11/12)
Artificial insemination	12	58.3(7/12)	50.0(6/12)
	Trial II — August/September 1982		
Natural mating	16	87.5(14/16)	86.7(13/15)[a]
Artificial insemination	23	65.2(15/23)	65.0(13/20)[a]
Total	63	73.0(46/63)	72.9(43/59)

( ) *Actual proportions*

[a]*Excluding dead or missing ewes.*

days obtained in this study with Yankasa sheep compares with a range of 16-21 days reported for the same breed by Kuteyi *et al.* (1978) and 17.76 ± 0.48 days reported for the West African dwarf sheep breed (Orji and Steinbach, 1975). The greater precision obtained in the present study is attributable to oestrus synchronization.

Lambing rates of synchronized ewes to natural mating was normal (88.9%) and higher than to articifical insemination (59.4%). The latter could be further improved with practice in view of the better lambing results obtained in Trial II (65.0%) compared to Trial I (50.0%), following artificial insemination. The lambing rate (78.6%) obtained in nursing ewes bred about 2 months after lambing is acceptable. Although it has been reported that higher lambing rates could be obtained under accelerated lambing programme if early weaning of lambs is practiced (Mauleon, 1979), lambs were not weaned until 3 months of age in the present study. This was due to the high mortality usually associated with weaning of lambs in this environment due to the lack of adquate facilities for artificial rearing (Dr. I.F. Adu, personal communication). Early weaning of lambs is not yet a practical proposition at the present time in Nigeria and any intensive sheep breeding scheme should take this into account.

The length of the rebreeding interval in this study (59.1 days) was partly accounted for by the time taken for progrestagen treatment (12 days) and the subsequent interval to the second induced oestrus (20 days) at which breeding took place. Breeding at the first induced oestrus under the present conditions could have restricted the rebreeding interval to about 42 days. However, successful breeding of progestagen-treated ewes at the first induced oestrus has been found to require further treatment of ewes with gonadotropic hormone at sponge removal

in order to induce ovulation (Robinson, 1979). Further studies on the shortening of the rebreeding interval in Yankasa sheep are necessary before the optimum of twice yearly lambing in an intensive production system can be realised in this breed.

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