S. Afr. J. Anim. Sci. 10, 69–72 (1980)

THE SYNCHRONISATION OF OESTRUS IN SHEEP. 4. INSEMINATION AT OESTRUS OR ON A TIME BASIS

Receipt of MS 21-05-1979

J.P.C. Greyling* and J.M. van der Westhuysen
Department Human and Animal Physiology, Univ. Stellenbosch, Stellenbosch, 7600

(Key words: *Synchronisation, oestrus, sheep, A.I. by oestrus or time)*
(Sleutelwoorde: *Sinkronisasie, estrus, skape, K.I. by estrus of tyd)*

OPSOMMING: SINKRONISASIE VAN ESTRUS BY SKAPE. 4 INSEMINASIE BY WAARGENEEMDE ESTRUS OF INSEMINASIE WAT OP 'N TYDSBASIS UITGEVOER IS

In 'n 2 × 2 faktoriaal eksperiment is vrugbaarheid, na inseminasie op waargeneemde estrus en inseminasie wat op 'n tydsbasis uitgevoer is, tussen 'n dubbele inspuiting prostaglandien (cloprostenol) groep met 'n 10 dae interval en 'n intravaginale (MAP) spons-groep vergelyk. Die prostaglandien groep is geïnsemineer 60 en 72 uur na die laaste inspuiting en die spons-groep is geïnsemineer 48 en 60 uur na sponsonttrekking. Alhoewel die besettingssyfer van ooie gemiddeld 12,75% laer was na inseminasie op 'n vasgestelde tyd teenoor inseminasie na waargeneemde estrus (64,0% vs 50,0% vir die sponsgroep en 65,4% vs 53,9% vir die prostaglandien groep) was die verskil nie betekenisvol nie.

SUMMARY:

In 'n 2 × 2 faktoriaal eksperiment is vrugbaarheid, na inseminasie op waargeneemde estrus en inseminasie wat op 'n tydsbasis uitgevoer is, 10-day interval and a group of progestagen sponge (MAP) treated ewes was compared following insemination at observed oestrus and insemination at a predetermined time. The prostaglandin treated group was inseminated at 60 and 72 hours following the last injection of cloprostenol and the sponge treated group at 48 and 60 hours following sponge withdrawal. Although the conception rates of ewes averaged 12,75% less following fixed time A.I. as compared to A.I. at observed oestrus (64,0% vs 50,0% for the sponge group and 65,4% vs 53,9% for the prostaglandin group, respectively), these differences were not significant.

The ultimate aim of synchronisation of the oestrous cycles of sheep is the practicability of a successful artificial insemination programme. Such a programme would usually require twice daily use of vasectomised rams for identification of ewes in oestrus. The possibility of artificial insemination at a fixed time following intravaginal progestagen sponge withdrawal has been investigated (Robinson & Moore, 1967; Colas & Cognie, 1968; Van Niekerk & Belonje, 1970; Van der Westhuysen, Van Niekerk & Hunter, 1970; Van Wyk, 1977) in an attempt to eliminate the time-consuming identification of ewes in oestrus. Not only is detection of oestrus the most time and labour consuming input in an A.I. programme, but it is also the area where many problems occur due to poor detection and "silent heats". The provision of teaser animals and equipment are expensive and all these inputs can be eliminated with a fixed-time insemination (Eaton, 1976) and the practical application thereof is thus warranted. When the efficiency of synchronisation of the oestrous periods in sheep with the double-injection regime of prostaglandin had been demonstrated, this was followed by an investigation of the applicability of fixed time A.I. following this technique of synchronisation (Acritopoulou, Haresign & Lamming, 1978). The success of fixed time A.I. depends on the degree of synchronisation of ovulation, since the degree of synchronisation of oestrus in sheep is much higher following the double-injection of prostaglandin (cloprostenol) than following the intravaginal progestagen treatment (Greyling, 1978). This investigation was undertaken to investigate the feasibility of fixed time A.I. following the use of progestagens or prostaglandins.

Procedure

During the normal breeding season (May, 1978), 104 S.A. Mutton Merino ewes ranging from maiden to multiparous ewes were randomly allotted to a 2 × 2 factorial designed experiment of equal group size, with the following treatments:

1. Intravaginal progestagen sponges (methyl acetoxy progesterone, MAP — 60 mg) for 14 days vs two injections of 250 µg cloprostenol (prostaglandin $F_2\alpha$ analogue — I C I 80996) with a 10-day interval between injections.

* *Present address: Animal and Dairy Science Research Institute, Irene 1675*

2. Artificial insemination at oestrus vs A.I. at a fixed interval after the cessation of treatments.

In the groups where oestrous-ewes were identified with the aid of vasectomised rams, insemination with 0,1 ml undiluted semen was performed 12 hours following the first positive test for oestrus and again 12 hours later. Where applicable, fixed time insemination was based on earlier results (Greyling, 1978). Following sponge withdrawal, insemination occurred after 48 and 60 hours, while the double-prostaglandin treated group was inseminated 60 and 72 hours following the last injection.

Results

All the ewes in the groups which were tested for oestrus with the aid of vasectomised rams, showed oestrus within 96 hours, except for 1 ewe in the group treated with intravaginal sponges. The oestrous responses for these groups are presented in Fig. 1. The time at which the fixed-time groups were inseminated are also indicated in this figure.

From the distribution of oestrus (Fig. 2) it can be seen that 80,7% of the MAP treated ewes had come into oestrus by the time of first insemination (48 hours following the cessation of treatment) and 88,4% by the second insemination (60 hours). Similarly, in the prostaglandin treated ewes, 92,3% of the ewes had commenced oestrus after 60 hours (first insemination) and 96,1% by the second insemination (72 hours).

The reproductive performances of these groups are represented in Table 1 and from this table it can be seen that the conception, lambing rates and fecundity did not differ significantly between the respective groups.

Discussion

The results obtained indicate that although the methods of synchronizing oestrus did not influence the latency to, and the duration of oestrus, the conception rate was reduced by an average of 12,75% when A.I. was performed after a pre-determined interval. However, considering that ovulation takes place approximately 30 hours after the commencement of oestrus (Van der Westhuysen, Van Niekerk & Hunter, 1970), fixed time A.I. of the MAP-sponge treated ewes would probably be more effective if performed at 60 and 72 hours following sponge withdrawal (Fig. 2). This is supported by Petcu, Scheul & Barbu (1977) who found the optimum time for insemination to be about 68 hours following the end of hormonal synchronisation. According to Colas, Brice & Guerin (1974) and Gordon (1975) (as quoted by Gordon, 1976) fixed time A.I. in sheep has progressed from two inseminations at 50 and 64 hours to a single insemination at 55-57 hours, without the conception rate, necessarily being depressed. Similarly Dýrmundsson (1978) obtained conception rates of 65,4% following an insemination 48-56 hours following sponge (MAP) withdrawal.

When prostaglandin was used to synchronise mating and the ewes inseminated 64 hours after the cessation of a double cloprostenol (125μg) treatment with a 14-day interval between injections Fairnie, Wales & Gherardi (1977) found the fertility to be 60%. Other workers (Fukui & Roberts, 1978) observed the fertility of ewes treated with a double-injection prostaglandin $F_2\alpha$ at a 12-day interval, to be much higher when inseminated at 70 hours (62%) than insemination at either 46, 54 or 78 hours following the cessation of treatment. Although the lambing rates and fecundities following insemination at a pre-determined interval in this experiment did not differ significantly from that of ewes inseminated at observed oestrus, the resultant lower conception rates following fixed time A.I. suggests that this procedure should be the subject of large scale field trials before practical application of the principle can be justified.

Table 1

The conception rate, lambing rate and fecundity of ewes treated with MAP sponges for 14 days or two injections cloprostenol at a 10-day interval following a fixed time insemination

	Group 1				Group 2			
	MAP sponge control	%	MAP sponge fixed time	%	PGF + PGF control	%	PGF + PGF fixed time	%
No. Ewes in each group	26		26		26		26	
Ewes conceiving with first oestrus	16[a]	64,0	13[a]	50,0	17[a]	65,4	14[a]	53,9
Lambs born/Ewes treated	25[a]	96,2	20[a]	76,9	29[a]	111,4	20[a]	76,9
Lambs born/Ewe lambing	1,56[a]		1,54[a]		1,71[a]		1,43[a]	

[a] Within the body of the table, figures having the same superscript are not significantly different from each other

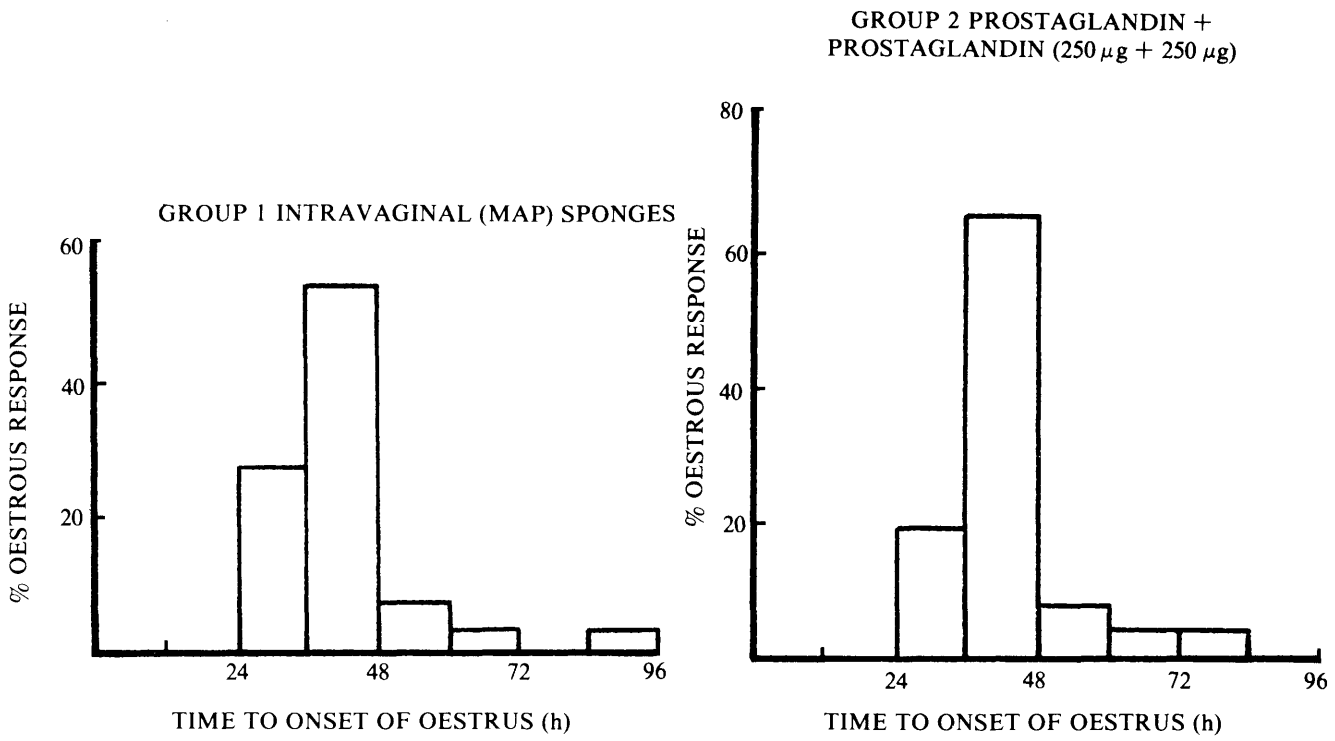

Fig. 1 *The distribution of the occurrence of oestrus in ewes following treatment with intravaginal progestagen sponges and a double-injection prostaglandin*

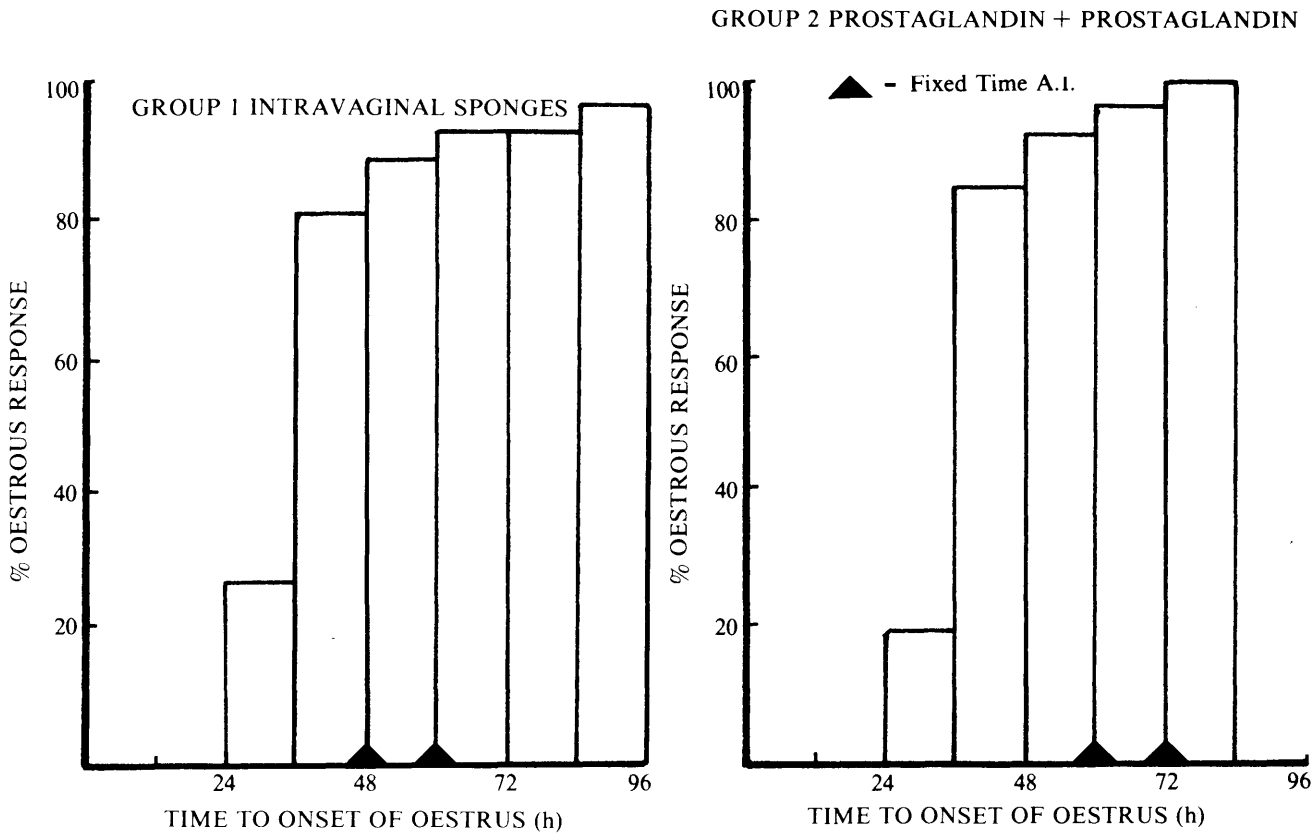

Fig. 2 *Oestrous response following treatment with intravaginal progestagen sponges and a double prostaglandin injection (Accumulative)*

References

ACRITOPOULOU, S., HARESIGN, W. & LAMMING, G.E., 1978. Time of ovulation in ewes after treatment with a prostaglandin $F_2\alpha$ analogue. *J. Reprod. Fert.*, 54, 189.

COLAS, G. & COGNIE, Y., 1968. Artificial insemination with or without oestrus detection following a progestational treatment in the ewe. *Proc. VIth Int. Congr. Anim. Reprod. Paris*, 2, 1407.

DYRMUNDSSON, O.R., 1978. Synchronisation of oestrus in Iceland ewes with special reference to fixed time artificial insemination. *Anim. Breed. Abstr.*, 46, 2779.

EATON, N.F., 1976. Practical aspects of A.I. programmes using "Estrumate" (Cloprostenol) In *Oestrus synchronisation in cattle*. Eds. Nancarrow & Cox. Proc. of Symposium, Sydney N.S.W.

FAIRNIE, I.J., WALES, R.G. & GHERARDI, P.G., 1977. Time of ovulation, fertilisation rate and blastocyst formation in ewes following treatment with a prostaglandin analogue (I C I 80996). *Theriogenology*, 8, 56.

FUKUI, Y. & ROBERTS, E.M., 1978. Fertility of ewes treated with prostaglandin $F_2\alpha$ and artificially inseminated at predetermined intervals thereafter. *Anim. Breed. Abstr.*, 46, 2783.

GORDON, I., 1976. Controlled breeding in cattle. Hormones in the regulation of reproduction, oestrus control and set-time artificial insemination. *Anim. Breed. Abstr.*, 44, 265.

GREYLING, J.P.C., 1978. *Control of ovulation in cycling ewes with a prostaglandin $F_2\alpha$ analogue*. M.Sc. (Agric.) thesis, University of Stellenbosch.

PETCU, D., SCHEUL, V. & BARBU, D., 1977. Optimum time for inseminating synchronised ewes. *Anim. Breed. Abstr.*, 45, 6054.

ROBINSON, T.J. & MOORE, N.W., 1967. The evaluation of progesterone and S.C. — 9880 impregnated intravaginal sponges for the synchronisation of oestrus for large scale artificial insemination of Merino ewes in spring. I : Control of the ovarian cycle in sheep. Ed. T.J. Robinson, Sydney. Sydney University Press.

VAN DER WESTHUYSEN, J.M., VAN NIEKERK, C.H. & HUNTER, G.L., 1970. Duration of oestrus and time of ovulation in sheep: Effect of synchronisation, season and ram. *Agroanim.*, 2, 131.

VAN NIEKERK, C.H. & BELONJE, P.C., 1970. The time of ovulation after synchronisation of oestrus in Merino ewes with medroxy-progesterone acetate. *Proc. S. Afr. Soc. Anim. Prod.*, 9, 177.

VAN WYK, L.C., 1977. Die tyd van ovulasie by Karakoelooie na sinkronisasie met behulp van Repromap-Plus. *S. Afr. J. Anim. Sci.*, 7, 167.