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THE SYNCHRONISATION OF OESTRUS IN SHEEP. 3. THE USE OF INTRAVAGINAL PROGESTAGEN AND/OR PROSTAGLANDIN

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OPSOMMING: SINKRONISASIE VAN ESTRUS BY SKAPE . 3. DIE GEBRUIK VAN INTRAVAGINALE PROGESTEROON EN OF PROSTAGLANDIEN

Die aanteeldoeltreffendheid van ooie wat behandel is met intravaginale progesteroon sponse (MAP), intravaginale progesteroon sponse (MAP) followed by an injection of cloprostenol (125μg), a double injection of 250 g cloprostenol at a 9-day interval and a control group were is vergelyk. Die estrus reaksie, die interval vanaf beëindiging van behandeling tot begin van estrus en die lengte van die estrusperiode het nie betekenisvol verskil vir die verskillende groepe nie. Die gemiddelde besettingssyfer van ooie behandel met 'n dubbele inspuiting cloprostenol met 'n 9-dae tussenpose, was betekenisvol laer (36,0%) vergeleke met die ander groepe (gemid. 71,9%).

SUMMARY:

The reproductive efficiencies of ewes treated with the intravaginal progestagen sponge (MAP), an intravaginal progestagen sponge (MAP) followed by an injection of cloprostenol (125μg), a double injection of 250μg cloprostenol at a 9-day interval and a control group were compared. The oestrous response, the interval from cessation of treatment to the onset of oestrus and the duration of oestrus did not differ significantly for the respective groups. The mean conception rate of ewes treated with a double injection of cloprostenol at a 9-day interval was significantly lower (36,0%) than that of the other groups (mean 71,9%).

It has been demonstrated that the oestrous periods of sheep can be efficiently synchronised with progestagens (Deweese, Glimp & Dutt, 1970; Van der Westhuysen & Van Niekerk, 1971) a progestagen-prostaglandin combination (Greyling, 1978; Greyling, Van der Westhuysen & Van Niekerk, 1979) and with a double injection of cloprostenol at an interval of 8 or 9 days (Haresign, 1976; Greyling & Van der Westhuysen, 1979).

Fertility following the intravaginal progestagen treatment (Hawk & Conley, 1973; Gordon, 1976) and the intravaginal progestagen cloprostenol method (Greyling, 1978; Greyling, Van der Westhuysen & Van Niekerk, 1979) is slightly depressed, whereas Fairnie, Cumming & Martin (1967a) found the synchronised oestrus following a double treatment of cloprostenol (125μg) to result in acceptable fertility.

This study was designed to evaluate the practical advantages of different synchronising techniques and to observe the oestrous and lambing performance where accepted procedures are compared within the same experiment.

Procedure

During the breeding season (February, 1978) 140 mature and 60 maiden S.A. Mutton Merino ewes of which the oestrous cycles had been previously monitored, were allotted to 4 groups. Each group consisted of 50 ewes, balanced with regard to age and stage of their cycle, so that days 1 to 17 of the oestrous cycle (day of oestrus = day 0) were represented in each group. The 4 groups then received the following treatments:

Group 1 : Control group.

Group 2 : Intravaginal sponges (MAP — 60 mg) for a period of 14 days.

Group 3 : Intravaginal sponges (MAP — 60 mg) for a period of 8 days and a 125μg intramuscular injection of cloprostenol (Prostaglandin $F_2\alpha$ analogue — ICI 80996) at sponge withdrawal.

Group 4 : Two intramuscular injections of 250μg cloprostenol with a 9-day interval between the 2 injections.

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For the sake of convenience the treatments were arranged so that the termination of sponge treatment (Groups 2 and 3) and the last cloprostenol injection (Group 4) coincided. The ewes were then regularly tested (06h00, 12h00 and 16h00) for oestrus with the aid of vasectomised rams. Ewes in oestrus were inseminated 12 hours after onset of heat and again at 12-hour intervals for as long as they remained in oestrus. The control group was tested and inseminated in the same way for a period equal to the duration of an entire oestrous cycle.

Results

The oestrous response and duration of oestrus following the different treatments are set out in Table 1 and Figure 1.

From Table 1 it is evident that 4 ewes (1 from Group 2 and 3 from Group 3) did not respond to the respective treatments and the total number of ewes exhibiting oestrus did not differ significantly between the respective groups. Similarly, the mean interval from cessation of treatment to the onset of oestrus and the duration of oestrus did not differ significantly between treatment groups. From Table 2 it is evident that the conception rate of ewes that received a double injection of prostaglandin was significantly lower than that of either the control group ($P < 0,01$), the intravaginal sponge/prostaglandin group ($P < 0,01$) and the group receiving intravaginal sponges only ($P < 0,05$). In consequence, the number of lambs born per treatment group, showed the same pattern. However, the fecundities of the 4 groups did not differ significantly from each other. The stage of the oestrous cycle when the treatments commenced, had no apparent effect on the oestrous response and conception rates of any of the groups.

Discussion

The data from this experiment show that the oestrous periods of sheep can be efficiently synchronised by either the intravaginal progestagen technique, the intravaginal progestagen sponge/prostaglandin combination or two injections of prostaglandin administered at a 9-day interval. In the present experiment the fertility of intravaginal progestagen sponge treated ewes and intravaginal progestagen sponge/prostaglandin treated ewes was only slightly below normal when compared to the control group. These results corroborate previous findings on progestagen sponges (Robinson, 1967; Van der Westhuysen & Van Niekerk, 1971) and the progestagen/prostaglandin technique (Greyling, 1978; Greyling, Van der Westhuysen & Van Niekerk, 1979) in sheep. The conception rate of the double-prostaglandin treated group was greatly depressed, but the reason for this depression is obscure. Hughes, Lucas & Norman (1977) using a different synthetic analogue (ONO 453) of prostaglandin, found conception rates of 70,8% with two injections given at a 7-day interval. When comparing the use of sponges (Cronolone) with a double injection cloprostenol as a means of synchronising oestrus Fairnie, Cumming & Martin (1976b), found conception rates of 56% and 53% for the sponge and prostaglandin groups, respectively. Recently, the effect on fertility of the time interval between the two consecutive injections has been demonstrated (Fairnie, Wales & Gherardi, 1977; Fairnie, Martin & Rogers, 1978). According to these workers, the time interval between the 2 injections of cloprostenol is critical for optimum fertility and should not be reduced to less than 13 or 14 days. Contrary to this Haresign (1978) achieved excellent fertility by giving two injections of cloprostenol at a 9-day interval, e.g. a conception rate of 66,0% to first mating.

From the results of this experiment it is therefore concluded that although the use of the double injection prostaglandin regime offers an efficient technique for synchronising oestrus, the disappointing fertility following injections at a 9-day interval renders the technique impractical. However, since injections at greater intervals tend to result in higher fertility (Fairnie, Wales & Gherardi, 1977), these possibilities need verification before this method for control of ovulation can be accepted.

Table 1

The oestrous response of ewes treated to synchronise oestrus

	Group 1 Control	Group 2 MAP – 60 mg	Group 3 MAP – 60 mg + PGF	Group 4 PGF + PGF
Number of Ewes	50	50	50	50
Number of Ewes in Oestrus	50	49	47	50
Interval from cessation of treatment to onset of oestrus (h)		43,59 ± 16,93	58,02 ± 12,87	55,24 ± 27,36
Range (h)	4 – 360	24 – 102	33 – 96	24 – 170
Duration of Oestrus (h)	34,68 ± 5,75	30,18 ± 7,13	32,46 ± 7,39	34,96 ± 5,75

Table 2

The conception rate, lambing rate and fecundity of ewes treated with progestagen and/or prostaglandin to synchronize mating

	Group 1 Control	%	Group 2 MAP - 60 mg	%	Group 3 MAP - 60 mg + PGF	%	Group 4 PGF + PGF	
Number of Ewes	50		50		50		50	
Number of Ewes conceiving/ Ewes showing oestrus	39[a]	78,0	30[a]	61,2	36[a]	76,6	18[b]	36,0
Ewes lambing/ Ewes treated	39[a]	78,0	30[a]	60,0	36[a]	72,0	18[b]	36,0
Lambs born/ Ewes treated	66[a]	132,0	45[a]	90,0	57[a]	114,0	29[b]	58,0
Lambs born/ Ewes lambing	1,69[a]		1,5[a]		1,58[a]		1,6[a]	

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

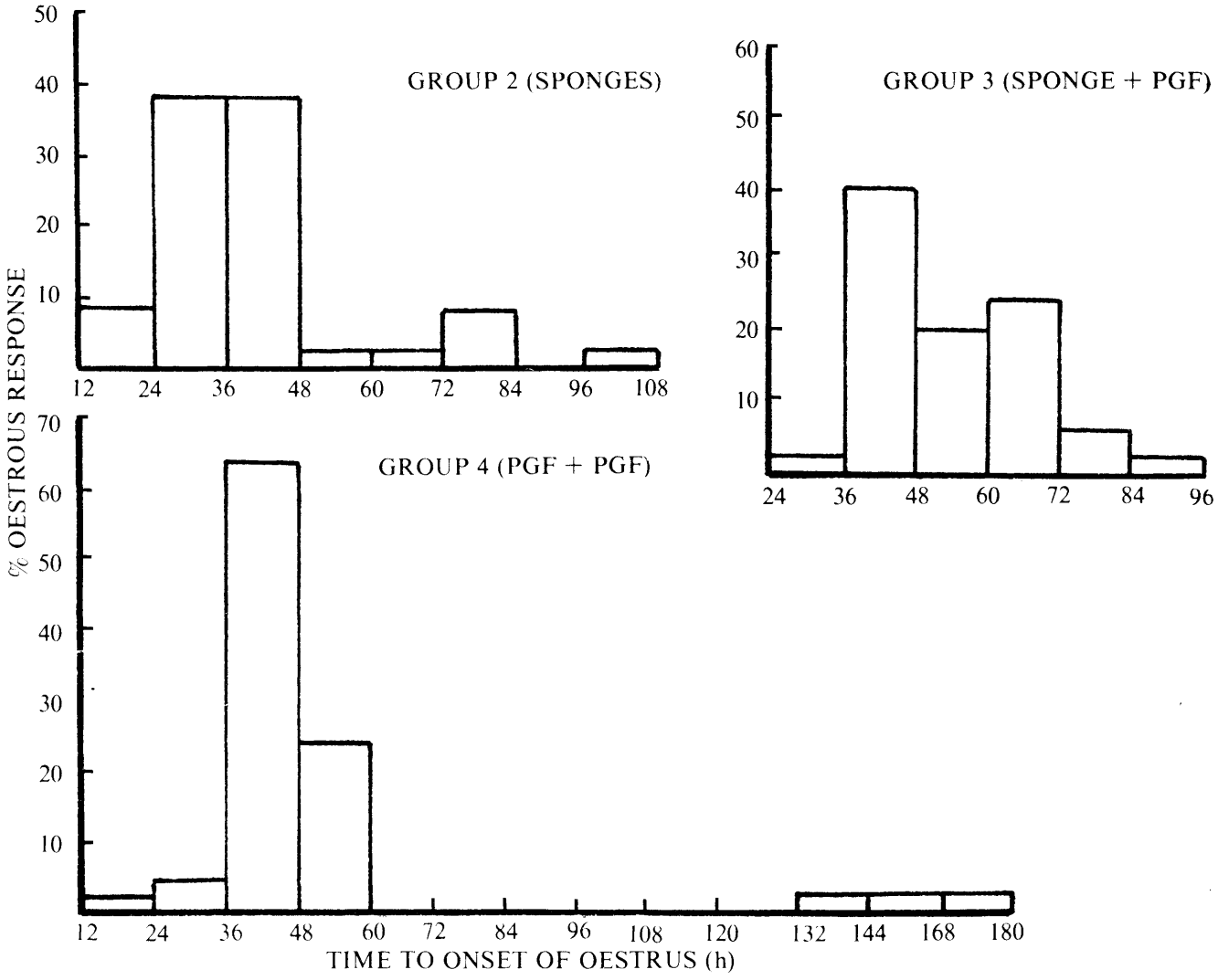

Fig. 1 The distribution of the occurrence of oestrus in ewes receiving intravaginal (MAP) sponges, intravaginal sponges/cloprostenol treatment and two injections of cloprostenol at a 9-day interval

References

DE WEESE, W.P., GLIMP, H.A. & DUTT, R.H., 1970. Comparison of medroxyprogesterone acetate orally and in vaginal sponges for synchronising oestrus in ewes. *J. Anim. Sci.*, 31, 394.

FAIRNIE, I.J., CUMMING, I.A. & MARTIN, E.R., 1976a. Use of prostaglandin analogue, I C I 80996, to synchronise ovulation in sheep in an artificial insemination programme. *Proc. Aust. Soc. Anim. Prod.*, 11, 133.

FAIRNIE, I.J., CUMMING, I.A. & MARTIN, E.R., 1976b. Synchronisation of ovulation as an aid to artificial insemination programmes in sheep. *Proc. 53rd Annu. Conf. Aust. Vet. Assoc.*

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, (4) 56.

FAIRNIE, I.J., MARTIN, E.R. & ROGERS, S.C., 1978. The lambing performance of Merino ewes following synchronisation of ovulation with cloprostenol, a prostaglandin analogue (I C I 80996). *Proc. Aust. Soc. Anim. Prod.*, 12, 256.

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.

GREYLING, J.P.C., VAN DER WESTHUYSEN, J.M. & VAN NIEKERK, C.H., 1979. Synchronisation of oestrus in sheep. 1. Dosage and time of prostaglandin administration following progestagen pretreatment. *S. Afr. J. Anim. Sci.*, 3, 185.

GREYLING, J.P.C. & VAN DER WESTHUYSEN, J.M., 1979. Synchronisation of oestrus in sheep. 2. Dose effect of prostaglandin in the double injection regime. *S. Afr. J. Anim. Sci.*, 3, 193.

HARESIGN, W., 1976. Controlled breeding in sheep using the prostaglandin analogue I C I 80996. *Proc. Brit. Soc. Anim. Prod.*, 22, 137.

HARESIGN, W., 1978. Ovulation control in sheep. In: *Control of Ovulation*, Eds. D.B. Crighton, G.R. Foxcroft, N.B. Haynes; G.E. Lamming, London — Boston: Butterworths.

HAWK, H.W. & CONLEY, H.H., 1973. Route of progestagen administration to the ewe and spermicidal action in the vagina at the ensuing oestrus. *J. Anim. Sci.*, 37, 957.

HUGHES, F., LUCAS, J.M.S. & NOTMAN, A.B., 1977. The synchronisation of oestrus and subsequent fertility in ewes following treatment with a synthetic prostaglandin analogue (ONO 453). *Vet. Bull.*, 47, (6), 468 (Abstr.).

ROBINSON, T.J., 1967. Conclusions. In : *The control of the ovarian cycle in sheep*, pp. 237-244. Ed. T.J. Robinson, Sydney: Sydney Univ. Press.

VAN DER WESTHUYSEN, J.M. & VAN NIEKERK, C.H., 1971. Synchronisation of oestrus in sheep early in the breeding season: The vaginal environment and fertility. *S. Afr. J. Anim. Sci.*, 1, 58.