REPRODUCTIVE ASPECTS OF INTENSIVE SHEEP BREEDING

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A great deal of research effort in France in the last 10 to 15 years has been directed at intensifying sheep breeding. In its simplest form intensification has meant out-of-season breeding using progestagens and pregnant mares serum gonadotrophin (PMSG) to synchronise and induce oestrus and ovulation, followed by artificial insemination (AI). In this way flocks lamb three times every two years. At a more complex level ewes are induced to lamb in batches throughout the year and oestrus is synchronised for insemination 40 to 50 days after lambing (Thimonier and Cognie 1977). This very intensive system works well under experimental conditions in the short term but we are not sure of its long-term effects on the productivity of sheep under commercial conditions.

The following is a description of a highly intensive sheep breeding programme which has been carried out on a flock of 2,000 Ile-de-France ewes ranging from seven months to nine years old. Within the commercial context of the experiment, a number of experimental treatments were applied and results of these are presented. Oestrus and ovulation were synchronised using flurogestone acetate (FGA) sponges inserted into the vagina of the ewes, followed by treatment with PMSG. The doses of these vary according to the season and the age and physiological state of the ewe (Table 1).

TABLE 1 Treatments used for synchronising oestrus and ovulation

	Treatment					
	Breeding season			Non breeding season		
	FGA††		PMSG	FGA		PMSG
	Dose (mg)	Duration (days)	(i.u.)	Dose (mg)	Duration (days)	(i.u.)
Dry	40	12-14	400-500	30	12-14	500-600
Recently weaned	40	12-14	500-550	30	12-14	550-600
Lactating	40	12-14	550-600	30	12-14	600-650
With lambs (7 months old)	40	14	400-500	40	14	450-500

†† SC 9880 (Searle)

The ewes were inseminated twice, 50 and 58 hours after sponge withdrawal. Lactating ewes received 500 x 10^6 sperm and dry ewes 250 x 10^6 sperm; in each case the semen used had a minimum concentration of 2,000 x 10^6 sperm/ml (Colas et *al.* 1973). In the third year an added refinement was to synchronise lambing on day 144 of gestation with an i.m. injection of 16 mg of dexamethasone (Bosc 1972).

Ewes were inseminated at four times of the year: January-February, April-May, July-August and October-November, to lamb in March-April, June-July, September-October and December-January respectively. The year-round cycle of activity is shown diagrammatically in Fig. 1. Insemination was always by AI but during the

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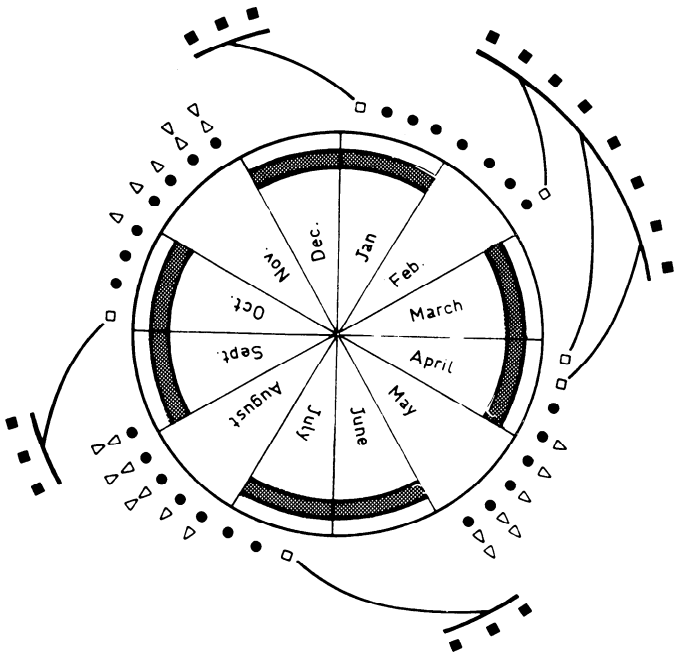

Fig. 1 Schematic representation of intensive lamb production with synchronisation of oestrus four times per year, 40–50 days after lambing

■ Diagnosis of pregnancy
● AI normal
□ AI ewes diagnosed non-pregnant
△ 1st return to rams
▽ 2nd return to rams
▩ Lambing

non-breeding season, from July to December, rams were used to re-mate ewes failing to conceive at AI. During the non-breeding season ewes were diagnosed as pregnant or not by analysing jugular blood samples taken 18 days after AI for progesterone (Saumonde and Thimonier 1972). The non-pregnant ewes were treated again at the next opportunity. After lambing, ewes were allowed to rear only one lamb each and the others were reared artificially. This programme has been running for three years; in the first two years ewes were re-inseminated 45 days after lambing and in the third year 55 days after lambing.

Using this system it has been possible to produce over two lambs per ewe per year, but in Table 2 it can be seen that the overall reproductive performance of the flock has fallen over the three years the programme has been in operation. The number of lambs born per ewe and the economic return from the system fell in the second year. Because of this, the interval between lambing and AI was increased in the third year from 45 to 55 days, lambs were weaned 10 days before AI rather than 10 days after AI, and the dose of PMSG was increased by about 50 i.u.

At all times the flock consisted mostly of lactating ewes so that the overall performance of the flock was dictated by the performance of this group. Both

prolificacy and fertility at AI were lower during the second year than at the corresponding times during the first year (Fig. 2). The modifications in the third year had little effect during the breeding season but improved both fertility and prolificacy in the ewes during the non-breeding season. The poorer performance of the ewes in the second and third years was probably not caused by a decreased response to PMSG (Gherardi and Martin 1978) and as the average weight of ewes in the flock was maintained throughout, the nutrition of the animals was not implicated either. It is clear, nonetheless, that Ile-de-France ewes are unable to maintain a high level of reproductive efficiency when subjected to a highly intensive breeding programme.

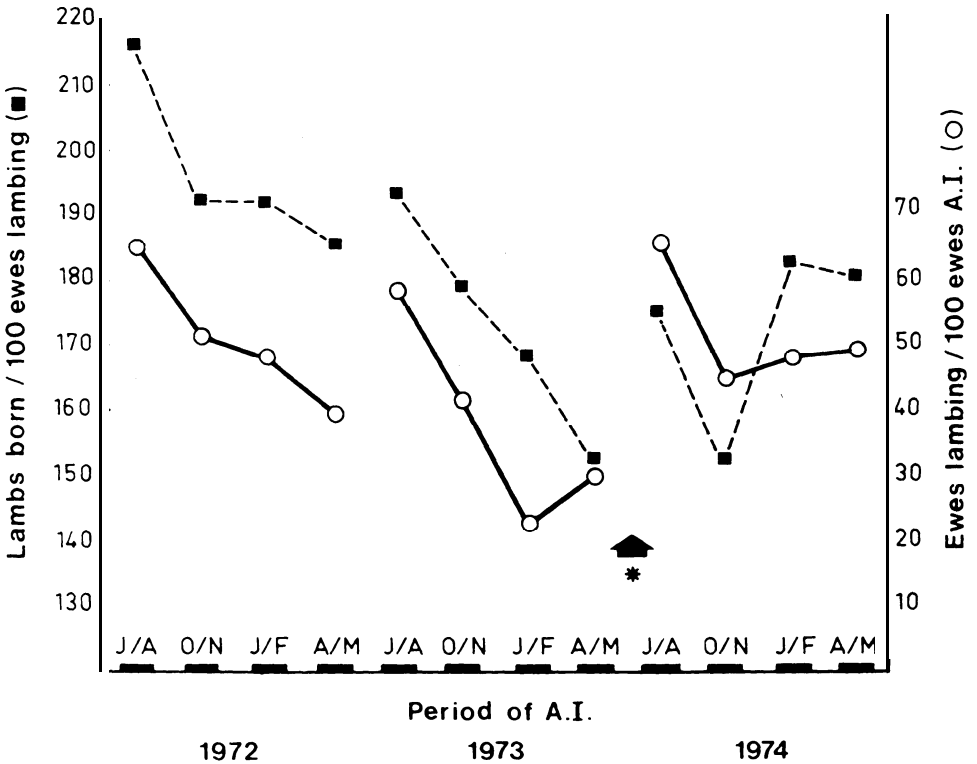

Fig. 2. The fertility (at lambing) (○) and prolificacy (■) of lactating ewes after AI at four periods of the year (July/Aug ; Oct/Nov ; Jan/Feb ; April/May) during the three years of the experiment.

* Before this time ewes were inseminated 45 days after lambing and lambs were weaned 15-40 days later. After this time ewes were inseminated 55 days after lambing and lambs were weaned from 10 days before to 10 days after AI.

Many lambs were lost at, or soon after birth in the first and second years, but synchronisation of lambing using dexamethasone, and good surveillance of lambing ewes reduced this loss to 8% in the third year. The value of synchronised lambing is even more dramatic than is shown here because 33% of

the ewes lambed before treatment and lost 14% of their lambs. By contrast, only 2.4% of the lambs born were lost in the ewes whose lambing was synchronised and supervised.

TABLE 2 Reproductive performance of the flock during three years

	Year 1	2	3
No. ewes over 7 months	2091	2082	1740
No. treatments/ewe/year	2.14	2.21	2.10
No. lambings/ewe/year	1.31	1.28	1.28
No. lambs/ewe lambing	1.79	1.62	1.65
Lamb deaths (%)	14	11	8
Lambs born/ewe/year	1.23	2.07	2.11

The scheme outlined here for intensive breeding was aimed at 1) maximising fertility of ewes at a synchronised insemination; 2) raising ovulation rate artificially using PMSG; and 3) minimising the loss of extra lambs so induced. In the final analysis the extra productivity from intensification did not offset the extra cost. The techniques and experience gained from this enterprise have been used to increase the efficiency of less intensive schemes which aim to produce three lambings per ewe every two years (Louault *et al.* 1976; Thimonier and Cognie 1977). The efficiency of these schemes has also been improved significantly by the incorporation of highly prolific, Romanov cross ewes.

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