STUDIES ON EMBRYO TRANSPLANTATION PROCEDURES

USING BOOROOLA-MERINO X PERENDALE EWES

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ABSTRACT

A study was carried out to develop an embryo transfer programme under farm conditions. For this embryos were collected from donor ewes 5-6 days after single-sire mating by rams of the same crossbreed as the ewes. Then the embryos were transplanted soon after collection or after they had been initially frozen and later on thawed before their transfer. To enable this study to be carried out, one hundred and sixty-one Booroola-Merino x Perendale ewes aged between 3 and 6 years and of 34-69 kg live weight were examined. These animals were classified as either carriers (F+) or non-carriers (++) of the fecundity gene on the basis of the number of ovulations recorded at laparoscopy carried out a few days after progestagen sponge treatment to induce oestrus synchronisation, and in a few cases on the basis of previous lambing data. The aims of the study therefore were also to identify ewe carriers or non-carriers of the fecundity gene, and to evaluate their ovulatory response to several doses of Pregnant Mare Serum Gonadotrophin (T1=0, T2=350, T3=700 and T4=1050 i.u. of PMSG) given during the embryo transfer programme.

On the basis of the criteria used to classify F+ and ++ ewes, 76 ewes were considered as carriers and 85 as non-carriers of the fecundity gene.

Immediately after progestagen synchronisation treatment the incidence of oestrus and the distribution of onset of oestrus was similar in both groups of ewes, and also following PMSG treatment given in the succeeding cycle.

Ovulation rate after the progestagen sponge treatment was significantly affected by genotype and age of the ewes, but it was not associated with the live weight of the ewes. The least-squares means for number of ovulations in F+ and ++ ewes and in 3 and 4-6 years old animals were 3.02, 1.73, 2.14 and 2.45 respectively. Higher sensitivity to PMSG treatment was observed from the right ovary than from the left ovary (3.40 v. 2.82 ovulations respectively).

No significant effect of dose of PMSG was found on the percentage of embryos recovered, the overall recovery rate being 66%. Of the ova or potential embryos recovered 78% had been fertilised and had developed to embryos. There were no significant differences between the 3 rams in the fertilisation rate in the ewes compared on a per ewe basis.

The reproductive performance of donor ewes which had been flushed, was considerably influenced by the efficiency of the embryo recovery procedures, since every embryo not recovered represents a potential pregnancy and such a situation sometimes is not desirable. In this study 30% of the ewes that were flushed, subsequently became pregnant and produce lambs as a result of one or more embryos not being recovered at surgery.

The number of ovulations after PMSG treatment was significantly affected by the dose-level of PMSG and the genotype, age and live weight of the ewes. F+ ewes recorded a significantly higher ovulation rate than ++ ewes. Their respective least-squares means were 3.61 and 2.31 corpora lutea. No significant difference was found between treatments 1 and 2 and between treatments 3 and 4. However, the response from the last two treatments was significantly higher than that from the first two treatments. Their respective least-squares means were 2.10, 2.01, 3.74 and 4.37 corpora lutea. Ewes 4-6 years old recorded a significantly higher number of ovulations than younger ewes (3 years old). Small significant effect of live weight was found on the ovulatory response of the ewes. Analysis within each genotype showed a similar trend in both genotypes, but small significant effect of weight was only detected in the ++ ewes.

The pregnancy rate that occurred after the transfer of two fresh embryos (86%) was significantly affected by the genotype of the recipient ewe (F+ ewes 75% v. ++ ewes 96%). The number of ovulations in the recipients and whether or not they had received PMSG before transfer had no effect on the incidence of pregnancy.

The pregnancy rate achieved after the transfer of frozen embryos (35%) was significantly influenced by the number of embryos transferred, but not by the ovulation rate in the recipient ewe or the time elapsing from flushing until freezing. Pregnancy rate was significantly higher after the transfer of 2 embryos compared to the transfer of single embryos (43% v. 0%), but only 8 transfers were made

in the later category.

On the basis of the number of ovulations, it can be concluded that ewe carriers of the fecundity gene recorded significantly higher ovulation rate after oestrus synchronisation and were more sensitive to PMSG stimulation than non-carrier ewes.

There was an encouraging pregnancy rate obtained with frozen embryos, even although the small number of transfers carried out limits conclusions that can be drawn. However, the eighty-six percent pregnancy rate achieved after the transfer of two fresh embryos per recipient, shows the feasibility of the embryo transfer programmme under conditions where suitable recipients are available. Where recipients are limited then additional embryos might be frozen and stored until ready for transplantation.

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