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MULTIPLICATION OF FIVE BREEDS OF "EXOTIC"
SHEEP IN NEW ZEALAND USING THE TECHNIQUE
OF EMBRYO TRANSPLANTATION

A thesis presented in partial fulfilment
for the requirements of the degree
of Master of Philosophy
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ABSTRACT

Sheep of five* breeds imported into New Zealand and held at a quarantine farm were increased in number through the use of embryo transplantation (ET) procedures. For this, donor ewes after superovulation treatment were inseminated with fresh semen of rams of their own breed and flushed to recover embryos 5 or 6 day after onset of oestrus. The embryos after classification and processing through ten washes of flushing media were transported to a secondary quarantine farm and transferred into synchronised recipient Coopworth and Romney ewes. Some of the surrogate ewes received intravaginal progesterone supplementation (CIDR) for 14 days after transfer. Details of lamb production were recorded. This thesis reports the results of some factors that can affect the success of a commercial ET programme.

Among the donor ewes 87-89% of the animals were in oestrus after synchronisation and gonadotrophin treatment. The ewes not in heat often had low or absent superovulatory responses. Superovulation was induced with either FSH-P or Folltropin given as 7 or 8 intramuscular injections at 12 h interval beginning 72 h before withdrawal of the progesterone treatment (CIDR). The gonadotrophin dose levels were modified according to the breed and also as the programme progressed. Most of the data were examined within breed.

The superovulatory response to either the type of gonadotrophin preparation or the dose levels did not differ significantly.

* Texel (from two sources, Danish (DT) and Finnish (FT) and considered as separate breeds), Finnish Landrace (Finn), Gotland Pelt (Got), Oxford Down (OXD), White Headed Marsh (WHM) breeds.

The variation in recovery rate of embryos was not affected by the type of gonadotrophin used, whether the animals treated were flushed on one or two occasions, whether flushing was done 5 or 6 days after oestrus, or according to the ovulatory response (classed as 1-8, 9-16 and >16 corpora lutea counted).

Overall 85% of the ova were fertilised and had developed into embryos. There were no significant differences in fertility between inseminations done in the morning or the afternoon, or when flushed once or twice, or when AI was followed by natural mating, or relative to the ovulatory response. Moreover there was no significant difference within the six breeds in the fertility rate.

The quality of the embryos, classified as "good" or "poor" on the basis of their appearance and stage of development consistent with the day of flushing (developmental age), was significantly affected in several of the breeds by the type of gonadotrophin, the dose levels, the ovulatory response and the age of the embryos when recovered.

The pregnancy rate after the transfer of two embryos was 59%, 72%, 60%, 53%, 53%, 46% for recipients carrying DT, FT, FINN, GOT, OXD, WHM embryos, respectively. The comparable values for embryo survival were 46%, 57%, 54%, 42%, 40%, 34%, respectively. In general among the factors studied involving breed of recipient, degree of synchronisation between donor and recipient, ovulation rate in the recipient, interval from flushing to transplantation and progesterone supplementation it was found that only the latter factor in the DT, FT and OXD breeds of embryos was significant.

The results from this multiplication programme after considering 409 treatments with gonadotrophin gave an average of 6.0 corpora lutea, 3.9 eggs recovered, 3.4 eggs fertilised and 1.5 lambs born per treatment. It is concluded that the low recovery rate and poor survival rate of the embryos are important factors to be overcome if a significant increase in the number of lambs born is to be expected from embryo transplantation. Work to overcome these problems is necessary, but attempts should also be made to increase the OR through modification of the gonadotrophin treatments. Support for this idea is suggested because in some animals with a high OR satisfactory numbers of eggs were fertilised and an increase of good quality embryos was recorded.

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