Accelerated and out-of-season lamb production in New Zealand

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Abstract

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The objective of this study was to evaluate ewe and lamb performance in an accelerated lamb production system, and to compare the performance and lamb output between a conventional and an accelerated lamb production system. In the "Conventional" system, ewes were bred in March to lamb in August. The "Accelerated" system was based on the "STAR" system (Lewis et al., 1996), in which there were five breeding periods within each year. In the current experiment these were 14th January, 28th March, 9th June, 21st August and 2nd November. Progesterone was used to synchronise the breeding periods and during the non-breeding season, eCG was used to induce reproductive activity. Lambing began on each of these dates and weaning was 73 days later, coinciding with the next breeding period. The experiment ran over a three-year period beginning with breeding in March 2003 and was complete with the weaning of lambs from the January 2006-bred ewes. This resulted in 15 lambing and breeding periods over the three years in the Accelerated system and three lambing and breeding periods in the Conventional system.

Average pregnancy rates were lower in the Accelerated system than in the Conventional system. Lamb growth rates were similar between the two systems, although lamb live weights at weaning were lower in the Accelerated system due to the age of the lambs at weaning (average = 69 vs 96 days). More lambs were born and weaned, resulting in more kilograms of lamb weaned in the Accelerated system relative to the Conventional system over the experimental period (26,200 vs 24,300 kg).

Labour input was 35% higher in the Accelerated system, or 13% higher per lamb weaned. Average annual ewe energy requirements were 6% higher in the Accelerated system. Ewe energy requirements per kilogram of lamb weaned was lower (6%) in the Accelerated system due to more breeding and lambing periods per ewe per year.

Laparoscopic observation of ewes' ovaries at each breeding period revealed that most ewes had active ovaries and were therefore capable of successfully producing a viable foetus. In a subsequent experiment, blood samples were collected for analysis of progesterone concentrations from ewes bred during the spring and autumn breeding periods. Observations of data indicated that a small number of ewes conceived and lost their conceptus, or had abnormal corpora lutea. Results suggested that pregnancies were failing due to a lack of an appropriate signal from the embryo to the dam/uterus.

Exposing Romney ewes to an artificial lighting regimen was unsuccessful for inducing reproductive activity during spring. In another experiment, melatonin implants administered to Romney ewes in spring and used in conjunction with eCG and progesterone, resulted in 61% more lambs born per ewe treated, compared to eCG and progesterone alone. This result indicated that melatonin implants, used with eCG and progesterone may be a suitable method for improving reproductive performance in sheep bred out of season in New Zealand.

Delaying weaning of lambs and breeding lactating ewes can be used to obtain heavier lamb weaning weights in the Accelerated system. Spring-bred ewes had lambs weaned at either 69 days post partum or 90 days post partum. Reproductive performance was similar between the two groups of ewes, and lamb live weights in the later weaned group were heavier when lambs were 90 and 120 days of age.

This research has shown that accelerated or out-of-season lamb production is an option for some New Zealand sheep farmers. However, the mechanisms associated with reproductive seasonality and methods of successfully circumventing this seasonality require further attention in order to achieve optimum reproductive performance.

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Sheep breeds

EF	East Friesian Composite (½ East Friesian, ¼ Texel, ¼ Polled Dorset)
Rom	Romney

Hormones (endogenous and artificial)

FSH	Follicle stimulating hormone
LH	Luteinizing hormone
GnRH	Gonadotrophin releasing hormone
eCG/PMSG	Equine chorionic gonadotrophin/Pregnant mares' serum gonadotrophin
CIDR	Controlled internal drug releasing devices
MAP	medroxyprogesterone
FGA	fluorogestone acetate

Reproductive jargon

Oestrus rate	Proportion of ewes displaying oestrus per ewe exposed to the ram
Pregnancy rate	Proportion of ewes pregnant per ewe exposed to the ram
Conception rate	Proportion of ewes pregnant per ewe mated
Fecundity	Number of lambs (or foetuses) per ewe pregnant
Fertility	Number of lambs (or foetuses) per ewe exposed to the ram
PPI	Post partum anoestrus interval (the period of time between parturition and resumption of ovarian activity