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**A Study of Out-of-Season Lamb Production in the Lower
North Island of New Zealand**

A thesis presented in partial fulfilment of the

requirements for the degree of

Doctor of Philosophy

in Animal Science

at Massey University

STEPHEN TODD MORRIS

1992

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ABSTRACT

Morris, S.T. 1992: A Study of Out-of-Season Lamb Production in the Lower North Island of New Zealand. PhD thesis, Massey University, Palmerston North, New Zealand. 214pp.

The objective of this study was to evaluate out-of-season lamb production in the lower North Island of New Zealand. Ewes representing three crosses (Border Leicester x Romney (BR), Poll Dorset x BR (PBR) and Suffolk x BR (SBR)) and three birth years were reared, under commercial farming conditions, to enter an out-of-season lambing experiment. Suffolk x BR hoggets had significantly ($P < 0.01$) heavier 16 month liveweights than PBR or BR hoggets. There were inconsistent differences in liveweight between PBR and BR ewe hoggets. Border Leicester x Romney hoggets produced more ($P < 0.01$) greasy wool at the yearling shearing than PBR or SBR hoggets.

The same sheep were then assigned to one of two lambing policies (June or August) at their 2-year-old mating and remained within that policy while they were evaluated for their 2-year-old (1987, 1988, 1989) and 3-year-old (1988, 1989, 1990) lambing performance. Lambing policy did not influence the proportion of mated ewes that lambed but there were more ($P < 0.05$) multiple births in the August-lambing ewes. Birth weights and weaning weights of the June-born lambs were significantly ($P < 0.001$) lower than those of their August-born counterparts. June-lambing ewes produced more ($P < 0.001$) wool (on average by 0.5 kg) than August-lambing ewes. Border Leicester x Romney ewes produced more ($P < 0.001$) greasy wool per year (by 0.7 to 1.2 kg) than PBR ewes while PBR ewes outperformed SBR ewes (by 0.3 to 0.5 kg) for annual greasy wool production. Reproductive differences between the ewe crosses were small and non-significant, although PBR ewes reared the heaviest lambs.

In an attempt to determine when the extra wool growth occurred in June-lambing compared to August-lambing ewes, six-weekly midside patch wool growth measurements were taken throughout a 12-month period on a sample of the same three ewe crosses described earlier. It was found that the seasonal decline in wool growth rate that normally occurs over the winter months in August-

(ii)

lambing ewes was minimised in June-lambing ewes. Associated with this effect was a significant ($P < 0.05$) increase in mean fibre diameter and an increase in staple strength at the following October shearing in June-lambing ewes.

The next experiment was designed to determine the relationships between sward surface height, intake and production for lactating June-lambing ewes. The organic matter intake (OMI) of June-lambing ewes was not influenced by a range (2.6 - 7.8 cm) of sward surface heights (SSH) during week 3 of lactation. Between weeks 4 and 7 of lactation, ewe OMI increased up to a SSH of 7.8 cm while in week 8 of lactation there was no increase in OMI between ewes grazing 4.4 or 7.8 cm swards. Sward surface height had no effect on ewe midside wool growth, mean fibre diameter or lamb growth but ewes on the 2.6 cm sward lost 8-10 kg more liveweight during lactation than those on the 4.4 and 7.8 cm swards. These results suggest that June-lambing ewes in good condition can maintain lamb growth at low (2-3 cm) SSH but at the expense of ewe liveweight loss.

The final trial investigated the effect of SSH on ewe intake and performance during the last month of pregnancy in June- and August-lambing ewes. Ewe OMI, condition score and liveweight gain increased as SSH increased from 2.0 to 8.0 cm. There was no effect of SSH on ewe midside wool growth, mean fibre diameter or lamb birth weights. June-born lambs were significantly ($P < 0.05$) lighter at birth than August-born lambs across all SSH treatments. At the same SSH, June-lambing pregnant ewes achieved similar OMI to those of August-lambing ewes.

The results of these studies are discussed in the context of the development of out-of-season lambing systems for the lower North Island of New Zealand.

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LIST OF ABBREVIATIONS

BR	Border Leicester x Romney
CIDR	Controlled Internal Drug Releasing device
CRC	Controlled Release Capsule
CFW	Clean Fleece Weight
cm	centimetre(s)
d	day(s)
°C	degrees celcius
°S	degrees latitude South
DM	Dry Matter
DMI	Dry Matter Intake
DOMI	Digestible Organic Matter Intake
epg	eggs per gram
EPM	Ellinbank Pasture Meter
FO	Faecal Output
g	grams(s)
gf	grams of fibre
GFW	Greasy Fleece Weight
ha	hectare(s)
HFRO	Hill Farming Research Organisation
iu	international unit(s)
kg	kilogram(s)
K	efficiency of utilisation of metabolisable energy
M	Maintenance
MAF	Ministry of Agriculture & Fisheries
ME	Metabolisable Energy
MFD	Mean Fibre Diameter
MJME	Megajoules of Metabolisable Energy
ml	millilitre(s)

mg	milligram(s)
μg	microgram(s)
m	metre(s)
μm	micrometre(s)
N/Ktex	Newtons per Kilotex
OF	Oesophageal Fistulated
OM	Organic Matter
OMI	Organic Matter Intake
OMD	Organic Matter Digestibility
PBR	Poll Dorset x (Border Leicester x Romney)
PMSG	Pregnant Mare Serum Gonadotrophin
RH	Relative Humidity
s	second(s)
SBR	Suffolk x (Border Leicester x Romney)
SSH	sward surface height(s)
v.	versus
WRONZ	Wool Research Organisation of New Zealand
X	tristimulus value (red)
yr	year(s)
Y	tristimulus value (green)
Z	tristimulus value (blue)

Statistical terms

SEM Standard Error of the Mean

NS $P > 0.10$

† $P < 0.10$

* $P < 0.05$

** $P < 0.01$

*** $P < 0.001$

r correlation