The Effects of Pre-Lamb Shearing on Feed Intake, Metabolism and Productivity of Sheep

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at Massey University

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والصلاة والسلام على خاتم الأنبياء والمرسلين

In the Name of Allah,
the Compassionate, the Merciful,
Praise be to Allah, Lord of the Universe,
and Peace and Prayers be upon
His Final Prophet and Messenger.

ERRATA

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* Reference number 4 (Wait 1972).

ABSTRACT

Dabiri, N. 1994: The Effects of Pre-Lamb Shearing on Feed Intake, Metabolism and Productivity of Sheep. PhD thesis, Massey University, Palmerston North, New Zealand. 182 pp.

The objective of this research programme was to investigate issues relating to the development of the pre-lamb shearing policy as a means of improving the productivity of, and financial returns to, New Zealand sheep farming systems. Four experiments were conducted with Border Leicester x Romney sheep to examine the potential advantages and disadvantages of pre-lamb shearing, and means of ameliorating the latter.

Experiment 1 compared the effect of pre-lamb and conventional (post-weaning) shearing by standard comb on the productivity of spring-lambing ewes (n= 250 per group) and their lambs under commercial conditions over 3 years. Ewes were shorn either about one month prior to lambing (during winter) or at weaning (during summer). Pre-lamb shearing was associated with a significant ($P<0.05$) increase in ewe fleeceweight and weaning weight in one year but not in the other (the first year being used to adjust ewes to the new shearing regimens. Shearing treatment did not affect lamb production (birthweight, weaning weight or growth rate).

In Experiment 2, a more detailed study was made of the effects of pre-lamb shearing, again by standard comb, in both spring (August)- and autumn (May)-lambing ewes (n = 30 per shearing x lambing policy group). Ewes in each policy were shorn on pregnancy day 118 (P118) or left unshorn until weaning. Pre-lamb shearing was associated with increased organic matter (OMI, 1739±58 vs 1526±59 g/d, $P<0.05$) and dry matter (DMI) intakes only at P141-144 (i.e. 2-3 weeks after shearing). Ewe liveweights and body condition scores, and lamb weights from birth to weaning, were unaffected by shearing treatment but back fat depths were significantly ($P<0.05$) lower in pre-lamb shorn ewes (4.3±0.2 mm) than in unshorn ewes (5.1±0.2 mm) on P142. The only parameter to exhibit a significant lambing policy x shearing treatment interaction was midside clean wool growth over P118-L (lactation day) 13, pre-lamb shorn May-lambing ewes producing significantly ($P<0.01$) greater clean wool weights than unshorn ewes (0.927±0.042 vs 0.721 ±0.048 mg/cm^2/day) whereas shearing was without effect in August-lambing ewes (shorn, 0.542±0.041 vs unshorn, 0.641 ±0.045 mg/cm^2/day, $P>0.05$).

The third experiment examined the potential benefits of pre-lamb shearing by cover comb. Ewes were shorn by cover comb or standard comb on P114 or left unshorn until weaning (n= 100/group). Despite similar post-shearing ewe survival rates and herbage intakes between ewes shorn pre-lamb by cover comb and unshorn ewes, standard comb-shorn ewes had greater losses (14 vs 3 %, P<0.05), OMI over P123-126 (1781±115 vs 1566±115 g/d, P<0.10) and biting rates (99.2±1.8 vs 93.7±1.8 bites/min, P<0.05) than cover comb-shorn ewes. Over the 20 days after shearing, only the standard comb-shorn group lost liveweight. Both pre-lamb shorn groups had greater (P<0.05) clean wool growth rates and superior (P<0.05) wool quality (yield and brightness) than unshorn ewes while lamb production and survival were similar between shearing treatments. Rectal temperature (RT) was significantly (P<0.05) lower in ewes shorn by the standard comb (38.9±0.08 °C) and cover comb (39.0±0.08 °C) than in the unshorn group (39.3±0.08 °C) on day 3 post-shearing (S3), but by S5 only the ewes shorn by the standard comb had lower RT. Generally, blood metabolite and hormone concentrations were different over the same time interval as RT, with circulating glucose and non-esterified fatty acid (NEFA) concentrations being elevated to the greatest extent in ewes shorn by standard comb.

Experiment 4 determined the effect of shearing by standard comb or cover comb on heat production and metabolism of non-pregnant, non-lactating sheep (8 pairs) in calorimetry chambers over 10 days post-shearing. Plasma NEFA concentrations and heat production (HP) were significantly greater in sheep shorn by standard comb than in those shorn by cover comb (a maximum difference in HP of 5.4 MJ/24h in wet, windy and cold conditions) while the reverse was true for body insulation and liveweight gain. This superior cold resistance in the cover comb-shorn group reflected their greater residual stubble depth (5.1±0.2 vs 3.1±0.2 mm).

The above results indicate that the effects of shearing treatment and lambing policy were additive in most respects, suggesting that the advantages and disadvantage of pre-lamb shearing spring-lambing ewes are also likely to apply to autumn- lambing ewes. The greater survival rate, rectal temperature and liveweight gain, but lower feed intake and heat production, of ewes shorn pre-lamb by cover comb than ewes shorn by standard comb, which reflected their greater residual stubble depth, clearly indicated that use of the cover comb should be strongly supported as a means of ameliorating the effects of pre-lamb shearing on cold stress and feed intake. A financial analysis of these results in a simulated sheep production system showed that pre-lamb shearing by cover comb could be expected to increase returns to the sheep farmer by approximately $1.26 per ewe compared with conventional post-weaning shearing. These increased returns were a consequence of both improved productivity and reduced overdraft charges for seasonal finance.

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AT	air temperature(s)
b	bite(s)
BFD	back fat depth
BI	body insulation
BLXR	Border Leicester x Romney
BR	biting rate(s)
BW	body weight
CIDR	Controlled Internal Drug Releasing device
cm	centimetre(s)
Cr_2O_3	chromic oxide
CRC	Contrroled Release Capsule
CS	condition score
CV	coefficient of variation
CW	clean wool
d	day(s)
P	day of pregnancy (e.g. P118 = day 118 of pregnancy)
L	day of lactation (e.g. L13 = day 13 of lactation)
S	day from shearing (e.g. S-2 = 2 days prior to shearing)
°C	degree(s) Celsius
°S	degree latitude South
D	digestibility
DM	dry matter
DMD	dry matter digestibility
DMI	dry matter intake
DOMD	digestible organic matter in dry matter
EPM	Ellinbank Pasture Meter
FD	fibre diameter
FO	faecal output
g	gram(s)
GW	greasy wool
GH	growth hormone
ha	hectare(s)
h	hour(s)
HFRO	Hill Farming Research Organisation
HP	heat production
I	intake
IU	International unit(s)
kg	kilograms(s)
l	litre

LCT	lower critical temprature
MJ	megajoules
ME	metabolisable energy
m	metre(s)
µg	microgram(s)
µm	micrometre(s)
mg	milligram(s)
meq	milliequivalent
ml	millilitre(s)
mm	millimetre(s)
mmol	millimol
Min	minimum
min	minute(s)
NEFA	non-esterified fatty acids
ng	nanogram(s)
N	nitrogen
OF	oesophageal fistulated
OM	organic matter
OMD	organic matter digestibility
OMI	organic matter intake
pg	picogram(s)
PMSG	Pregnant Mare Serum Gonadotropin
RT	rectal temperature(s)
SSU	sheep stock unit
SSH	sward surface height(s)
3OHB	3-hydroxybutyrate
s	second(s)
vs	versus
W	watts
Y	tristimulus value (green)
Y-Z	tristimulus value (yellow)
Z	tristimulus value (blue)

Statistical Terms

PSE	Pooled Standard Error of Mean
SEM	Standard Error of Mean
LSmean	Least Square of Mean
SELSM	Standard Error of Least Square Mean