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**THE EFFECT OF GRAZING WILLOW (*Salix* spp.) FODDER
BLOCKS UPON REPRODUCTIVE RATE AND MANAGEMENT
OF INTERNAL PARASITES IN MATED HOGGETS**

A thesis presented in partial fulfilment of the requirements for
the degree of Master in Animal Science
at Massey University, Palmerston North,
New Zealand

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2007

DECLARATION

The studies presented in this thesis were completed by the author whilst a Postgraduate student in the Institute of Veterinary, Animal and Biomedical Science, Massey University, Palmerston North, New Zealand. I hereby affirm that the content of this thesis is original research conducted by the author. All views and conclusions are the sole responsibility of the author. All references to previous work are included in the references section of each chapter. Any assistance received during the preparation of this thesis has been acknowledged.

I certify that the content of this thesis has not already been submitted for any degree and is not being currently submitted for any other degree. I certify that to the best of my knowledge any help received in preparing this thesis, and all sources of materials used, have been acknowledged in the thesis.

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ABSTRACT

A grazing experiment was conducted for 116 days from 19 January to 15 May in the late summer/autumn of 2006 at Massey University's Riverside dryland Farm, near Masterton (New Zealand) to compare the effect of grazing willow fodder blocks or control perennial ryegrass (*Lolium perenne*)/white clover (*Trifolium repens*) pasture, during the pre-mating and mating periods, on gastrointestinal parasitism control and reproductive rates in 7 months old ewe hoggets. A rotational grazing system with 348 Romney weaned hoggets was used. Hoggets were randomly allocated to three treatment groups (116/group), being: control pasture with regular anthelmintic drenching, control pasture with trigger drenching (drenched only when mean faecal egg count of each group exceeded 1000 eggs/g wet faeces) and willow fodder blocks with trigger drenching. Four replicated pasture areas and five replicated willow fodder blocks were rotationally grazed by single groups of animals, using animals as the replicates for statistical analysis. The fodder blocks contained small trees and a mixture of herbage growing under the trees. After mating, the three groups were joined together and managed as one group until the end of the experiment at weaning, on 7 January 2007. Hogget live weight (LW), dag scores, faecal egg counts (FEC) and reproductive rate at foetal ultrasound scanning, lambing, docking and weaning were measured. Ewe hogget wool production was measured at weaning.

Relative to control pastures, fodder block herbage was of lower dead matter content and its legume content was slightly higher. Total N concentration (35 g/kg dry matter; DM), organic matter digestibility (OMD; 0.68) and metabolisable energy (ME; 10 MJ/kg DM) were similar for fodder block pasture and control pasture; the selected tree fodder had lower concentrations of N (24 g/kg DM) and was higher in OMD (0.74) and ME (10.4 MJ/kg DM). Tree fodder contained higher concentrations of CT (22.9 g/kg DM) compared to 1.6 g/kg DM in control pasture and herbage in willow fodder blocks.

Grazing willow fodder blocks increased LWG (approximately 97 g/day vs. 86 g/day; $P < 0.0001$) and increased reproductive rate corrected to equal LW by approximately 17% units ($P < 0.05$), due to increases in both oestrus activity ($P < 0.01$) and conception rates (hoggets pregnant/100 hoggets mated; $P < 0.05$). Calculated daily DM (1.41 kg) and ME (14 MJ) intake were similar in all groups. Calculated daily CT intake (6.0 g vs. 2.1 g)

and CT intake/100 g CP intake (2.2 g vs. 0.7 g) was higher for willow fodder block hoggets than for the control pasture groups; this may have increased the flow of undegraded dietary protein (UDP) to the small intestine, leading to increases in reproductive rate of this group. Grazing willow fodder blocks failed to reduce the number of anthelmintic drenches (3) needed to maintain FEC below 1000 epg wet faeces, but was successful in reducing dag score relative to grazing conventional ryegrass/white clover pastures.

It was concluded that grazing willow fodder blocks can play a beneficial role in sustainable farming systems as it can sustain animal growth rates, increase reproductive rate and reduce dag formation in parasitized hoggets. These benefits were associated with reduced dead matter content and increased legume content in fodder block herbage and with increased intake of secondary compounds from the trees. However, both pasture and trees need to be managed as a tree/pasture system in order to produce herbage of higher nutritive value and more efficiently utilise willow fodder blocks as a supplementary feed. After 6 years of grazing in this manner, the survival rate of the trees was approximately 85 %.

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DEDICATED TO:

MY WIFE BRENDA,

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DAD, MUM AND MOTHER IN LAW,

AND MY BROTHERS AND SISTERS,

FOR THEIR ENDLESS LOVE, PATIENCE AND ENCOURAGEMENT.

LIST OF ABBREVIATIONS

ADF	Acid detergent fibre
B	Billion
BCAA	Branched chain amino acids
BCS	Body condition score
C	Carbon
CH ₄	Methane
CHO	Carbohydrate
cm	Centimetre
cm ³	Cubic centimetre
CO ₂	Carbon dioxide
CP	Crude protein
CT	Condensed tannins
D	Diameter
DM	Dry matter
DOMD	Digestible organic matter in the dry matter g/100 g DM
DP	Digestible protein
DS	Dag score
EAA	Essential amino acids
epg	Eggs per gram
FA	Feed allowance
FEC	Faecal egg count
G	Gram
GA	Grazing area
GI	Gastrointestinal
GLM	General linear model
h	Hour
ha	Hectare
HCl	Hydrochloric acid
HM	Herbage mass (kg DM/ha)
HT	Hydrolysable tannin
kg	Kilogram
L ₁	First larval stage
L ₂	Second larval stage
L ₃	Third larval stage
LP	Lambing percentage
LW	Live weight
LWG	Live weight gain
M	Million
M/D	MJ ME/kg DM
MAF	Ministry of Agriculture and Forestry
ME	Metabolisable energy
MJ	Mega joule
m	Meter
mm	Millimeter
MRT	Mean retention time
MW	Molecular weight
N	Nitrogen
N ₂ O	Nitrous oxide
NAN	Non ammonia nitrogen

NDF	Neutral detergent fibre
NEAA	Non essential amino acid
NH ₃	Ammonia
NV	Nutritive value
NZ\$	New Zealand dollar
°C	Degrees Celsius
OM	Organic matter
OMD	Organic matter digestibility
OR	Ovulation rate
P	Probability
PEG	Polyethylene glycol
pH	Measure of acidity
SE	Standard error
SSH	Sward surface height
TGD	Total grazing days
t	Days
UDP	Undegraded dietary protein
VFA	Volatile fatty acid
VFI	Voluntary feed intake
vs	Versus

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