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THE INFLUENCE OF PASTURE CRUDE PROTEIN INTAKE ON DAIRY CATTLE  
CONCEPTION EFFICIENCY

A THESIS PRESENTED IN PARTIAL FULFILMENT  
OF THE REQUIREMENTS FOR THE DEGREE  
OF MASTER OF PHILOSOPHY IN VETERINARY  
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1992

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**ABSTRACT**

Excessive dietary rumen degradable protein and high blood urea nitrogen (BUN) levels are reported to depress conception efficiency in dairy herds. High protein levels occur in New Zealand dairy pastures. This study explores the association of pasture protein and energy levels, and cow BUN, protein and energy measures with conception efficiency in dairy cows in the Manawatu region of New Zealand.

A survey study was conducted on 10 dairy farms on which samples of blood and vaginal mucus were collected from 745 cows within 2 hours before artificial insemination. Blood was analyzed for BUN, serum albumin (ALB), glucose (GLUC),  $\beta$ -hydroxybutyrates (BOHB) and non-esterified fatty acids (NEFA) while vaginal mucus was analyzed for urea nitrogen content (MUN). Pasture samples were collected weekly during the animal sampling period and analyzed for crude protein, metabolizable energy and dry matter content. Reproductive records, including results of pregnancy diagnosis conducted 8 to 15 weeks after services at which samples were collected, were obtained from the farms and entered into the DairyCHAMP computer program.

Pasture crude protein levels ranged from 13% to 28%. The associations between dietary crude protein levels classified as high, medium and low and weekly conception rates indicated that as pasture crude protein increased, fertility decreased ( $P < 0.005$ ) in cows in their fourth or greater lactation. There was little variation in pasture metabolizable energy content and no significant association existed with conception rate. The association of the probability of conception with BUN and MUN, and blood levels of ALB, GLUC, BOHB and NEFA when tested by logistic regression analysis, revealed a significant

negative association between BUN and fertility ( $P < 0.005$ ). MUN was positively associated with the probability of conception ( $P < 0.05$ ).

Dietary crude protein from pasture and BUN had a similar negative influence on fertility in pastured cattle as was observed in heavily supplemented or fully fed cattle in the northern hemisphere.

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**LIST OF ABBREVIATIONS**

3-OHB	3-hydroxybutyrate
AB	Artificial breeding
AI	Artificial insemination
ALB	Albumin
ASAT	Aspartate amino transferase
BOHB	$\beta$ -hydroxybutyrate
BOHBA	$\beta$ -hydroxybutyric acid
BUN	Blood urea-N
CIDR	Intravaginal progesterone device
CP	Crude protein
CPDM	Crude protein dry matter
CR	Conception rate
dg	Degradability
DCP	Dietary crude protein
DIP	Degradable intake protein
DM	Dry matter
GLUC	Glucose
GnRH	Gonadotropin releasing hormone
MConD	Mean conception date
ME	Metabolizable energy
MFID	Mean first insemination date
MUN	Vaginal mucus urea-N
NEFA	Non-esterified fatty acids
PBSEG	Phosphate buffer solution in EDTA and gelatine
PGF	Prostaglandin $F_{3b}$
PSB	Planned start of breeding programme
PUN	Plasma urea-N
RDP	Rumen degradable protein
SE	Starch equivalent
SUN	Serum urea-N
UIP	Undegradable intake protein
VFA	Volatile fatty acids