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**A Comparison of Reproductive Performance and
Physiology of Three Genotypes of Holstein Friesian
Dairy Cattle**

A thesis presented in partial fulfillment of the requirements
for the degree of

Doctor of Philosophy in Animal Science

at

Massey University

Palmerston North,

New Zealand.

Lorna Rachel McNaughton

2003

12-December-2003

CERTIFICATE OF REGULATORY COMPLIANCE

This is to certify that the research carried out in the Doctoral Thesis entitled "A comparison of reproductive performance and physiology of three genotypes of Holstein Friesian dairy cattle" in the Institute of Veterinary, Animal and Biomedical Sciences at Massey University, New Zealand:

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Signature: *LRMcNaughton*

Signature: *[Signature]*

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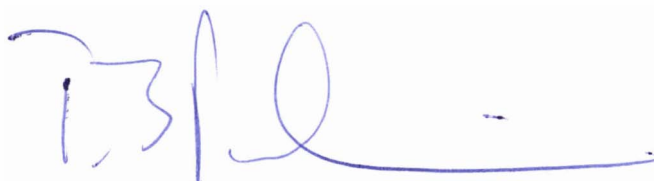
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Supervisor's Name: Timothy Parkinson
Signature:

Date: 12 December 2003

Abstract

It is important to achieve a consistently high reproductive performance in the seasonal, pastoral-based dairy production systems found in New Zealand. A decline in dairy cattle reproductive performance has been reported in many countries and this decline has been suggested to be due to the incorporation of Holstein genetics into the Friesian populations. The use of Holstein genetics (referred to as overseas genetics) has increased rapidly in New Zealand in the past 10 years. This thesis investigates the reproductive performance and physiology of animals in the Dexcel Holstein Friesian Strain Trial, from the onset of puberty, through to the end of the second lactation in a pasture-based dairy production system (total 272 animals). Two strains of New Zealand genetic origin, of either high (NZH) or low (NZL) genetic merit were compared to high genetic merit Holstein-Friesian animals of overseas genetic origin (predominantly North American and Dutch origin, OS).

Differences in live weight at puberty were identified between NZ and overseas strains. Nulliparous OS heifers were found to have longer oestrous cycles and luteal phases than NZ heifers, but pregnancy rates between the strains were not different. Body condition score at calving was found to be an important predictor of the length of the postpartum anovulatory interval. Postpartum anovulatory intervals were significantly shorter ($p < 0.05$) in OS than NZH animals. Final pregnancy rates were not different between the strains. The timing of luteal regression, following an unsuccessful first insemination was found to be more variable in OS than NZH cows, with some OS cows initiating luteal regression prior to the timing of maternal recognition of pregnancy.

The results from this thesis showed that there are differences in reproductive performance between the strains and that some OS animals are able to perform well in pasture-based dairy production systems. In conclusion, provided OS genetics are proven in New Zealand before they are widely used, there is no reason to recommend against the use of OS Holstein Friesian genetics.

Further investigations should focus on the area of body condition score mobilisation and the control of the timing of luteolysis, which are areas where differences between the strains were identified.

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