Genetic analysis of incidence of clinical mastitis in New Zealand dairy cattle

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ABSTRACT

The aim of this thesis was to estimate genetic parameters and examine the effect of different dairy breeds and heterosis on the incidence of clinical mastitis in New Zealand dairy cattle. The data set used in this study was records of clinical mastitis collected during 2005/06 to 2008/09 seasons. The data set consisted of 92,961 lactations from 53,419 Holstein Friesian, Jersey and HF x JE crossbred cows. The cows were the progeny of 641 sires from 167 dairy herds that participated in a progeny-testing programme for sires. Cows with at least one event of clinical mastitis during the season were coded 1 and cows without mastitis were coded 0. The collective incidence of clinical mastitis was 11% for 92,961 lactations. A mixed model was used to estimate heritability, repeatability and breed effects for the incidence of clinical mastitis. The model included the fixed effects of contemporary group (herd and year), calving month, breed, parity, breed composition and heterosis effect of crossbred cows. The random effects included were additive animal and permanent environment of cow.

Heritability for the incidence of clinical mastitis was 0.015 ± 0.003 and repeatability was 0.070 ± 0.005. By breed comparison, Jersey cows had 2.9% less incidence of clinical mastitis than Holstein-Friesian cows and the heterosis effects in crossbred cows had 13.4% less than the average of the parental breeds. The results from this study suggest that selection for resistance to clinical mastitis will result in a low rate of genetic gain but using Jersey sires of low breeding values can be an alternative to increase genetic resistance to clinical mastitis in New Zealand dairy cattle.

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LIST OF ABBREVIATIONS

Abbreviations

AY	Ayrshire
BS	Brown Swiss
BV	Breeding value
BW	Breeding worth
CG	Contemporary group
CM	Clinical mastitis
CMT	Californian Mastitis Test
DairyNZ	Dairy New Zealand
EBVs	Estimated breeding values
F_1	First cross
HF	Holstein-Friesian
IMI	Intra-mammary infection
JE	Jersey
kg	Kilogram
LIC	Livestock Improvement Cooperation
MAS	Marker-Assisted Selection
ms	Milksolids (fat + protein)
NR	Norwegian Red
SAS	Statistical Analysis Software
SCC	Somatic cell count
SCM	Subclinical mastitis
SCS	Somatic cell score
SD	Standard deviation
Staph. aureus	*Staphylococcus aureus*
Strep. agalactiae	*Streptococcus agalactiae*
Strep. dysgalactiae	*Streptococcus dysgalactiae*
Strep. uberis	*Streptococcus uberis*
WMT	Wisconsin Mastitis Test
XB	Crossbred of Holstein-Friesian and Jersey