Genetic alternatives for dairy producers who practise grazing

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Introduction The decline in cow fertility has had a negative impact on all dairy producers, especially those that practise seasonal calving with pasture-based dairying. One alternative that is being tried in the United States (US) by a few graziers is to use bulls from New Zealand (NZ) because NZ producers have practised seasonal calving for some time. However, genotype-environment interaction is a concern; genetic correlations that were derived by the International Bull Evaluation Service (2004) between bull rankings from different countries were often lower for NZ than for other countries. The objective of this study was to compare the performance of daughters of NZ Friesian and Holstein artificial-insemination (AI) bulls with daughters of other Holstein AI bulls (predominantly from the US) that were in the same US herd and calved at the same time.

Material and methods Milk, fat, protein, somatic cell score (SCS, an indicator of mastitis) and days open were examined for the first three parities of Holstein cows. Traits were standardized for environmental effects in the same manner as in the current US Department of Agriculture genetic evaluation. Cows were required to have calved after December 1999 and before August 2004 and to have had the opportunity to express the performance trait; i.e. the herd remained on production testing. Data for first-parity yield traits and SCS were from 489 daughters of 14 NZ bulls and 5419 daughters of 1732 other bulls in 149 herds. Second- and third-parity yield traits represented 345 and 174 NZ daughters and 5057 and 2840 other daughters in 126 and 78 herds, respectively. Data for first-parity days open were from 450 daughters of 13 NZ bulls and 5036 daughters of other bulls in 138 herds. Number of NZ daughters per herd ranged from 1 to 36. The model included fixed effects for herd-year-season and strain. Strain difference for each parity-trait combination was tested for significance at $p \leq 0.05$, 0.01 or 0.001.

Results Strain differences in trait means are given in Table 1. Mean first-parity milk and protein yields were lower by 501 and 5 kg, respectively, for daughters of the NZ bulls than for daughters of other bulls. Mean second-parity milk and protein yields were lower by 467 and 5 kg, and third-parity means were lower by 448 and 4 kg. Fat yields were higher by 2 kg (nonsignificant). First-parity daughters of NZ bulls had higher mean SCS than did daughters of other bulls (3.2 versus 3.0). Daughters of NZ bulls had 7 fewer days open during first lactation ($p \leq 0.05$) than did daughters of other bulls but had 2 and 3 greater days open during second and third lactations (nonsignificant). Fewer traits showed significance for later parities because of fewer observations.

Table 1 Performance comparison of Holstein daughters of NZ AI bulls with daughters of other AI bulls by parity[1]

Trait	Parity 1	Parity 2	Parity 3
Milk (kg)	–501***	–467***	–448***
Fat (kg)	2	2	2
Protein (kg)	–5**	–5*	–4
SCS	0.2***	0.1	0.2
Days open	–7*	2	3

[1]Significance of strain difference (NZ minus other daughters) designated at $p \leq 0.05$ (*), 0.01 (**) and 0.001(***).

Conclusions Strain differences existed for several performance traits. Daughters of US bulls were more productive than daughters of NZ bulls for milk and protein. First-parity daughters of US bulls also had lower SCS, but daughters of NZ bulls had fewer days open. However, the individual bulls chosen to be sires from each country influenced all strain differences. Producers should consider the economic values of all the performance traits when making genetic choices between US and NZ bulls, and those values should be combined into an index appropriate for expected economic conditions. Producers who practise grazing and seasonal calving should place more weight on fertility traits than is recommended for the general dairy cattle industry because of their higher economic value in a seasonal grazing environment.

References

International Bull Evaluation Service (2004). Description of National Genetic Evaluation Systems for dairy cattle traits as applied in different Interbull member countries. http://www-interbull.slu.se/national_ges_info2/ begin-ges.html, accessed November 30, 2004.