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

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Suitability of small and large size dairy cows in a pasture-based production system

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Keywords: pasture, cow size, body condition score, body weight, milk acetone

Introduction Pasture-based dairy production with greatly reduced supplemental feeding and block-calving in spring is increasingly applied in Switzerland. The prevalent cow type has been selected mainly for high individual production in a barn feeding system with balanced diet. This cow type has continuously increased in size over the last 30 years. The question arises whether this type is suitable for the new system, and particularly if cow size is a critical factor. Theoretically a large, heavy type of cow has a higher intake capacity, while the nutrient requirements for a small, light type are easier to satisfy.

Materials and methods In a 3-year trial, two herds of multiparous Red-Holstein-Simmental crossbred and Brown Swiss cows were formed (breed distribution: 50/50). Herd B consisted of 13 large and heavy cows [in 2002: 4.4 ± 0.9 years old (mean ± SD), 726 ± 62 kg body weight (BW) of the cows having calved at turnout to pasture, 147 ± 2 cm withers height (WH); in 2003: 4.6 ± 1 years old, 720 ± 63 kg, 146 ± 2 cm WH]. Herd S consisted of 16 smaller and lighter cows (3.8 ± 0.6 years old, 558 ± 34 kg BW, 138 ± 3 cm WH, resp. 4.4 ± 0.6 years old, 590 ± 38 kg BW, 137 ± 2 cm WH). Each herd had access to 5.8 ha pasture in a rotational system, so that the same overall stocking rate was obtained (1700 kg/ha). Each herd received 2115 kg of concentrate until the end of the 10-week breeding season. Individual milk production and contents of fat, protein and acetone as well as BW were recorded once a week, and body condition score (BCS) once a month. Concentration of acetone was determined by flow injection analysis as described by Reist *et al*. (2000). BW and BCS changes were analysed statistically with a t-test resp. Aspin-Welch test in case of unequal variances. Acetone values were analysed with a Mann-Whitney test.

Results Herd S produced more milk than herd B (82,527 *vs* 78,741 in 2002 and 91,173 *vs* 83,560 kg ECM in 2003). During the same time, the changes in BW and BCS were slightly higher in the B-cows than in the S-cows (Table 1). Acetone milk content was also higher in the B-cows, especially during the first year (Figure 1).

Table 1 Body weight and BCS changes (mean ± SD) of the large and heavy cows (B) and small and light cows (S) between calving and nadir

	Type B		Type S	
Body weight changes				
In 2002 (kg/cow)	-101	± 32	-53	± 35*
In 2002 (%)	-13.7	± 3.9	-10.4	± 4.9*
In 2003 (kg/cow)	-132	± 57	-91	± 24*
In 2003 (%)	-17.2	± 6.6	-14.8	± 3.2
BCS changes				
In 2002	-0.65	± 0.45	-0.32	± 0.34*
In 2003	-0.73	± 0.51	-0.55	± 0.32

*differences between types were significant (P<0.05)

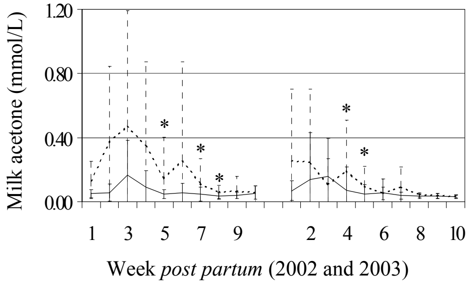

Figure 1 Acetone content in the milk (mean ± SD) of the large and heavy cows (---) and of the small and light cows (—)(* P<0.05 between types)

Conclusions The results of the first 2 years show that the small and light cows seem to be better adapted to the pasture-based milk production as practiced in this trial: as a herd they produced more milk but mobilized less body reserves than the large and heavy cows. Differences between types were more distinct in 2002 and became statistically less significant in 2003. If this trend is confirmed during the third year, this would suggest that the cows might have adapted to trial conditions over the years.

References

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