J. Dairy Sci. 90:4856–4862
doi:10.3168/jds.2006-869

Comparative Reproductive Performance and Early Lactation Productivity of Jersey × Holstein Cows in Predominantly Holstein Herds in a Pasture-Based Dairying System

M. J. Auldist,*[1] M. F. S. Pyman,† C. Grainger,* and K. L. Macmillan†
*Department of Primary Industries, Ellinbank, Victoria, Australia
†Department of Veterinary Science, University of Melbourne, Werribee, Victoria, Australia

ABSTRACT

The aim of this study was to compare the reproductive performance, milk production, live weight, and body condition loss during early lactation of purebred Holstein (H) cows to Jersey × H (J × H) crossbred cows in 4 Victorian herds. Cows of H and J × H breeding were managed together within each herd, and all herds had a seasonally concentrated calving pattern that commenced in early spring (July). All crossbred cows included in the study were 25, 50, or 75% H and were considered collectively as J × H regardless of the sire and dam breeds used to reach those percentages. Each herd owner provided records of reproductive performance and milk production. Compared with H cows, J × H cows had higher first-service conception rates (52 vs. 42%), higher percentages confirmed pregnant by 6 (68 vs. 54%) and 14 wk (86 vs. 78%) after the first day of inseminating, and lower final not-in-calf rates (11 vs. 16%); however, these differences were not observed in all herds. A random selection of H and J × H cows had body condition assessed on 3 occasions between the start of calving and the first day of the artificial insemination program. The selected cows were also weighed on the final occasion. Overall, body condition scores were slightly higher for J × H cows than for H cows, but changes in body condition score between calving and the start of inseminating were similar between breed groups. The H cows were 40 kg heavier than J × H cows and had daily milk yields in early lactation that were 2.2 kg higher. Daily yields of milk fat and protein did not differ between H and J × H cows during the study period. The improved reproductive performance of J × H cows compared with H cows may render them more suitable for use in dairy herds with seasonally concentrated calving patterns. Their improved reproductive performance was not associated with differences in condition loss in early lactation.

Key words: cross-bred cow, Jersey, Holstein, reproduction, body condition

INTRODUCTION

The declining reproductive performance of dairy cattle in many countries has been associated with an increased proportion of genes derived from Holstein (**H**) sires of North American origin (Butler, 1998; Buckley et al., 2003; Dillon et al., 2003). First-service conception rates in American herds have declined from approximately 65% in 1951 to 40% in 1996 (Lucy, 2001) with equivalent decreases in the United Kingdom (Pryce and Veerkamp, 2001) and Ireland (Dillon et al., 2003). The decline in reproductive performance of H cows grazing pasture has been associated with large weight losses in early lactation when cows mobilize body adipose reserves to achieve high milk yields (Beever et al., 2001; Fulkerson et al., 2001; Snijders et al., 2001).

Low reproductive performance in a seasonally concentrated calving system is exacerbated by insufficient time to recover from the negative energy balance of early lactation because the required time of breeding coincides with peak lactation (Borman et al., 2004). As a consequence, herd owners can have difficulty maintaining the 12-mo calving interval essential to seasonally concentrated calving. There is evidence this has occurred in Victoria: from 2004 to 2006 the proportion of seasonally calving herds in Victoria declined from 63 to 41% (Dairy Australia, 2006). Additionally, the InCalf Project, a large Australian study that measured the reproductive performance of cows in 124 herds with seasonally concentrated calving patterns (Morton, 1999), documented that the proportion of cows pregnant in the first 6 wk of the AI program was only 63% (Morton, 1999). Ideally, it would be 75% to maintain a concentrated calving pattern in a seasonal calving system. These figures suggest many Australian herd owners are also struggling to maintain satis-

Received December 21, 2006.
Accepted May 24, 2007.
[1]Corresponding author: vfmeditor@fishingmonthly.com.au

factory reproductive performance in their herds. At the same time, there has been a strong shift to using semen from H sires of North American origin within the Australian dairy cow population as indicated by the proportion of the H breed in recorded herds increasing from 40% in 1978 to more than 80% in 2002 (Carrick, 2003).

A recent study suggested that one way to improve the reproductive performance of cows in Victorian herds was to breed Jersey × H (**J × H**) crossbred cattle instead of purebred H cattle (White, 2001). Similarly, a New Zealand study demonstrated that H cows had a significantly lower survival in seasonally calving herds than J × H crossbred cows because of their lower fertility (Lopez-Villalobos et al., 2000). This suggests that J × H crossbred cattle may be more suitable than pure H cows for use by herd owners who choose to maintain a seasonally concentrated calving pattern to maximize the use of pasture as an economical feed source.

The present experiment had the aim of quantifying the differences in reproductive performance between H and J × H cattle in 4 commercial herds in Victoria. Data were also collected to test the hypothesis that differences in losses of BCS and BW in H cows compared with J × H cows were negatively related to reproductive performance.

MATERIALS AND METHODS

Herds

The 4 selected herds were in Gippsland, 2 from within the Macalister irrigation district near Maffra (latitude 37°58′37″, longitude 146°58′37″; herds A and B), and 2 were rain-fed farms from near Warragul (latitude 38°14′36″, longitude 145°56′10″; herds C and D). Each farm included H and J × H cows under common management conditions and participated in a herd-testing program. In 2003, herd A was visited on September 4, October 13, and November 12; herd B on September 5, October 14, and November 14; herd C on August 21, September 17, and October 24; and herd D on July 25, August 29, and October 6.

Cows

The 4 herds were stratified into H and J × H cows based on their herd breeding records. Cows that had an unknown sire or dam in their breeding records were excluded from the data set unless the herd owner was able to provide evidence of three generations of ancestry. To be included as a crossbred J × H cow, cows had to be recorded as being 25% J and 75% H (HHHJ or HHJH), 50% J and 50% H (JJHH or HHJJ), or 75% J and 25% H (JJJH or JJHJ). This recording system is the official system of the Australian Dairy Herd Improvement Service. The first 2 letters relate to the breeding of the sire and the last 2 letters to the breeding of the dam (for example a cow recorded as HHHJ is the progeny of a pure Holstein sire and a crossbred dam). Only these listed combinations (above) occurred in the study herds. Purebred Holstein cows were designated HHHH.

Reproductive data are presented for all cows that met the above criteria. The two herds in the Macalister irrigation region were too large to weigh every cow (i.e., >400 cows) without compromising the time the herd spent at pasture. In these herds, approximately 100 cows were randomly selected for study (approximately 50 of each breed, balanced for age as closely as possible). In the remaining 2 herds, every cow was weighed. For all measurements except reproductive variables, data are presented only for cows that were weighed, were present and identifiable on at least 2 visits, and were enrolled for at least one herd test during the study period (for example, at an early visit some cows in a herd were yet to calve; at other times, some cows were not in the main herd).

The number of cows studied in each breed category for measurements other than reproductive variables is presented in Table 1, along with an estimate of the proportions of H genetics amongst the studied cows (calculated by averaging the percentage Holstein for each individual cow in each group). Mean cow age and the spread of calving dates are also presented for the studied cows in each herd.

Measurements

Reproductive Variables. Each herd owner maintained complete breeding records on a herd management software program. The cows were pregnancy tested at least 6 wk after the seasonal AI program was completed, and those that were not pregnant were retested 6 wk after the end of the natural service breeding period.

The records for each herd were collected and downloaded into the herd management program, DairyData for Windows (Warnnambool Animal Production Services, Warrnambool Victoria, Australia) and the reproductive performance indices for the H and J × H cows in each herd calculated. The indices generated by the program included 21-d submission rate (**21-dSR**; proportion of herd that was artificially inseminated in the first 21 d of the seasonally concentrated artificial insemination program); conception rate to first insemination (**first CR**); 6 wk in-calf rate (**6-wICR**; proportion of cows pregnant in the first 6 wk of the AI program); 14 wk in-calf rate (**14-wICR**; pro-