Proceedings of the N.Z. Society of Animal Production, 41: 48-52 (1981)

PRODUCTION DIFFERENCES BETWEEN JERSEY AND FRIESIAN x JERSEY COWS IN COMMERCIAL DAIRY HERDS

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SUMMARY

Friesan x Jersey (Fx) cows in 14 Waikato herds averaged 174 kg milkfat/lactation compared to 151 kg from Jersey (J) herdmates. This breed difference was associated with higher daily levels of milkfat/cow in early lactation (0.81 v 0.71 kg/cow/d) and longer lactations (265 v 255 days). The shape of the lactation curves were different for the two 'breed types', appearing to be more persistent in Fx cows.

Average calving day and day of first mating were similar for the two breed types. Among the mature cows, 83% of Fx animals were pregnant at the end of the AB period compared to only 72% of J herdmates. This fertility difference was also reflected in average day of conception (312 v 315), but final in-calf rates were similar (96% v 95%).

It is equally likely that the production differences were associated with milk flow or milk let-down characteristics rather than J cows being less 'competitive' than Fx herdmates.

INTRODUCTION

The breed composition of the New Zealand dairy herd has changed substantially in the past 20 years. A predominantly Jersey herd has become a 'Friesian x Jersey' crossbred herd, with inseminations using semen from Friesian sires exceeding 50% of all inseminations since 1970. This change has occurred even though any production advantages arising from hybrid vigour are likely to be small (Stichbury, 1965). Campbell (1977) noted that although Friesian x Jersey crossbreds (Fx) produced 4.9% more milkfat, they were 16% heavier and created a 'competitive' environment which resulted in reduced production from Jersey (J) herdmates. In light of the prevalence of cross-bred cows it seemed important to compare production differences of J and Fx cows in commercial herds.

MATERIAL AND METHODS

Included in a survey designed to estimate the within herd association of cow condition with variation in milkfat production, there were 14 of a total of 31 seasonal Waikato herds which included from 13.5% to 82.0% "crossbred" cows (Macmillan and Bryant, 1980). These cows had been classified as JF (Jersey x Friesian cross) or FX (Friesian cross including FJF, JJF animals) by their owners.

The herd mates were unregistered J cows. Cows in these 14 herds were used to compare the two breed types (J and Fx).

Age, breed, calving date, production figures, production index (PI) and breeding index (BI) were obtained from production testing records. Calving condition was the monthly score recorded closest to calving date; post-partum condition score as that score about 6 to 7 weeks after calving; and early milkfat production as the daily production recorded on average 8 weeks post-partum. All herd owners used the inseminating service provided by the Auckland Livestock Improvement Association and kept complete mating records until the end of the herd breeding programme.

Analyses of variance included three main classifications — herd, age (2, 3, 4 to 7, and 8 or older) and breed (J or Fx). All first order interactions were tested and lactation length, calving date and early milkfat production were included as covariates as appropriate. Within-herd regressions were calculated for associations of lactation with early milkfat production and lactation length.

RESULTS AND DISCUSSION

The Fx cows produced 23 kg more milkfat than their J herdmates (Table 1). All 'breed' differences listed in Table 1 were statistically significant ($P<0.001$) except for calving day and post-partum change in condition ($P>0.25$). The PI and BI 'breed differences were largely the consequence of higher milkfat production by the Fx cows. While the breed difference in calving condition score (0.2

TABLE 1: DIFFERENCES BETWEEN FRIESIAN CROSS (Fx) AND JERSEY (J) COWS IN 14 'MIXED' HERDS FOR MILKFAT/COW AND OTHER RELATED PARAMETERS

	Fx	*J*	*Difference (Fx-J)*	*S.E.D.**
Milkfat/cow (kg/lactation)	174	151	23	2.6
Early milkfat (kg/cow/d)	0.81	0.71	0.10	0.01
Lactation length (d)	265	255	10	3
Calving day (day no. in year)	225	226	−1	2
Calving condition score	4.9	4.7	0.2	0.05
Post-partum change in condition score	−0.37	−0.42	0.05	0.05
Production Index	108	95	13	1.2
Breeding Index	109	105	4	1
No. of cows	769	986	—	—

*Standard error of breed difference in model with 3 main effects and 3 first order interactions

units) was statistically significant, it is so small that it is unlikely to have contributed substantially to milkfat production differences (Macmillan and Bryant, 1980).

The lower early milkfat production levels and the shorter lactation length of J cows were both associated with the lower lactation milkfat average. When both these factors were allowed for, the breed difference per lactation was 7 kg of milkfat. The respective age x breed differences (Fx - J) were 2 yr old 21 kg; 3 yr old 22 kg; 4-7 yr old 22 kg; 8 or more years old 29 kg. However, regression analyses showed that the nature of this age x breed difference in production varied between the groups (Table 2). Whereas the average lactation length for J cows in the four age group categories varied from only 254 to 258 days, Fx cows varied from 275 to 261 days. The early milkfat production in each age category was from 0.08 to 0.12 kg/cow/d higher in the Fx cows.

Early milkfat production and lactation length were not strongly correlated. Collectively they had a strong association with average milkfat/cow/lactation, their inclusion in regression models being associated with r^2 values of 0.7 to 0.8. In each age group the higher early milkfat production for Fx cows was also associated with a higher coefficient. Amongst mature and old Fx cows, higher lactation length coefficients were also found (Table 2). These coefficient differences suggest that as well as having higher levels of early

TABLE 2: PARTIAL REGRESSION COEFFICIENTS FOR EARLY LACTATION MILKFAT (kg/cow/d) AND LACTATION LENGTH (DAYS) ASSOCIATED WITH MILKFAT PRODUCTION/COW/ LACTATION AND RELATED MEANS FOR FRIESIAN CROSS (Fx) AND JERSEY COWS (J)

Age Group	*Coefficient*	*Fx*		*J*	
	Early milkfat	120.3	(0.68)*	111.4	(0.60)
2	Lact. Length	0.48	(275)	0.47	(254)
	Constant	−62		−54	
	Early milkfat	139.9	(0.81)	79.2	(0.72)
3	Lact. Length	0.57	(261)	0.58	(255)
	Constant	−93		−57	
Mature	Early milkfat	118.0	(0.90)	108.6	(0.78)
(4-7)	Lact. Length	0.70	(265)	0.54	(258)
	Constant	−104		−61	
Old	Early milkfat	131.1	(0.85)	112.2	(0.74)
(8 or more)	Lact. Length	0.62	(262)	0.55	(254)
	Constant	−93		−69	

*means derived from same analyses as in Table 1

milkfat production, mature Fx cows have lactations curves which are more persistent; that is, the early advantage is retained and increased.

When 'breed' comparisons were made between the J cows in the 9 "pure Jersey" herds and the Fx cows in the 8 "straight crossbred" herds also included in the survey, the results were similar to those recorded in Table 2. This would suggest that the breed differences noted in the 14 mixed herds (Table 1) are genuine breed differences and not "competition" effects. If competition for feed was a contributing factor, then the breed difference in higher producing herds could be expected to be less than in lower producing herds. However, the correlation coefficient between the two breed means for each of the 14 herds was 0.82 with the J cows producing 0.93 kg of milkfat for each kg of milkfat from the Fx herdmates. Further, even though the proportion of Fx cross in these 14 herds varied from 13.5% to 82%, the breed within herd difference in average milkfat production was relatively consistent (herd x breed : $P = 0.23$). Any competition for feed was not reflected either in large differences in breed means for condition score at calving or in *post-partum* change in condition score (Table 1).

The possibility of milk let-down or milk removal characteristics being associated with the breed differences is enhanced by several observations. First, even though Fx cows produce more milk with a lower test, herd owners do not regard them as being slower to milk than J cows. This would suggest that Fx cows have a higher average milk flow rate. D. C. Clayton (personal communication) observed that with cows at the Ruakura No. 2 Dairy which were production tested at weekly intervals, less time was required to milk each row of Fx cows than J cows in the Jersey herd. Campbell (1977) concluded that the J cows in mixed herd at Ruakura suffered from increasing competition as the proportion of Fx herdmates increased. It is also possible that the remaining J cows were required to adapt to the milking times and patterns of the Fx cows. In light of Clayton's comment this could result in under-milking. If there are significant breed differences in milking time or milk let-down, then the effect of these differences could be most pronounced in mixed herds if milking management procedures favoured the faster milking breed.

In a field trial involving the use of dry cow therapy (DCT) in 11 herds at the end of the 1977-8 season, the difference in milkfat production between Fx and J cows (including lactation length as a

covariate) was 17 kg (195-178). This breed difference is similar to that found in the 14 mixed herds. The DCT trial also showed that the effect of mastitis on production differed between the two breeds. In Fx cows, animals which had had mastitis produced 3 kg less than uninfected herd mates. With J cows, the within breed difference was 12 kg.

A difference in breed fertility also occurred in the 14 mixed herds. Although the mean calving date and date of first mating were the same for the two breeds, the mean conception date was three days earlier for Fx cows (312 v 315; $P<0.05$). This difference was associated with a lower percentage of J cows conceiving by the end of the AB period (72% v 83%), but the overall pregnancy rate was similar (96% v 95%). In the Ruakura herd where the breeding programme lasts only 13 weeks this difference in breed fertility was reflected in a lower pregnancy rate in J cows (94% v 88%; Macmillan and Clayton, 1980).

In conclusion, the results obtained from the 14 mixed herds indicate that significant increases in average per cow production should result if these 14 herd owners replaced their remaining J cows with Fx cows. It is probable that many other herd owners could make similar gains. Further research is necessary to confirm the indication from these analyses that Fx cows are better suited than J cows to the management conditions existing in many commercial dairy herds.

ACKNOWLEDGEMENTS

To the 31 herd owners, 8 advisers and staff of the Auckland Livestock Improvement Association.

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