Milk Production and Production Index Comparisons in Mixed Breed Dairy Herds

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ABSTRACT

Jersey cows in six mixed breed dairy herds produced up to $0.36 per cow per day less than their Friesian herd mates, during the 1991/92 dairy season. Jersey cows received lower Production Indexes (PI's) than their Friesian and Crossbred herd mates.

It is not clear whether this lower production of Jersey's is a result of competition for feed between breed groups or is a genuine genetic difference between breeds. Some of the difference can be explained by the lower protein to fat ratio of Jersey milk compared to Friesian milk.

Jersey cows are more efficient producers of milk income per kg liveweight than Friesians. If the breed composition of a herd is changing towards Friesians or Crossbred, then stocking rate as measured by liveweight per ha will also increase. Where stocking rate is already high this will inevitably reduce pasture intake of individual cows unless pasture supply is increased. Farmers would like to know if the Jersey component of their herds can be managed to improve production relative to Friesian or whether changes in breed composition of their herds are necessary to achieve optimum production and herd size in relation to feed supply and other farm resources.

Keywords: Mixed breed dairy herds, Production Index, breed competition, milk income, liveweight per ha, stocking rate, culling.

INTRODUCTION

The Production Index (PI) is used in New Zealand dairy herds to rank cows on their productive performance based on herd testing results. During June 1990, the Livestock Improvement Corporation updated the calculation of the Production Index. This was principally to incorporate milk protein and volume into the comparison in addition to milkfat, but other enhancements to the calculation were also made. Cows are now compared with herd mates of similar age, breed and season calved, (a contemporary group). In mixed breed herds, production indexes are calculated for each breed group, (breed PI). An adjustment is then made to the breed PI to allow across breed comparisons of production indexes within a herd.

A consequence of the change is that the herd average Breeding Index (an estimate of the herds genetic potential) will not necessarily match the herd average Production Index. Prior to 1990 the herd Breeding Index (BI) was also the herd average PI. Both these figures are reported to farmers and it was not long before questions were being asked on why the differences occurred.

During the 1990/91 season it was noticed in one herd that the average PI was 7 units lower than the average BI. The season ended with average PI 4 units lower than average BI (table one).

At the same within breed PI (e.g. 125) the average Jersey was producing at 92% of the level of the average Friesian, and the average Crossbred at 95% of the Friesian. After adjustment to allow PI to be compared across breed, the Jerseys and the Crossbreds had average PI's below that of the average Friesian. This accurately reflected the difference in the value of production per cow per day.

TABLE 1: 1990/91 herd testing summary for a Northland mixed breed herd

	% of herd breed	Average PI	Average $ earned/cow/day (A+B-C)	Average BI
Friesian	35%	126	$3.39	125
Jersey	30%	120	$3.13	128
Crossbred	35%	123	$3.24	128
Herd Average		123		127

One explanation discussed with this farmer was that both Jersey's and Crossbreds were failing to compete adequately in the herd with the larger Friesian cows under the current management. Perhaps the breeding programme should be orientated towards one breed or the other, or move towards a full crossbred herd?

Another implication of the difference between breeds in PI was that more Jerseys and Crossbreds would be culled for low production than Friesians if PI was used as a sole criteria.

Are these observations unique to this herd?

Results From Other Herds

Examination of Breed by Production Index herd reports for the 1991/92 season show that the average PI of Jerseys in 4 mixed breed herds in Northland was consistently below that of Friesians. This was consistent with milk solids production levels.

Further analysis of a Northland herd showed that Friesian cows earned on average $0.35 more per lactation day than did their Jersey herd mates, using the 1991/92 Northland

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Dairy Company final payout for protein, milkfat and volume (table 2). Jersey cows made up 66% of the total herd making the "persecuted minority" theory a little shaky.

TABLE 2: Production Performance (average $earned/day) and average Production Index of Breed Groups in a mixed breed Northland Herd.

	No. of Cows	Average PI	$ earned/day	Average Age (years)
Friesian	26	140	$3.61	5.5
Jersey	226	130	$3.26	5.1
Fiesian x Jersey	29	138	$3.36	3.6
Others*	60	140	$3.64	5.2

An analysis of a Wairarapa herd showed a similar result. Friesians out produced Jerseys by $0.36 per day. In this herd crossbred cows were out performing Friesians by $0.08 per day with an average age one year younger than Friesians (table 3).

TABLE 3: Production Performance (average $ earned per day) and average PI of breed groups in a mixed breed Wairarapa herd.

	No. of cows	Average PI	Average $earned/day	Average Age
Friesian	34	137	$4.09	4.9
Jersey	127	129	$3.73	5.3
Friesian x Jersey	58	144	$4.17	3.8

DISCUSSION

In the mixed breed herds studied Jersey cows produced on average at lower levels compared to their Friesian and crossbred herd mates. This resulted in Jerseys receiving lower average production indexes than their herd mates. A higher proportion of the Jersey cows in the herd will be candidates for culling on low production than the Friesian and Crossbred cows. Campbell (1977) reported that Jersey cows milked in Crossbred herds produced 24 kg less milkfat and 19 kg less protein than their crossbred herd mates. Because these Jersey cows also produced less fat and protein than their contemporaries milked in pure Jersey herds led Campbell to suggest that increasing competition for feed may be a factor depressing production as the total weight of cow per ha of the crossbred component of the herd rises.

MacMillan *et al.*, (1981) found that Friesian x Jersey cows produced 23 kg more milkfat per cow than their Jersey herd mates in 14 Waikato mixed breed herds. They concluded that the breed differences noted in these herds were genuine breed differences and not competition effects. They raised the possibility of milk let down or milk removal differences being associated with the breed differences. Jersey cows in mixed herds were required to adapt to the milking times and patterns of the other breeds and this could result in under-milking if milking management procedures favoured the faster milking breed.

Competition for feed between breeds in a mixed herd is a less likely explanation when Jersey cows that are in predominantly Jersey herds (tables 2 and 3) also show lower production than Friesian and crossbred herd mates. MacMillan *et al.*, 1981 noted that the breed differences in milkfat production within a herd was consistent over a wide range of breed mixes.

Further evidence that the production differences observed could be genuine breed differences, comes from Livestock Improvement Corporation national herd testing figures (table 4). In over 6000 mixed breed herds throughout New Zealand, Jersey cows produced between 2 and 5% below their Friesian herd mates during the past three seasons (i.e. at a given within breed PI, e.g. 125, a Jersey's production was 2 to 5% lower than a Friesian). Crossbreds were 1% higher than Friesians. A wide range of breed compositions and farming conditions are represented.

TABLE 4: Relative Production Performance of Jerseys and Crossbreds to Friesian Herdmates of the same Breed PI in over 6000 herd-tested mixed breed herds in New Zealand. (Expressed as a % of Friesian Production).

	1989/90	1990/91	1991/92
Jerseys	98	95	96
Crossbreds	101	101	101

One explanation for the lower ranking of Jerseys in mixed breed herds is that protein production of Jerseys is likely to be poorer than Friesian and crossbreds at the same level of milkfat production. Under the previous milkfat only comparison, Jerseys would have similar PI's for similar milkfat production but under the current system the lower protein production is taken into account at a relative value in excess of milkfat (RG Jackson pers comm).

This explanation does not appear to explain all the difference observed between Jerseys and Friesians. In all herds examined, milkfat as well as milk protein production of the Jerseys was lower than the Friesians. This is consistent with MacMIllan *et al.*, (1981,) results where Production Indexes for Jersey's calculated on milkfat alone, were on average 13 points lower than their crossbred herd mates.

A factor other than a lower protein to fat ratio of Jersey cows appears to be involved as Jersey milk consistently ranked lower in mixed breed herds than Friesians.

FARM MANAGEMENT IMPLICATIONS

Owners of mixed breed herds need to be made aware that the Jersey component of their herd is likely to be producing and earning at lower levels per cow than the crossbred or Friesian component. The largest difference between breed groups in two herds examined was $98.50/cow/lactation at 1991/92 payout levels. This was between crossbreds and Jersey cows in the Wairarapa herd. If the Jersey component of this herd had been replaced with Crossbred cows of the same productive ability as the current Crossbreds, then there was a potential for an extra $12500 of milk income for the farmer.

One advantage that Jersey cows have over Crossbreds and Friesians is their lower liveweight. Campbell noted that Crossbred cows were 16% heavier than Jerseys, and earned from milk products 6.5% more than Jerseys. Liveweight

differences in the current Friesian and Jersey comparison at Ruakura, show Friesians to be up to 92 kg (26%) heavier than Jerseys.

If this liveweight difference is typical of the Friesians and Jersey cows in the two herds examined in this paper then Jerseys are superior to Friesians in terms of gross milk income per kg of liveweight (table 5).

TABLE 5: Examination of earning ability of Breed Groups relative to Estimated Liveweight.

	Wairarapa Herd. Milk Income per cow	Northland Herd. Milk Income per cow	Mid-Season Breed Liveweights Ruakura Breed Comparison 24/01/92	Milk Income per kg Liveweight Wairarapa Herd	Milk Income per kg Liveweight Northland Herd
Friesians	$942.75	$834.60	439 kg	$2.15	$1.90
Jerseys	$857.68	$740.02	347 kg	$2.47	$2.12

A move towards crossbred and/or Friesians in a mixed breed herd will increase the stocking rate in terms of liveweight carried per ha and would lower the efficiency of the herd as expressed by milk income per kg of liveweight. This could well explain some dairy farmers frustration at being unable to produce more milksolids per hectare as they introduce more crossbred animals into a high stocking rate Jersey herd situation (Dunn, 1993).

If competition between breeds for feed can be proven as a cause of production differences in mixed breed herds then management options such as split herds could be used to help reduce competition and presumably to increase production. If the differences between breeds are real rather than the result of competition, then optimum stocking rate (liveweight per ha) and milksolids production per ha become key issues in determining the herd's breed composition.

Farmers need to be aware that Production Indexes are accurately reflecting production and earning levels of cows in mixed breed herds, and therefore could well be resulting in more Jersey cows being culled from herds for low production than other breed groups. The production index is not yet able to take account of liveweight differences.

Where farmers wish to retain a particular breed composition in their mixed breed herd it is recommended that each breed group be treated separately for culling purposes. Should two animals of different breed have the same PI then the animal from the heavier breed should be culled based on her lower earning efficiency per kg liveweight. But where the farmer is wishing to retain the most productive animals, and feed supply is not limiting then culling on PI alone is recommended.

The Livestock Improvement Corporation recognises that liveweight differences both within and between breeds are important considerations in high stocking rate situations and it has several projects underway investigating how liveweight differences can be incorporated into ranking cows on productive merit.

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