WHAT DO AUSTRALIAN DAIRY FARMERS LOOK FOR WHEN SELECTING SIRES?

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SUMMARY

This paper identifies the traits which Australian dairy farmers consider of greatest importance when selecting sires to breed herd replacements with the ultimate aim of developing a selection index for use by farmers. Currently 25% of semen used in artificial breeding in the Australian dairy industry originates from the US or Canada. The Australian Dairy Herd Improvement Scheme converts genetic evaluations from the country of origin of those overseas sires to Australian Breeding Value equivalents for production traits, but not for other traits. The implications for the dairy industry of the lack of complete information on overseas sires is discussed.

INTRODUCTION

In Australia, the estimated breeding value of dairy bulls and cows is known as an Australian Breeding Value or ABV. ABVs are calculated for several production, workability and type traits (Jones 1991).

PTAs (predicted transmitting abilities) and BCAs (breed class averages) are the means of sire evaluation in the USA and Canada respectively. These cannot be directly compared to ABVs because each country uses a different scale. PTAs and BCAs for milk production traits are converted to the ABV scale and called ABV(C)s so that foreign and local bulls can be fairly compared. However, a number of traits, for which ABVs are available, are either not available for foreign bulls (ie. workability traits) or are available but cannot be converted to ABV(C)s (ie. type traits). Therefore to the extent that dairy farmers regard non-production traits as important, they are missing information on which to make decisions concerning foreign bulls.

For Australian bulls, dairy farmers face the problem of combining the information in the ABVs for 40 different traits to select the most profitable bulls. A logical approach to this problem is to combine the ABVs into an index such as that suggested by Mallamaci (1991). However, farmers vary in their ultimate breeding objectives and therefore in the appropriate index. Therefore a computer package is being developed which will allow farmers to construct a selection index appropriate to their own objectives. To assist us in this task, we need to know the extent to which dairy farmers agree in their ranking of bulls and in what way they disagree.

With this in mind, it is the intention of this study, by way of a survey of dairy farmers, to:

1) determine the most important differences between farmers in selecting bulls;
2) assess the importance that farmers attach to traits other than production;
3) determine if farmers rank bulls similarly to the Mallamaci selection index.

MATERIALS AND METHODS

Farmer survey

To determine what a sample of Australian dairy farmers consider of greatest importance when selecting sires, a single survey, of which there were four versions, was conducted at a field day in Terang, Western Victoria. The 37 participants in the survey were not selected using the usual, and preferable, randomisation techniques. All farmers who approached the Australian Dairy Herd Improvement Scheme (ADHIS) stand at the field day and agreed to complete a survey form and be subsequently interviewed were accepted as participants.

To make it as easy as possible for farmers to rank the bulls the survey was conducted in the following way. Farmers were asked to rank 10 bulls in order of preference, from 1 (best) to 10 (worst), based on 14 ABVs. Within each survey set, there were only 5 traits which varied (table 1). The range in ABVs for bulls was from +500 to +1500 litres for milk volume, +37 to +53 kilograms for fat, +20 to +35 kilograms for protein, +85 to +93 for milking speed, temperament and likeability, and -2 to +8 for overall type, mammary system, fore udder, angularity, rib, size, bone and medial suspensory ligament (MSL). Typically the farmers were comparing pairs of bulls, one of which was superior for protein production but inferior for another trait.

Table 1: The traits which varied on each survey set

Survey	ABV Traits				
1	Protein	Temperament	Milking speed	Overall type	Rib
2	Protein	Temperament	Likeability	Mammary system	Size
3	Protein	Temperament	Fat	Fore udder	Bone
4	Protein	Temperament	Milk volume	Angularity	M.S.L.

When ranking the bulls, farmers were asked to assume that the price of semen, the ABV of traits not listed on the survey and the reliability of the ABVs were the same for each bull. It was possible for farmers to rank two or more bulls equally.

Selection index

A brief description of the selection index of Mallamaci (1991) is as follows. The economic value of milk production traits were calculated assuming a payment formula ($3.78 * protein + $2.10 * fat - $0.025 * volume) and assuming a constant amount of feed was available to a herd. This means the extra income generated from higher producing cows was discounted for the increase in feed requirement per cow and hence the corresponding decrease in herd size that is necessary.

The value of other traits was calculated by the method of Wickham (1979). Wickham assumed that dairy farmers cull cows based on their profitability and therefore the traits most closely related to survival were also the ones with the greatest effect on profitability. To do this, Mallamaci (1991) carried out a regression analysis in which a cows survival in the herd from one year to the next was predicted from her milk, fat and protein production, milking speed, temperament and type traits. The importance of other traits relative to the production traits was judged by the ratio of the regression coefficients and the ratios were used to set economic weights for non-production traits. The 14 traits which had a significant effect on survival early and late in life were retained. The weights for the Mallamaci index are given in Table 3.

Statistical analysis

The extent to which farmers agreed was measured by the correlation between their rankings. The pattern of correlations among farmers was summarised by carrying out a factor analysis. The importance farmers placed on each trait was determined by a regression analysis which predicted the average ranking of each bull from it's ABVs.

RESULTS

The average correlations between farmers were 0.21 (survey 1), 0.48 (survey 2), 0.69 (survey 3) and 0.03 (survey 4). The factor analysis divided the farmers in each survey set into two groups. Examination of the bull rankings given by these farmers showed that in each case one group was composed of farmers who selected mainly on production traits (group 1) and the other group of farmers who gave greater emphasis to some other traits (group 2). The average correlations within and between groups are given in table 2. This shows that there is considerable agreement among farmers in group 1, some agreement within group 2 and little agreement between the two groups.

Table 2: Correlations between farmer rankings within and between farmer groups

Survey	All farmers	Within group 1	Within group 2	Between gp 1 & gp 2
1	0.21	0.85	0.53	-0.09
2	0.48	0.73	0.29	0.17
3	0.69	0.79	0.73	0.54
4	0.03	0.93	0.18	-0.31

The regression of average rankings on ABVs was carried out using the bulls average rank over all farmers and separately using his average rank over group 1 and group 2 farmers (table 3). In table 3, a negative regression co-efficient means that farmers selected in favour of that trait and so gave bulls with a high ABV a low or good rank. For the average over all farmers, only protein and MSL had a significant effect on rank but there was a tendency to select for high fat yield, milking speed, temperament and low size and bone. When the farmers are divided into the two groups a clearer picture emerges. Farmers in group 1 selected for high protein and fat and slightly for low milk volume. Farmers in group 2 selected for high milking speed, temperament, MSL and less so for high protein and milk volume.

These results were confirmed by the farmers comments during the interviews. Group 1 farmers said protein followed by fat were the most important traits. They felt the low ABVs for non-production traits were not low enough to cause a problem or could be overcome by corrective mating. Low milking speed was not important to those farmers who milked in a rotary shed. Of the group 2 farmers, one farmer selected a bull with low production but high temperament ABVs as his first choice with the intention of mating him to poor temperament, high producing cows. A small number of farmers thought size or rib were important because they were correlated with production. In general, owners of Friesian herds preferred bulls of low ABV for size whereas owners of Jersey herds preferred high size ABVs.

DISCUSSION

The average rankings of all the farmers agreed quite well (r=0.83) with the Mallamaci index. This was because the index weights for milking speed and temperament were intermediate between the low weights of group 1 farmers and the high weights of group 2 farmers. Consequently the index, or one like it, could represent the breeding objectives of the "average" dairy farmer quite well. It must be acknowledged that a survey of a larger sample of farmers could lead to a different emphasis on individual traits or the identification of further groups or sub-groups.

The Mallamaci index could be improved by adding the ABV for survival. Also, the choice of type traits could probably be improved. A set of type traits which predicted survival as well as those used here but which did not include negative weights for angularity, fore udder and rib, would probably be accepted more readily.

Although the average farmer agreed quite well with the index, individual dairy farmers varied widely. In some cases this appears to represent genuine differences in breeding objectives. It is obviously important for a customised selection index to allow farmers to vary in the importance they attach to workability traits. However, other differences between farmers in ranking may be due to misconceptions held by some farmers. For instance, when production ABVs are known it does not make sense to select for rib because it is thought to be correlated with production. Also some farmers appear to have undue faith in corrective mating. Regardless of her production, a cow will produce higher yielding daughters when mated to bulls with high production ABVs than when mated to bulls with low production ABVs. Farmers rank MSL as important when ranking bulls, yet cows with poor MSL seldom get culled as indicated by the low weight given to MSL in the index.

The considerable weight attached to non-production traits by group 2 farmers indicates that an absence of such information on foreign bulls will have serious consequences on their use by these farmers.

Table 3: Regression co-efficients illustrating the effect of each trait on bull rank given by all farmers, group 1 farmers and group 2 farmers (standard errors in brackets) and Mallamaci index weights

Trait	Regression co-efficients*			Mallamaci index weights ($/unit of ABV)
	all farmers	group 1	group 2	
Milk volume	-.0018 (.0020)	.0040 (.0016)	-.0072 (.0037)	-6.04
Fat	-.16 (.12)	-.20 (.08)	-.06 (.25)	130.20
Protein	-.30 (.11)	-.33 (.08)	-.24 (.21)	432.90
Milking speed	-.30 (.25)	.19 (.18)	-.92 (.47)	360.00
Temperament	-.36 (.21)	-.08 (.15)	-.95 (.42)	268.45
Likeability	.02 (.23)	.03 (.16)	-.23 (.47)	322.21
Overall type	-.06 (.20)	.03 (.15)	-.14 (.37)	11.91
Mamm system	-.09 (.18)	-.04 (.13)	-.27 (.37)	48.95
Fore udder	.11 (.19)	.10 (.13)	.07 (.40)	-38.19
Angularity	-.11 (.20)	.12 (.16)	-.29 (.37)	-133.45
Rib	.03 (.20)	.15 (.15)	-.10 (.37)	-108.07
Size	.23 (.18)	.24 (.13)	.14 (.37)	8.09
Bone	.34 (.19)	.32 (.13)	.37 (.40)	108.97
MSL	-.49 (.20)	-.18 (.16)	-.85 (.37)	62.68

* The highest negative regression coefficients indicate the traits most important in selection

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