

**GOING WITH A 3 WAY CROSS
AN OVERVIEW OF 10 YEARS OF CROSSBREEDING
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In 1996 a decision was made to change our breeding goal of a straight bred Holstein herd to a crossbred herd.

This decision was made by the need to breed cows that better suited our preferred production system. The decision was to firstly, breed for efficiency of production, and secondly, to maximise heterosis (hybrid vigour) by 3 way crossbreeding our cows.

A breeding program was designed to ensure that at around the eight year mark, the herd would be approximately 33.3% Holstein, 33.3% Holstein x Jersey and 33.3% Swedish/Aussie Red x Holstein x Jersey.

This initial breeding program was necessary to ensure that a detailed analysis of each breed group could be made.

The 2004/05 season, the 8th season was used for the analysis.

The results of the analysis would then determine the future breeding goals that would best suit our system of our herd, to ensure our business objectives were going to be met.

This paper gives an overview of the decision to make the change in breeding direction and the results, both physical and financial of the difference in breed groups for our system.

Dairy business system

Milking 430 Crossbred Aussie/Swedish Red x Holstein x Jersey. Plus purebred Aussie Reds cows on 133 ha. and running all replacements

Pasture based plus 1.5t grain/pellets

Seasonal calving

Business objective

Our business objective is to minimise risk. To ensure maximum profitability in times of low milk price or high input cost or both, but our business structure must also enable us to take advantage of times of high milk price and/ or low input costs.

To be labour efficient, with the focus on keeping it simple.

Breeding for efficiency of production

When breeding for efficiency of production, we were looking to breed cows that were capable of a high pasture intake per kg of live weight, be labour efficient low maintenance "easy care" cows, with excellent fertility and longevity, carry extra body condition and could reduce the number of replacements needed. In addition we needed to breed a cow that could cope with variations in inputs, to enable maximum profit under different milk price / cost ratios.

Maximising heterosis by 3 way crossbreeding

The aim of going to a 3 way cross over the traditional 2 way cross was to maximise heterosis in future generations. A 3 way will maintain heterosis at 86%, a 2 way at 67% and a 4 way at 93%.

Heterosis has the largest positive effects on the genetic traits of low heritability, including fertility, health & longevity.

The heterosis effect on production is around a 5% gain on the average of the parent breeds, at least a 10% gain for fertility and a 30% gain in longevity (survival).

Production

Tables 1 & 2 show the production details for 2nd & 3rd lactation cows in the analysis year of 2004/05.

The common difference between the breeds was found to be that the Holstein out produced the crossbreds in first lactation, but in subsequent lactations the crossbreds caught up. Protein production was found to be superior in the 2 & 3 way Swedish/Aussie Red crosses than in the Jersey/ Holstein crosses.

Table 1: 305 Day production details for 2004/05 2nd lactation cows.

Breed	No. cows	Protein kg	Milk Solids kg	Litres
SRB-ARDB, 2 & 3 way crosses	10	273	601	7610
HF	8	281	601	8061
HF- J x	18	263	582	6816

Table 2: 305 day production details for the 2004/05 3rd lactation cows.

Breed	No. cows	Protein kg	Milk Solids kg	Litres
SRB-ARDB, 2 & 3 way crosses	11	298	651	8337
HF	8	299	661	8486
HF x J	10	279	634	7853

Fertility:

The gains in fertility can be seen in table 3. The gains were in line with 10% that we expected from heterosis. The added gain in the 2 & 3 way crosses where Swedish & Aussie Red were used, can be attributed to the selection for fertility in the Swedish TMI since 1972.

Table 3: 2005 Preg test results for 188 cows

BREED	No.in Herd	6 Week in calf	9 week in calf	13 week in calf
SRB & ARDB, 2& 3 way crosses	50	44=88%	49=98%	50=100%
Jsy X Frs	68	52=77%	61=91%	66=97%
Holstein Frs	49	27=55%	36=74%	44=90%

Longevity:

Longevity (survival) was found to be one of the biggest contributors to efficiency of production and true profit for our business. The cows born in the year 2000 are a good representation of what we find occurs for each breed group in our system.

Table 4 shows the cows born in 2000 that completed their 3rd lactation in 2004/05 and went thru into their 4th lactation.

Table 5 shows these same cows for the current 2007/08 season.

Table 4: Cows born in the year 2000 and milking in their 4th lactation.

Breed	No. Born	No. going thru	% thru to 4 th lac.
SRB-ARB, 2 & 3 way crosses	18	11	61%
F X J	23	11	52%
HF	16	5	31%

Table 5: Cows born in the year 2000 and currently milking in their 6th lactation.

Breed	No. Born	No. going thru	% thru to 4 th lac.
SRB-ARB, 2 & 3 way crosses	18	9	50%
F X J	23	7	31%
HF	16	0	0%

Economic analysis

The economic analysis was a crucial part of the program. This analysis would give us a clear picture as to the future breeding direction we needed to take that would best suit the economics of our system.

For the economic analysis we to split the cows from the herd into breed groups, and then calculated each breeds income and costs.

The assumptions being, each herd is producing 111,000 kg MS, b/fat and protein adjusted, and self replacing herds at % of cows going into 4th lactation for each breed group within current herd. Full income, milk, culls, calves and full expenses per breed group. The Holstein herd has an average live weight of 580 kg.

Cost of production

We found that the cost of production in both the crossbred sections of the herd was basically identical. \$2.28/ kg MS for the Holstein x Jersey and \$2.29/ kg MS for the Swedish/Aussie Red x 2 & 3 way with Holstein and Jersey.

The Holstein section had a cost of production of \$2.79, which was 17% higher than the crossbred sections. The cost of production for our current 2007/08 season for the Holstein section would now be 23% higher than the crossbreds due to the higher input costs.

Operating surplus

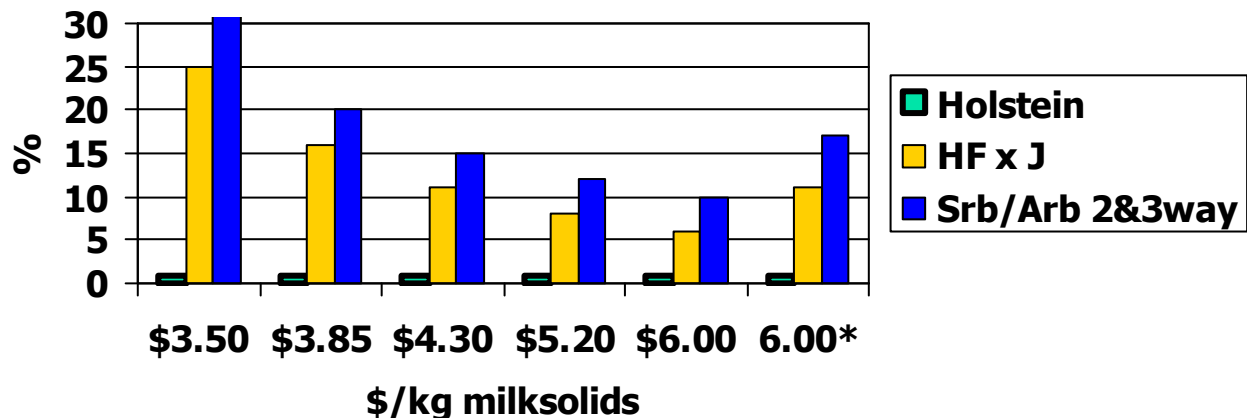
We found that there was a significant difference in operating surplus between the breed groups.

We found that as milk price dropped or in put costs raised the difference in operating surplus increased. The trends in operating surplus between the breed groups can be seen in the table below.

At high a milk price of \$6.00/ kg of MS, as is current and the input costs for the 2004/05 season, the % difference was only 9% gain in operating surplus for the Swedish/Aussie Red 2 & 3 way crosses above the Holstein and 5% for the Jersey X Holstein crosses above the Holstein.

If we factor in the current milk price of \$6.00/ kg MS and current input costs, the difference in operating surplus increases to 16% above the Holstein for the Swedish/Aussie Red crosses. For the Jersey x Holsteins the gain increases to 9% above the Holsteins.

% operating surplus above Holstein section of herd



Conclusions

The decision in 1996 to change direction with our breeding program and move to a 3 way cross, has been an overwhelming success for our business. We have been able to clearly identify which type of cow and the future breeding strategy needed to best suit the economics of our system.

We found that longevity, efficiency of production, easy care and fertility are achievable from higher producing cows without the negative issues of other high producing cows, which are "masked".

We were able to clearly identify that some breed groups of cows could cope with variations in inputs, while other types of cows simply could not cope when input levels are varied due to different milk price/ cost ratios.

We found that we have the ability to voluntarily cull the herd, (rather than have it compulsory), for efficiency of production (kg MS per kg live weight).

We find that using 3 breeds to maximise heterosis is best in the crossbred section of the herd. Using the best bulls of each breed works best, I believe there is no compromise on this point.

We find that tall sharp cows don't work. We find that the genetic traits that have a negative correlation to survival need to be avoided, cows with big ABV pluses for stature, angularity, body depth, rump width are best avoided; all these are negative for survival. Good rear leg set, foot angle, udder depth, fore udder attachment and front teat placement should be priorities in our breeding program.

Crossbred bulls will not be used in the crossbred section of the herd, but will in the Aussie Red section. Using a crossbred bull, for example the Danish Red bull Ascona 62.5% HF & 27.5% DRM over a Holstein cow can result in the progeny having anywhere from 0% hybrid vigour to 100% hybrid vigour. The aim within the crossbred section of the herd is not to breed a new breed of cow, but to maximise heterosis (hybrid vigour), using crossbred bulls does not allow heterosis to be maximised.

The future

We plan to run a herd of around 60% 3 & 4 way crossbred cows and 40% registered Aussie Reds. After six months of researching the French Montbeliarde breed, the decision was made to introduce it into the crossbred section of the herd. The Montbeliarde has no Holstein content and is currently the world's fastest growing dairy breed. It offers an 8% gain in production thru heterosis similar to the Brown Swiss, which is 3% higher gain than the Jersey. The breed has excellent protein production with the big bonus of extra body condition that our system needs, as well as health, fertility, and added calf value. It is bred specifically to handle different feed inputs and types; particularly high fibre low cost feeds.



Struth, this is harder than writing this paper! But here is "This is your life" for Steve Snowdon

Well, I left school after completing Form 5 (year 11). The old man said if I passed Form 5, I could leave, so I had a choice, either go to Melbourne and train as a Telecom technician or takes a job milking cows for 6 days a week earning \$35 a week. It didn't look like a good career move for the family.

I spent three stints share farming; and we owned our own herd, which was mainly registered Holsteins, by the second one. I ended up spending the first 22 years of my working life trying to get a deposit to buy our own farm. I finally got together \$118k or 23% equity to buy this farm in 1996.

From a milking area of 49ha we have been able to increase assets to just over \$1.5m in the first 9 years of owning our own farm. This increase in assets has enabled us to purchase our current property at Tyers near Traralgon, Victoria

I have a strong belief that dairying is a business. That our primary function is to convert energy into profit. We invest in energy; we then should expect a good marginal return/MJ of ME for our investment. To achieve this, it's extremely important that you define and understand your system and the economics within it. I have always had a strong belief that you need to define your system then design a cow to maximise profit within the system, not let the cow dictate and run the system.