CROSSBREEDING FOR OPTIMAL PRODUCTION

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INTRODUCTION

Millions of dollars can be made or foregone by understanding how to use the difference between breeds. Breeds can no longer be meaningfully classified as European, British or Bos indicus. Commercial reality is that the characteristics of breeds within these groups differ enormously. In the early 70's the Charolais, Simmental, Limousin and Chiaiiina were associated with high growth rate and lean carcasses. Double muscled animals were discriminated against. However, now we have specialist terminal sire breeds such as the Belgian Blue with low fat content and quite extreme muscle development on the one hand and more moderate breeds such as the Salers, Gelbvieh and Tarentaise with more emphasis on maternal characteristics and, on the other hand, the Wagyu with emphasis on high fat content at the other extreme. Each of these breeds has characteristics which may be sought in current commercial markets. Clearly for a sustainable commercial enterprise a combination of maternal and carcass attributes is required and a crossbreeding program can achieve this.

Dr Larry Cundiff, at Clay Centre, USA has been responsible for a considerable amount of work on many breeds. 1 have edited and photocopied some of his work for you. This contains detail on a host of breed characteristics which will be useful. Of particular importance in his paper is the illustration of the variation which occurs between breeds and that which occurs within breeds. It is quite clear that the most important commercial difference is that between breeds but in considering breeds of similar characteristics the variation between sires becomes more important.

Work in Western Australia, Struan Research Centre and in the United States illustrates aspects of management and breeding which can be used to stimulate your ideas aimed at achieving better production and higher prices from beef cattle going to today's and future markets.

A controversial issue today is the polarisation of markets based on fat requirements. Certain parts of the Japanese market prefer and pay high prices for highly marbled meat but the overall majority of markets are declaring war on fat and retail yield is more important. Although there is considerable scope for selecting within breeds to meet these requirements changing breed composition is a far quicker means of changing performance and using crossbreeding can give an added bonus of hybrid vigour.

To illustrate some of the above and to incorporate aspects of cow maintenance I refer you to two pieces of work at Struan Research Centre.

(1) Production per hectare of different crossbreeding systems

This experiment was designed to evaluate the beef production from two terminal sire systems, one using a small hybrid dam (Jersey Hereford) and the other, a larger hybrid dam (Simmental Hereford) in comparison to that from a British breed straightbred (Hereford) system. The cows were run at two stocking rates with the following results:

Performance of calves from cows aged between 3 and 9 years (1982-88) at two stockings rates at Struan Research Centre

Breeding System	Hereford x Hereford		Charolais Jersey Hereford		Charolais Simmental Hereford	
Stocking rate cows/ha	1.0	1.2	1.0	1.2	1.0	1.2
No. of calves	114	121	108	120	118	115
Weaning wt of calves (kg) (approx. 220 days)	291	271	319	315	338	318
Carcass weight (kg)	157	148	181	180	195	180
Dressing %	53.2	53.1	55.2	55.5	55.9	54.4
Fat thickness mm	7.1	6.1	5.3	5.3	4.8	3.6
Carcass length mm	919	909	970	968	976	963
Carcass wt/mm	0.17	0.16	0.19	0.19	0.20	0.19
Carcass wt/hectare/yr (kg)	126	155	136	183	161	174
Hay fed tonne/cow/year	0.43	0.46	0.45	0.53	0.48	0.57
Gross Margin/cow	270	269	291	305	352	304
Gross Margin/hectare	270	323	291	367	352	365

These results show that different genotypes can give different production per cow and per hectare. The genotype with the highest production potential (in this case Charolais Simmental Hereford) may not give the highest return if feed is limiting. It also shows that even with the same genotype changing the management (varying the stocking rate) can have a marked effect on returns per hectare. With the crossbreds we obtained many calves with carcasses which were within the 180-220 kg preferred by the supermarket trade. However the Hereford calves were lighter than this and under normal circumstances would be weaned and grown to heavier weights or sold as stores. Steer calves from the last two calf crops from this experiment were sent to a feedlot to study post weaning growth and suitability for the export trade.

(2) Genotypes for the Asian Market

These observations illustrate cattle genotypes, which when grain fed would produce carcasses suitable for the high priced Asian markets. The main challenge was to find genotypes with increased marbling, less subcutaneous fat, with white fat and without sacrificing lean meat yield. The following genotypes, representing a wide range from very early maturing to very late maturing, were used.

1990

50% Jersey 50% Hereford
75% Hereford 25% Jersey
Hereford x Hereford
50% Charolais 25% Jersey 25% Hereford
50% Charolais 25% Simmental 25% Hereford
75% Simmental 25% Hereford

1991

50% Jersey 50% Hereford
25% Jersey 75% Hereford
Hereford x Hereford
50% Charolais 25% Jersey 25% Hereford
50% Charolais 25% Simmental 25% Hereford
50% Murray Grey 25% Friesian 25% Hereford

Detailed results are presented in Tables I and II.

After 300 days in the feedlot all genotypes produced carcasses averaging over 330 kg with white fat and ideal meat colour. Compared with the Hereford, Jersey crosses had reduced growth rate and subcutaneous fat but higher marbling and similar estimated total lean meat yield of the carcasses. In contrast, those crosses with Charolais and Simmental breeding had higher growth rates, lower subcutaneous fat, similar marbling but much higher estimated lean meat yield (+50 kg). The Jersey crosses appeared to conform more closely to the high marbling requirement of the higher priced Japanese market whereas the European crosses met the specifications of the middle Japanese and Korean markets where yield of red meat is more important and marbling less important. As the various markets can have marbling and/or yield premium these differences offer producers opportunities for increasing prices in future.

Two years ago one feedlot operator was chasing Angus and Murray Greys for the marbled market. He found that the contracts were mostly written without a premium for marbling. He now purchases about 800 Euro crosses each month and claims the net gain to the operation is $80 per head or $700,000 per year- This is comprised of less time on feed to reach target weight (reduced 50%), greater feed conversion efficiency, and greater yield of saleable meat. With yield estimates now available through chiller assessments more feedlots and works will see the benefits in $ terms of high yield cattle. You can help this process by following the performance of your cattle either through the feedlot or through the meatworks.

The overall challenge to the international beef industry is to produce appealing products that can be put on the plate of every kind of consumer, or in the meat cabinet, at a price the consumer is willing and able to pay and at a profit to the various sectors of the industry. We have the technology, the cattle and the environment to do just that.

Table 1 Weight and carcass details of Struan steers at Peechelba Feedlot

	J H	H J H	H H	C J H	C S H	S S H
All Steers						
Wt. on entry 8/6/89 (kg)	302	322	328	372	380	378
Wt. 10/4/90 (kg)	623	665	654	762	758	723
Wt. gain/day 8/6/89-10/4/90	1.06	1.12	1.05	1.27	1.23	1.13
Steers slaughtered 11/4/90 after 300 days in feedlot (quartered 10/11 rib)						
Number slaughtered	8	21	12	15	10	8
Wt. 10/4/90 (kg)	595	637	624	735	745	692
Carcass wt. (kg)	337	363	366	428	442	405
Hot Fat thickness rump (P8)	17.1	24.5	24.7	18.3	13.2	15.8
Dress %	56.6	57.0	58.6	58.2	59.4	58.5
Eye muscle area cm^2	70.4	70.3	66.0	88.6	96.0	82.8
Marbling (1-12)	2.88	2.76	2.33	1.80	1.90	2.00
Meat colour (1-9)	2.75	2.67	2.75	2.93	3.20	3.25
Fat colour (1-10)	1.00	1.14	1.00	1.13	1.00	1.00
Est. Total lean meat (kg)	191	197	192	240	254	226
Steers slaughtered 1/6/90 after 350 days on feed (quartered at 5/6 rib)						
Number slaughtered	5	6	4	5	3	3
Wt. 31/5/90 (kg)	687	764	754	855	824	828
Carcass wt. (kg)	382	439	433	486	483	485
Hot Fat thickness Rump (P8)	27.5	37.3	39.0	13.6	23.7	26.3
Dress %	55.6	57.4	57.5	56.8	58.6	58.6
Marbling Score	4.60	4.17	2.50	3.00	3.00	2.33
Meat colour	4.00	3.67	4.00	4.00	3.67	4.33
Fat colour	1.60	1.20	1.00	1.20	1.00	1.33
Est. Total Lean Meat (kg)	190	195	183	247	250	243

Table II Final weight and carcass details of Charlton steers slaughtered 9/4/91 after 300 days on feed (quartered at 10/11 rib)

	J x H	H J H	H x H	C J H	C S H	M H F
Wt. on entry 28/5/90	272	309	298	319	335	307
Wt. all Steers 4/4/91 (kg)	614	683	672	707	761	726
Wt. gain/day 28/5/90-4/4/91	1.10	1.20	1.20	1.25	1.37	1.35
Number slaughtered	22	22	23	15	14	9
Carcass weight (kg)	335	381	375	398	434	409
Hot Fat thickness Rump (P8)	15.3	24.3	23.0	12.9	13.4	22.7
Carcass length (mm)	1060	1098	1082	1126	1121	1099
Carcass wt/unit length	0.316	0.347	0.346	0.353	0.388	0.372
Dress %	54.6	55.8	55.8	56.2	58.2	56.3
Eye muscle area (sq. cm.)	68.8	69.0	70.0	81.3	89.6	67.1
Marbling Score	2.45	2.13	2.17	2.26	2.00	2.33
Muscle Score (Ausmeat)	4.9 C	5.4 C	6.0 C	5.6 C	7.4 B	6.0 C
Cold Rump fat (P8) (mm)	17.4	23.4	22.5	13.3	12.5	28.0
Rib fat thickness (mm)	13.6	20.1	22.2	14.9	14.1	20.6
Meat colour	1.64	1.73	1.35	1.40	1.21	1.67
Fat colour	1.70	1.13	1.00	1.14	1.25	1.00
Est. Total lean meat (kg)	189	205	200	225	247	219