final report

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Define a beef supply chain system through to a specified end product

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Refining a beef production system to reliably supply a specified product

Final Report from Team Te Mania
PIRD Project Number - S2003/V08

August 2007

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Executive Summary

The stated aim of the project was to define the most important variables contributing to the reliable production of a specified beef product and once identified use these to design production and communication strategies within the supply chain. Three outcomes listed below have facilitated achievement of this aim:

1. Identification and reinforcement of the fact that selection of sires is critical to the production of traits such as carcase weight, fatness and marbling.
2. Demonstration that herd differences are significant and carcase feedback is important to benchmark these herd differences.
3. A simple system of genetic benchmarking for commercial herds has been developed and trialled. This will allow commercial breeders to fine tune their selection procedures.

This project will have direct benefits to members of Team Te Mania allowing them to achieve the project aim.

- The genetic benchmarking analysis has demonstrated that the sire input model predicts genetic merit of commercial herds with a degree of accuracy. A simple spreadsheet is available for use by individual herds to predict the genetic merit of their commercial cow herd. The future use of this tool will need to be further promoted to realise its full benefit but it can be used by Te Mania principles when allocating lease sires to Team herds. This approach should be further developed to make a genetic benchmarking tool available via web based delivery mechanisms.

- Analysis of feedback data has clearly demonstrated the importance of using the correct sires but this does not over-ride the herd of origin effect that includes a number of confounded effects including age of turn-off and genetic merit of the dams. Selection of sires is critical to continued improvement of the herd output. Herd effects need to be more clearly defined and understood. Feedback of carcase traits should be used to rank herd performances against a credible benchmark.

- As planned in the project proposal, carcase data has been submitted to BREEDPLAN, resulting in increased accuracy for carcase EBVs. Higher accuracy in progeny test bulls flows through to higher accuracy of selection for team members using Te Mania bulls. This result is documented in an invited paper to the upcoming AAABG conference in September. Records from the Angus Australia web site show that Te Mania has 21, 2004 born males with an accuracy for IMF EBV above 70%. The next best herd has only two male progeny with equivalent accuracy despite there being four herds in the list registering more than 500 calves per year. A copy of the AAABG paper is attached as Appendix C.

A project such as this also has some indirect benefits by enhancing cohesion within the Team from the knowledge transfer and the cooperative approach of the project. It reinforces the commitment of the seedstock herd to the continued improvement of the commercial production system.

The broader industry will benefit from the further development of the sire input model and recommendations from the analysis of carcase feedback. The sire input model should be developed as a web based service to make it readily available.

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Project Background

The following background information is repeated from the project application to allow readers to context the results in light of the background.

Team Te Mania is an alliance of commercial Angus breeders with a seedstock breeder. The alliance then coordinates the marketing of steers from the commercial breeders, using volume and similar breeding lines to attract industry premiums. Te Mania Angus were already established as premium seedstock breeders but realised that the future lay in making sure that the genetics they developed within the seedstock herd complied with requirements of all sectors of the beef production chain. Importantly this included a processing and meat marketing sector that were becoming more conscious of meat quality while still trying to maximise returns from the carcase.

Progeny testing has become important to make use of the latest versions of Breedplan which now include EBVs for carcase data. There is a subtle but very important difference in these traits as the direct information (carcase data) can no longer be collected from the seedstock herd. Carcase data needs to come from commercial herds that slaughter all their male calves not a selected few as would be the case if slaughter data came from the seedstock herd. However commercial herds are generally not equipped to record the relevant data for genetic evaluation. Specifically they do not as a rule identify sires and there is no AI used to create across herd linkage. Good carcase data only eventuates from planned progeny test programs.

Team Te Mania has a number of members whose herds are fully recorded with the society under the ACR register. These members are the primary contributors to the progeny testing program. The ACR status adds accuracy to the progeny test allowing the steer progeny to be monitored all the way through to slaughter with full pedigree information on both the sire and the dam. Knowing the dam allows for correction of the female side of the mate allocation and therefore makes the estimate of the sire potential more accurate. In addition the ACR status means that fertility and calving ease data is being collected on the test sires in a commercially operating herd. Opportunistic use is made of slaughter data from other herds when it is deemed to be of suitable quality. This data is carefully monitored to ensure that the guidelines for Angus progeny testing are closely followed especially that the management group has not been selectively harvested and the data is biased.

Twice annually, Team members attend a bull selection day, on-property at Te Mania Angus, where they lease the required number of bulls to use in their joining program. A large amount of the Team cattle are artificially inseminated with Te Mania Angus semen, which they purchase cost price, and in turn the Team receives feedback from the resultant progeny after slaughter. Currently there are almost 16,000 cows in the program. Two previous PIRD grants have been utilized by the Team to refine the current structure, especially aspects of genetic evaluation and selection of herd improving sires.

Progeny in the ACR registered herds are identified following standard Angus society procedures with the three letter identifier, year letter and 3 or 4 digit individual ID. Data collection begins at birth and follows standard BREEDPLAN recording procedures including weights, calving records and scanning. The steers are sent to a number of different outlets that have agreed to supply feedback suitable for inclusion in BREEDPLAN ie. AUSMEAT or MSA accredited operators collect data. Heifer progeny are also fully recorded on BREEDPLAN.

Two other partners will be brought into the group for purposes of this PIRD project. LR.com will provide a web-based recording system for all animals and will co-ordinate the data recording and collection on-farm, in feedlots and at slaughter. Rangers Valley Feedlot have been purchasing Team steers for the past four years and have agreed to assist in the feedlot and carcase data collection for this project. All data from the feedlot and carcase will electronically be submitted to

LR.com and be matched with the on-farm data. Appropriate data will be submitted to BREEDPLAN for genetic analysis.

Project Operation

Te Mania seedstock herd and Team Te Mania undertook to use considerable resources of 16,000 breeding cows from 35 commercial herds and the Te Mania seedstock herd to develop and test a genetic benchmarking system and to investigating carcase feedback, with the aim to modify herd production systems.

Assistance was sought from a recording company LR.com to record much of the on-farm data. For commercial reasons this company withdrew after two years leaving a void in the data collection area and requiring a new system of data collection. Due to this disruption much of the on-farm pasture conditions and serial weights were not recorded. This was responsible for the non-achievement of aim to more fully describe the herd effects that the analysis of carcase feedback has shown to be very important.

The Animal Genetics and Breeding Unit, Armidale, NSW has been responsible for developing the sire input model and the data analysis.

The involvement and cooperation of Rangers Valley feedlot has been outstanding, supplying most of the carcase data that was analysed. In addition the feedlot representative, Richard Eldershaw has attended the Team Te Mania workshop on several occasions providing extra feedback and encouragement.

It was planned to experiment with TGRM as a method of streamlining the selection techniques for both the progeny test and the commercial herds however during the life of the project, TGRM was commercialised and the cost of using this program is prohibitive for un-confirmed benefits. The Te Mania seedstock herd continues to use the service to make selections and to do mate allocations.

Outcomes against aims and expected benefits to the group as submitted in the project application

The stated aim of the project was to define the most important variables contributing to the reliable production of a specified beef product and once identified use these to design production and communication strategies within the supply chain. To a large extent these aims have been met. The critical descriptors of quality for commercial beef producers have been researched and recommendations made with the following three points summarising the outcomes:

1. Identification and reinforcement of the fact that selection of sires is critical to the production of traits such as carcase weight, fatness and marbling.
2. Demonstration that herd differences are significant and carcase feedback is important to benchmark these herd differences.
3. A simple system of genetic benchmarking for commercial herds has been developed and trialled. This will allow commercial breeders to fine tune their selection procedures.

These outcomes have been relayed to Team members and representatives of the cooperating feedlot but this will need to be a continuing process if all parties are to use the knowledge to their mutual benefit.

The expected outcomes from the project, as submitted in the project application, are italicised and repeated in this report for reference. Achievements against each expected outcome follow.

Team Te Mania members will have defined critical control points for breeding and producing a specified beef product. This quality assurance system will be used to promote and market the superiority of the Team Te Mania product to current and prospective buyers. Growth rate will be related to the grazing systems and pasture availability and this will describe the production system. The suitability of the genetics for each defined grazing system will be determined.

Critical points for the breeding program have been defined with it being clearly demonstrated that sires are important and that the process of monitoring the genetic merit of herds by sire inputs will serve as a guide to planning the breeding program. Developing a quality assurance system for management and nutritional constraints was reliant on LR.Com recording pasture and animal details during the data collection period. Due to the withdrawal of this partner this outcome has not been fully achieved. However our analysis of carcase feedback clearly identified the differences between herds over and above differences explained by sires. As a result, one recommendation that arises from this project is that monitoring the production systems of different herds with the aim of developing a quality assurance system with well documented critical control points should be pursued in further projects.

> *Financial benefits will accrue to the commercial producer from premiums in the market place for cattle that have higher compliance to specifications. Current estimates of this premium are 5 cents per kg liveweight that on a 400 kg steer would increase returns by $20 per head. For Team Te Mania turning off more than 6000 steers per year this adds up to $120,000 increase in farm gate price. As it is demonstrated that higher compliance can be achieved it is expected that this premium will increase.*

Results of this study have been presented to the Team Te Mania annual workshop and the results have been discussed with a representative of Rangers Valley feedlot who were partners in this project. Team members are convinced they are receiving a premium over the general industry price. However the level of premium is undisclosed as commercial confidences require that prices are not openly discussed.

> *All Team members who contribute data will receive a genetic benchmarking report and a comparative growth and pasture report. Guidelines will accompany this report that makes suggestions for improvement of any deficiencies.*

Team members who had used Te Mania sires for a sufficient period, whether they contributed data or not, received a report and their personal results were discussed at the Team Te Mania workshop in July 2006. The excel worksheet is now available for use by any member. Due to the lack of pasture and management monitoring the comparative growth and pasture report was not available.

> *The genetic information will be used to assist in sire selection from the seedstock herd. Once a genetic profile has been established a personalised index can be developed for each herd and the mating allocations can be streamlined by using tools such as TGRM (see attachment on TGRM). In addition the strengths and deficiencies identified in the collective commercial herds will be used to further improve selections within the seedstock herd thus ensuring that genetic improvement is appropriate for the defined production systems-market end point.*

The genetic information on each herd has been made available to the Te Mania principles who now select and allocate most of the bulls, sight unseen, to team members who lease bulls. The allocation of lease bulls is based on the needs of individual herds. Very few team members insist on viewing lease bulls, rather accepting the allocations assigned by Te Mania principles. This shows a degree of faith in the system that in part stems from knowledge that the Te Mania principles are using good information to make selections. The advent of sire selection by the Te Mania principles was within the time line of this project.

> *The value of an integrated livestock recording system will be demonstrated with the use of LR.com. It will also be an opportunity for the recording system to be fine tuned to the needs of the production system.*

This outcome has not been achieved due to the withdrawal of LR.com as a partner in this project.

> *The increase in compliance of cattle through the feedlot system will be worth a considerable amount of money to the feedlotter and processor. Conservative estimates of between $300 and $400 per head for compliance would mean that moving from 80% compliance to 90% in the 6000 Team steers would be worth $240,000 per year.*

This outcome has not been documented but most involved in the project are optimistic that extra compliance is reality and that financial improvements of this magnitude are being achieved. The averages of carcase feedback for marbling at 3.2, carcase weight at 430 kg and eye muscle area of 80 cm^2 are believed to be well above general industry performance, remembering that these results are for a range of days on feed and production systems.

Consistent with the project proposal data was collected from the progeny test herds and entered into BREEDPLAN. Over the life of the project this has been monitored and used to refine the progeny testing program. This data has resulted in higher accuracy for carcase EBVs for Te Mania sires. Higher accuracy in progeny test bulls flows through to higher accuracy of selection for team members using Te Mania bulls. This result is documented in an invited paper to the upcoming AAABG conference in September. Records from the Angus Australia web site show that Te Mania has 21, 2004 born males with an accuracy for IMF EBV above 70%. The next best herd has only two male progeny with equivalent accuracy despite there being four herds in the list registering more than 500 calves per year. A copy of the AAABG paper is attached as Appendix C. A further examination of the Angus Australia website shows that of the top 300 highest ranking sires (with more than 25 progeny) on the B3 index, Te Mania has the largest representation. The higher accuracy is attracting more breeders to use Te Mania genetics.

A project such as this also has some indirect benefits by enhancing cohesion within the Team from the knowledge transfer and the cooperative approach of the project. It reinforces the commitment of the seedstock herd to the continued improvement of the commercial production system.

Genetic Benchmarking

One of the major objectives of this project is to develop a system of genetic benchmarking for commercial herds. Within Team Te Mania there are herds that record with BREEDPLAN in the Angus Commercial Register (ACR). These herds allowed comparison of a benchmarking model with the BREEDPLAN analysis of genetic merit.

The principle behind the development of this system for genetic benchmarking is that sires used for any calf crop explain half of the genetic merit of the calf crop. A further 25% is explained by the maternal grandsire and a another 12.5% explained by the maternal great grand sire (see Figure 1). The model developed for this project considered only the sire and maternal grand sire because it was expected that information of the maternal great-grand sire would be limited.

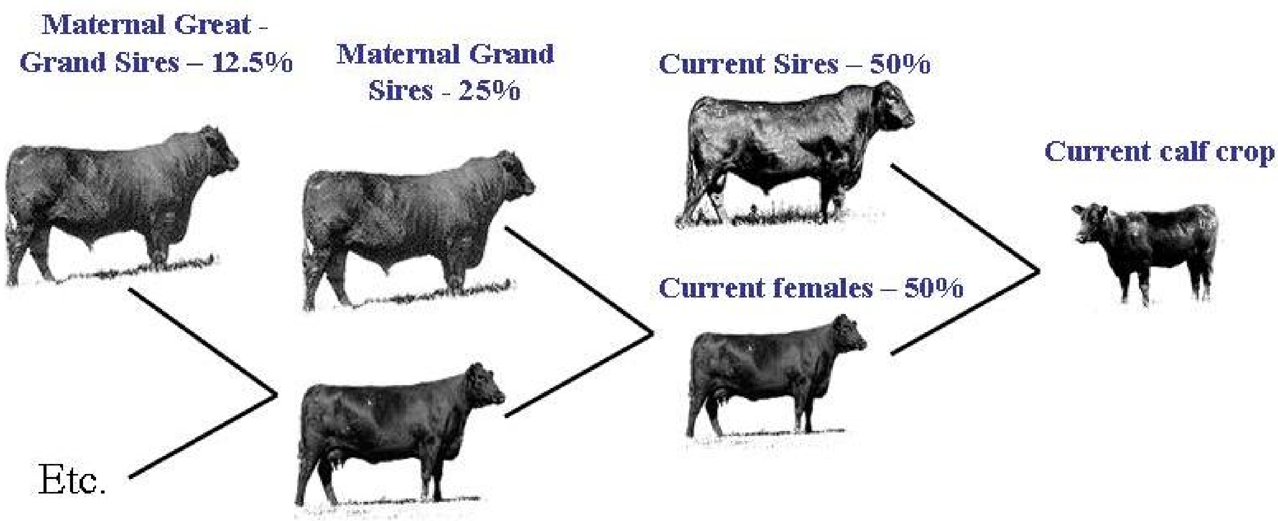


Figure 1: Sire contribution to current calf crop.

Other assumptions made in the model development were that where the sires were unrecorded the genetic merit was breed average and that sires made equal contribution to the calf crop. Data input was sire ident, EBVs for the recorded sires and years over which the sire was used in the herd (the input screen for the excel model is shown in figure 5).

Trends in individual EBVs and indexes predicted by BREEDPLAN or TakeStock (formerly StockTake) were compared to the trends predicted by the sire use model. Genetic progress for indexes over time is calculated as part of the TakeStock analysis. The breed average for the trait or index being considered is also included as a benchmark.

Results comparing the Sire Usage with BREEDPLAN predicted genetic merit. Figure 2 shows the trends for an ACR recorded herd with long history (>15 years) of using Te Mania sires. The herd trend for IMF predicted by the sire use model (diamonds) compares well with the BREEDPLAN prediction of the same trend (triangles). Both predict that the herd is well above breed average (squares).

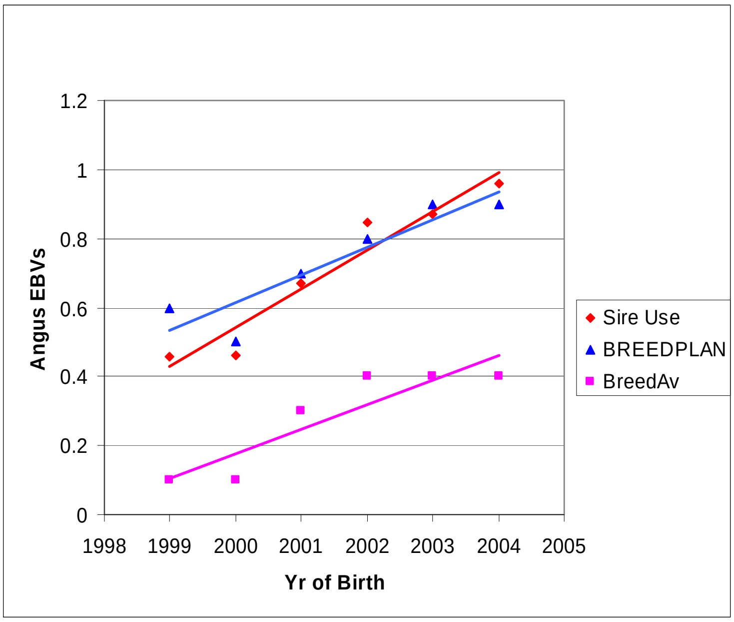


Figure 2: Genetic trend for IMF for an ACR recorded herd.

For the same herd the sire use model is adequately predicting the trend for the B3 index as predicted by TakeStock (Figure 3).

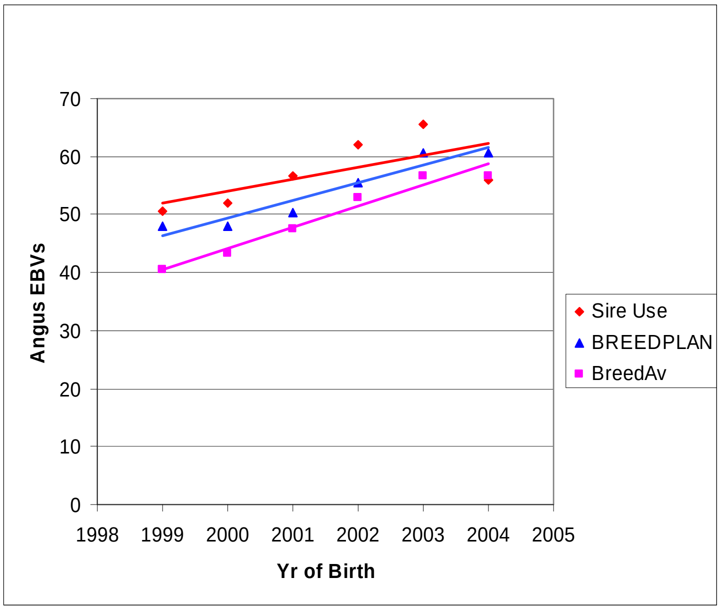


Figure 3: Genetic trend for B3 index as predicted by TakeStock for an ACR recorded herd

Figure 4 shows the prediction of the trend in IMF as predicted by the sire use model and BREEDPLAN for a second ACR recorded herd. However this herd has a shorter recording history in BREEDPLAN and a shorter history of Te Mania sire usage (6 years). The agreement between the BREEDPLAN prediction and the sire use model is not as good but both predict an upward trend and again above breed average.

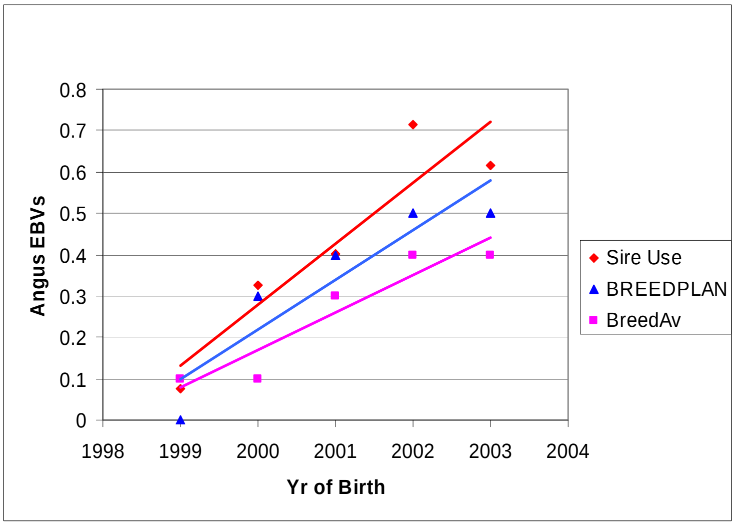


Figure 4: Trends for IMF for a second ACR recorded herd but with only 6 years of sire input data

Reports for four EBVs and two indexes for herd 1 are shown in Appendix A.

Commercial herd reports. Commercial herds with a history of sire usage were also tested albeit with no alternative evaluation for comparison purposes. Individual breeders were shown their results and asked for feedback. Figure 5 shows a predicted trend for IMF for a commercial Team member with the breed average as a benchmark. The herd proprietor has been placing emphasis on IMF for some years and has had positive carcase feedback. Twenty Team members were shown reports similar to that included as Appendix B and most considered that the reports made sense in light of their past selection intentions.

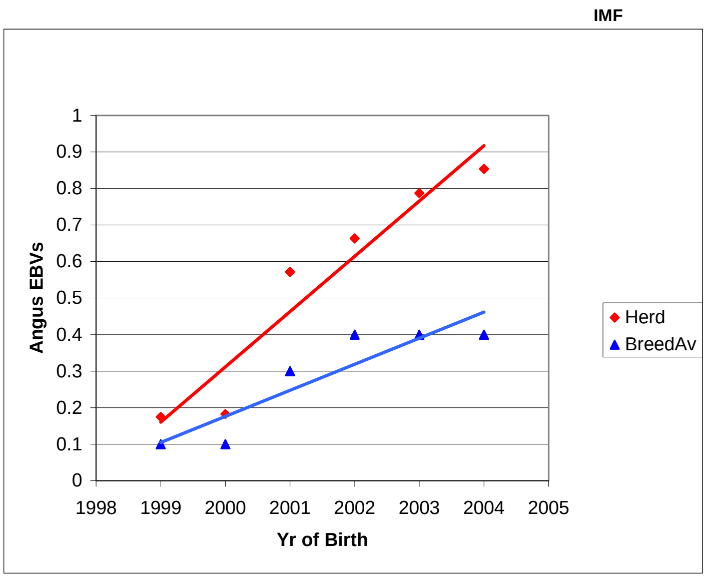


Figure 5: Trends in IMF as predicted by the sire use model benchmarked against breed average for a commercial Team Te Mania member

Conclusions and recommendations for use and future development. The above demonstration shows that with sufficient history of sires, the sire use model can give a reasonable prediction of genetic merit as predicted by BREEDPLAN or Take Stock. The model could be developed further to include maternal great-grandsire contributions if there was sufficient recorded sire history. Further promotion of the model within the Team will be undertaken and the concept should be developed further for broader industry use. The spreadsheet model should be re-written in a more transportable language and could be developed as a web based service.

Spreadsheet Model for estimating genetic merit. The spreadsheet model allows breeders to input sires used and years of use. Then by nominating the trait they would like to investigate (via a drop down menu at the top of the page) their estimated genetic merit compared to the breed average is shown. For breeders using Te Mania sires, EBVs are stored in a worksheet and automatically extracted when the sire identification is entered into the spreadsheet. For sires that are not Te Mania bred the EBVs can be accessed from the web and entered into a separate sheet entitled 'Add Sires'. The EBV and index values will then be picked up in the spreadsheet model. Instructions are shown in a comment dialogue box. The spreadsheet model will accompany electronic versions of this report and is available for commercial breeders to use.

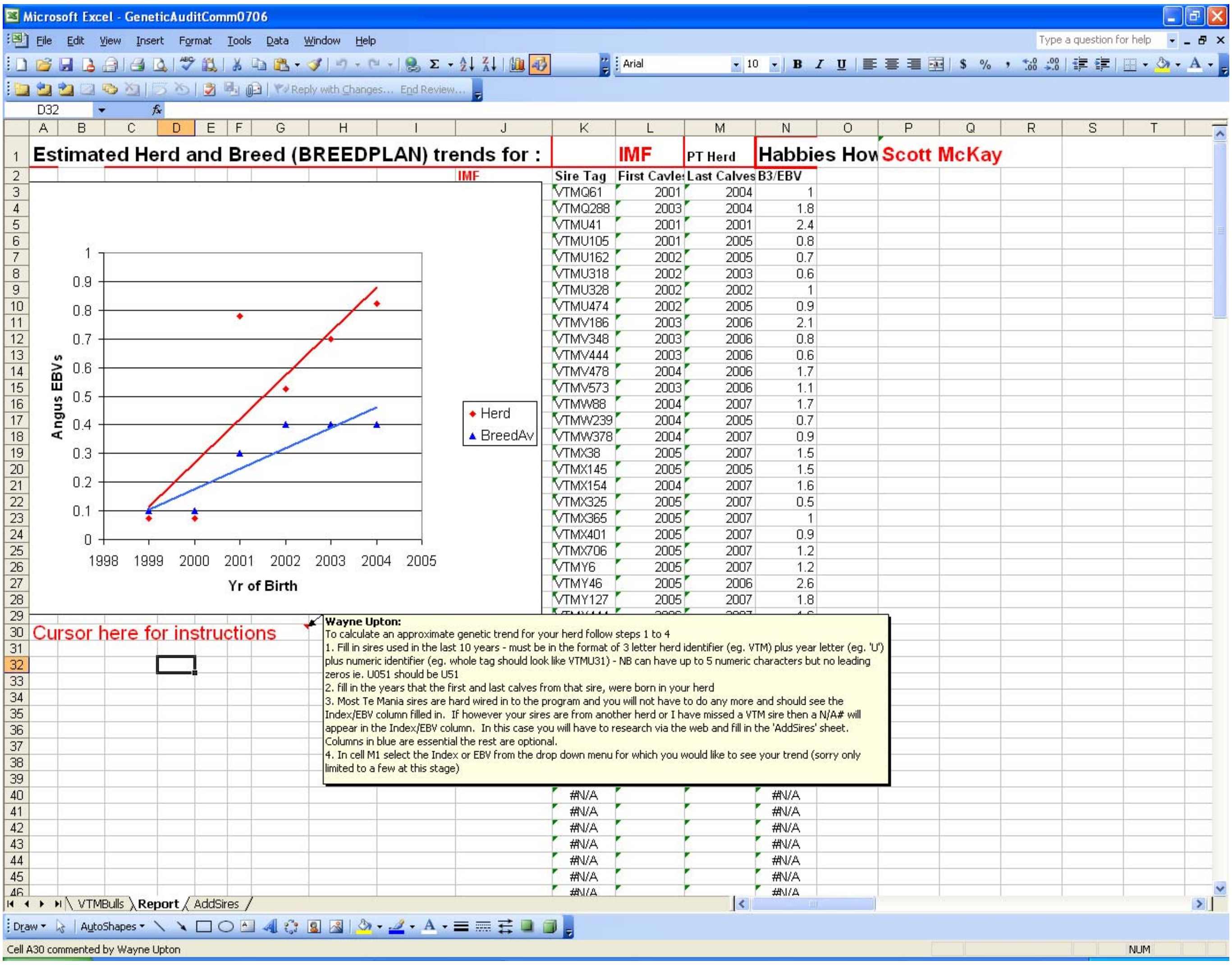


Fig 5: Spreadsheet model allows the breeder to enter sires used and years of use.

Analysis of Feedback Data

Phenotypes of 1261 progeny of known sires were recorded from 6 herds slaughtered at one of 7 abattoirs, on 85 different slaughter days from 1999 to 2006. Cattle were fed in four different feedlots. Progeny were sired by 119 sires and linkage across slaughter days was from sires used across herds. Descriptive statistics for all traits are shown in table 1.

Table 1: Number of records, Means, SD, Minimum and Maximum for variables

Variable	N	Mean	Std Dev	Minimum	Maximum
FLIW	1027	413.57	32.85	328	492
SlaughterDate	1261	6/11/2004		29/04/1999	4/08/2006
Age at Slaughter (days)	837	856.52	119.81	237	1207
Dentition	664	2.86	1.03	2	6
Carcase Weight (kg)	1259	429.79	41.94	281	560
Hot P8 Fat (mm)	1041	24.12	7.52	5	58
Marble Score	1226	3.20	1.18	0.4	9
Eye Muscle Area (cm^2)	421	79.90	6.44	60	100
Days on Feed	967	289.07	65.86	130	386
Daily Weight Gain (kg/day)	959	1.24	0.29	0.7	2.37

Incomplete data recording reduced the number of records available for analysing some traits as shown in the first column of table 1. Eye Muscle Area was recorded on only a small number of animals and across slaughter date linkage was insufficient to allow analysis.

Table 2: Unadjusted progeny averages for Carcase Weight, Daily Weight Gain, Slaughter Age, P8 Fat and Marble Score by herd

Herd	Carcase Weight (kg)	Daily Weight Gain (kg/day)	Slaughter Age (days)	Feedlot Intake Weight (kg)	Days on Feed	P8 Fat (mm)	Marble Score
1	421.3	1.19	823.3	422.1	311.5	23.2	2.7
2	441.4	1.13	881.0	430.5	315.3	27.2	3.0
3	443.1	1.15	974.4	423.5	323.9	24.1	2.8
4	450.5	1.17	862.5	392.9	334.1	25.2	4.1
5	397.9	1.47	741.4	401.7	215.9	20.3	2.9
6	432.1	1.08	na	422.0	319.6	25.1	2.8

Significant effects on Carcase Weight, Marble Score, P8 Fat depth and Daily Weight Gain were determined using SAS. Slaughter Date nested within herd was used to define the contemporary group for all analyses. Feedlot, age and days on feed were confounded within the slaughter date within herd and could not be analysed as separate effects. Feedlot intake weight was analysed as a continuous variable and sire was treated as a random effect. Significant effects for the four variables are shown in table 3.

Table 3; Records analysed and significant effects on dependent variables Carcase Weight, Daily Weight Gain, Marble Score and P8 Fat Depth

Variable	Number of Records	Herd	Sire	Feedlot Intake Weight
Carcase Weight	962	P<0.0001	P<0.0001	P<0.0001
Daily Weight Gain	903	P<0.0001	P<0.0001	n.s.
Marble Score	1146	P<0.0001	P<0.0001	n.s.
P8 Fat Depth	1013	n.s.	P<0.0001	n.s.

Herd effects were significant for all but P8 fat depth. Least squares means for the 6 herds, for carcase weight, weight gain per day and marble score are shown in figures 6, 7 & 8. Some of the effects seen in the herds may be explained by differences in age as the contemporary group used was slaughter date within herd. Age was not significant in any of the evaluations as it is confounded with slaughter date. Sire was a significant effect in all four traits but intake weight was only significant for carcase weight. Similarly days on feed was not a significant effect on any of these traits but it will also be confounded with the herd effect.

Herd 4 has the heaviest carcase weight when corrected for feedlot intake weight and sire, with a least squares mean (LSM) of 462 kg, while herd 5 has the lightest LSM of 379 kg. Interpreting these herd effects must be done with knowledge of the production and market system used as there is confounding of important traits such as age and days on feed. The raw data shows that herd 4 has an average age at slaughter of 863 days while herd 4 has an average age of only 398 days and this could have a major effect on carcase weight. However herd 3 has the highest average age at slaughter at 974 days and the LSM for carcase weight is only 454 kg so slaughter age is not the only influence that the herds are having. Likewise days on feed for herd 5 is considerably lower than other herds and this will have an effect on the carcase weights. Another major influence is of course the genetic merit of the females being used. Dam identification was only available in a subset of the data and not all the known dams had EBVs available, so the dam effect could not be adequately analysed.

The herd effects on daily weight gain and marble score will have the same confounding as for carcase weight. As might be expected herd 3 with the lowest carcase weight, days on feed and age has the highest daily weight gain. This herd is supplying a greater proportion of their animals to the domestic market. However when corrected for sire the marble score for herd 3 is relatively high, likely to be an effect of the genetic merit of the dams. Herd 4 on the other hand has the lowest daily weight gain and the highest marble score. Herd effects were not significant for P8 fat depth.

More complete data recording of the herds could help to explain the herds effects further.

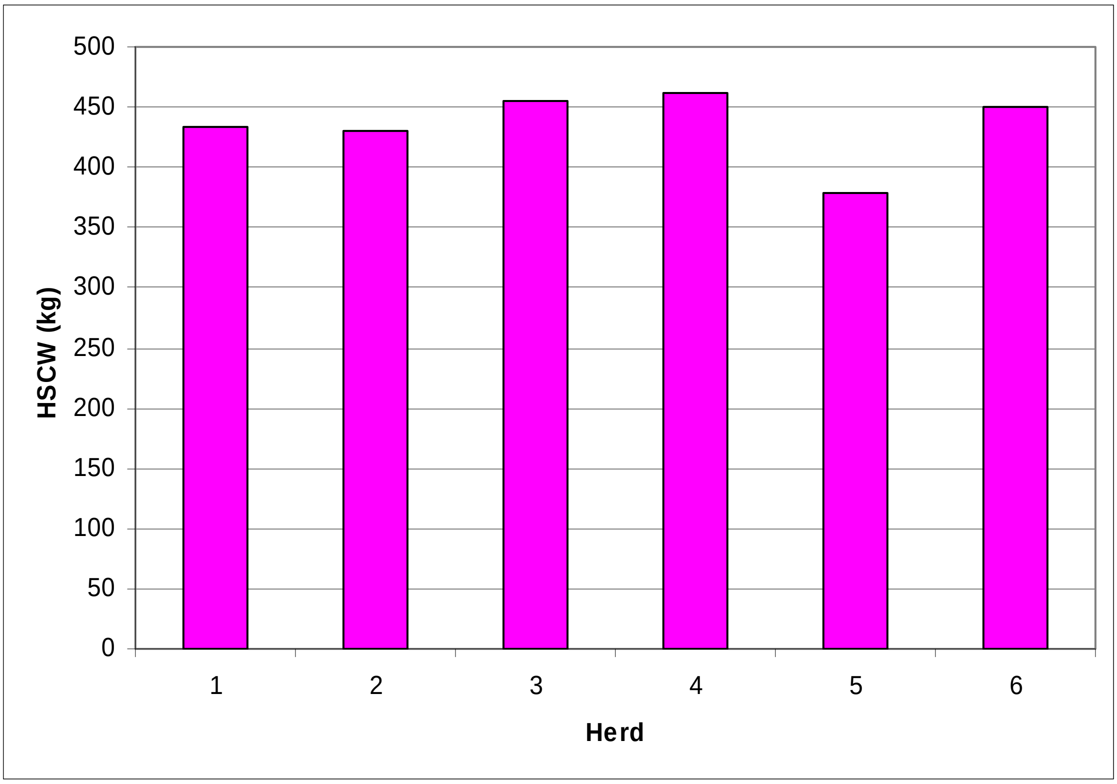


Figure 6: Least Squares Means for Carcase Weight by 6 Herds

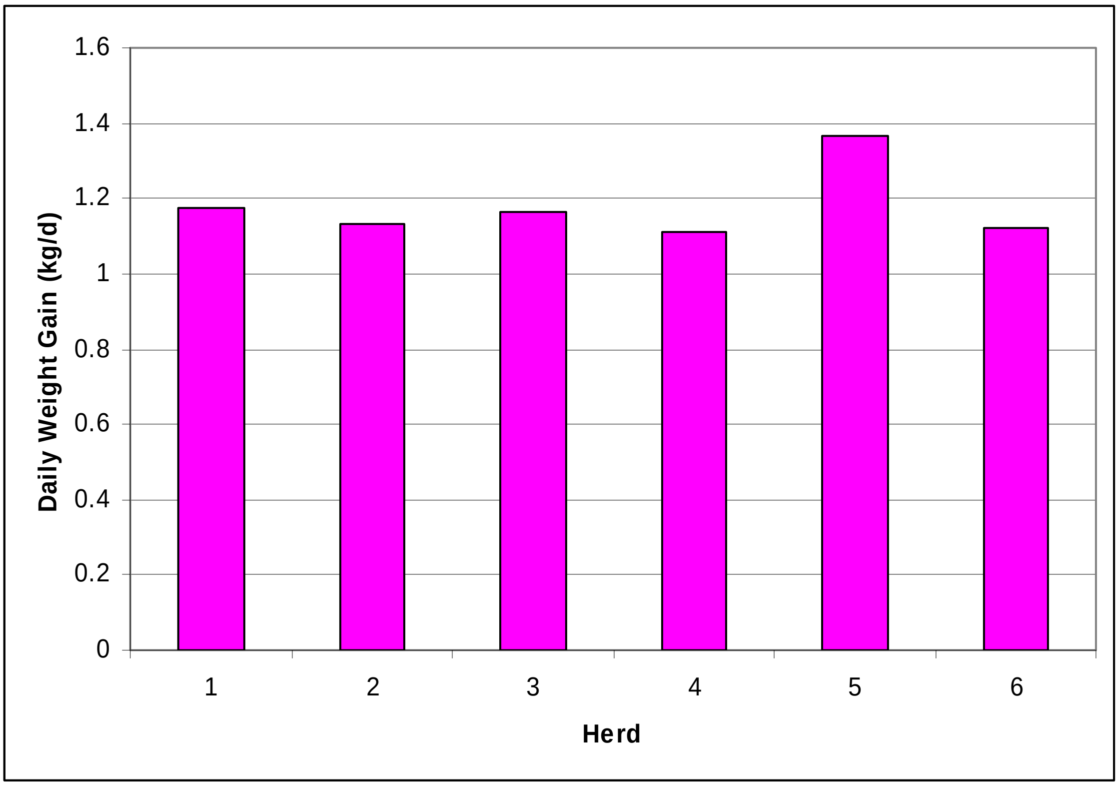


Figure 7: Least Squares Means for Daily Weight Gain by 6 Herds

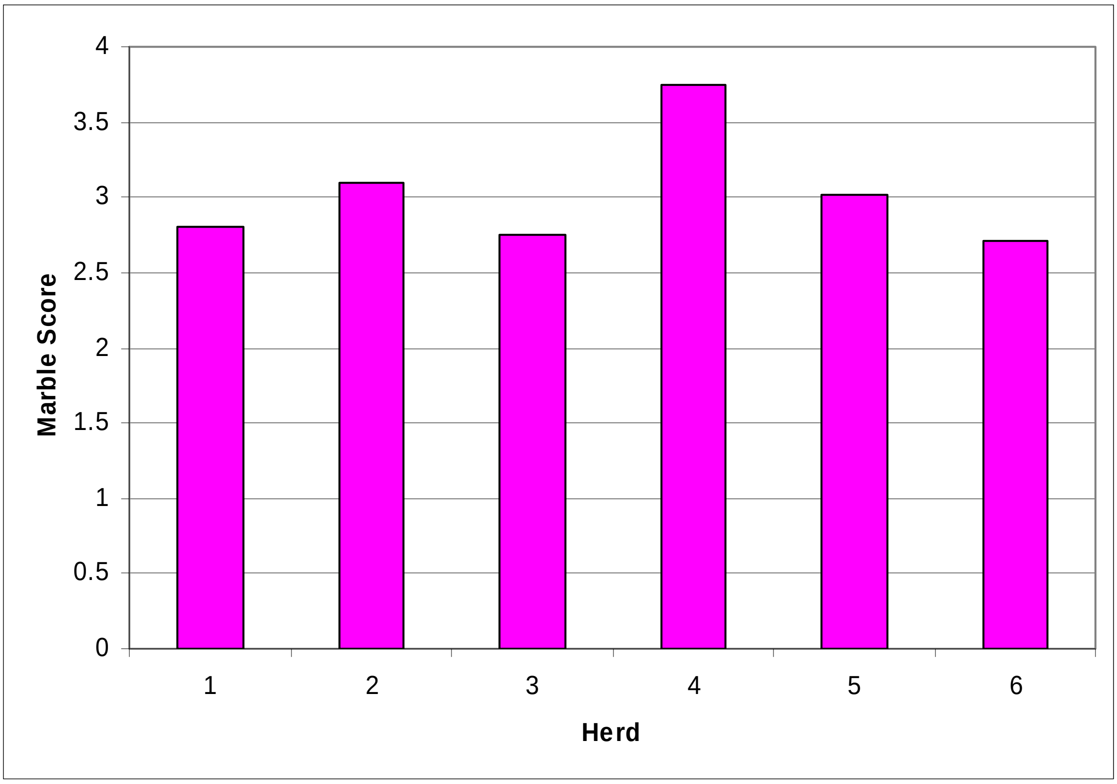


Figure 8: Least Squares Means for Marble Score by 6 Herds

Sire had a significant effect on all four traits analysed. Solutions from the SAS analysis after correcting for herd, slaughter day within herd and in the case of carcase weight, feedlot intake weight, for the top 20 sires compared to the bottom 20 sires for each of the traits are summarised in table 4.

Table 4: Comparison of adjusted progeny phenotypes for the top 20 versus the bottom 20 sires for 4 traits

Trait	Carcase Weight	Daily Weight Gain	Marble Score	P8 Fat
Top 20 Sires for given trait	411.1	1.13	3.3	27.0
Bottom 20 Sires for given trait	403.8	1.07	2.8	23.2

The differences between the top 20 and bottom 20 sires demonstrate the magnitude of genetic differences across the 119 sires with progeny in this data set. A further analysis fitting appropriate sire EBV values as a covariate produced regression coefficients for the regression of phenotypes on the EBV. For a model such as this that considers the sire only the expected regression coefficient is 0.5 if the phenotype and the EBV are defined similarly. The regression coefficient of carcase weight on carcase weight EBV was 0.35(±0.11). The carcase weight EBV is corrected to 650 days of age where the average of this data set was 857 days of age. This regression value with relatively large standard errors is acceptably close to the expected value of 0.5. The regression coefficient of carcase P8 fat depth on P8 fat EBV was 0.62 (±0.20), once again not significantly different from the expected 0.5, especially when it is considered that the EBV is corrected to 300 kg carcase weight and the average weight of carcases in this data set was 430 kg.

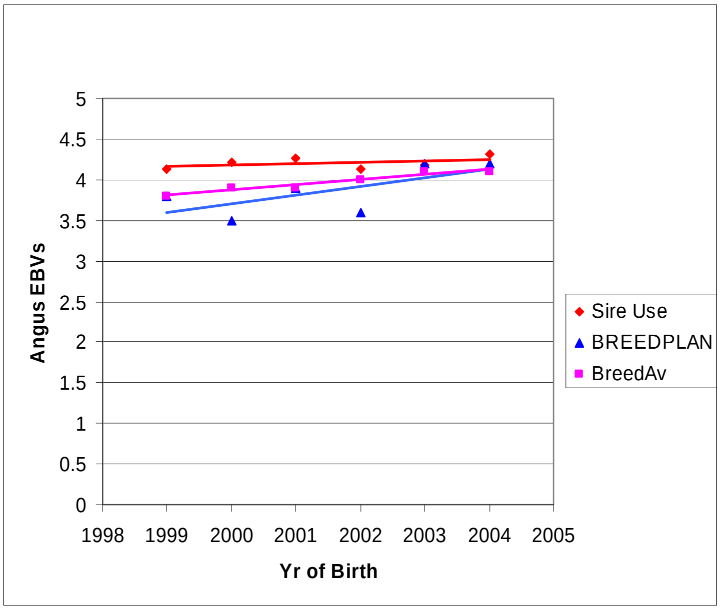
For the other two traits there is no EBV with the same definition as the carcase measures, however the regression coefficient for marble score on IMF EBV was 0.19(±0.04) and for daily weight gain on 600 day

EBV is 0.003(±0.001). These effects appear quite small but over the range of IMF EBVs of -1.4 to 2.7 we are predicting an increase in marble score of 0.77 of a marble score, which is the same magnitude of change seen between the top 20 and bottom 20 sires. Similarly the range of 600 day EBVs in the sires used from 41 to 106 predicts a change in daily weight gain of 0.20 kg/day.

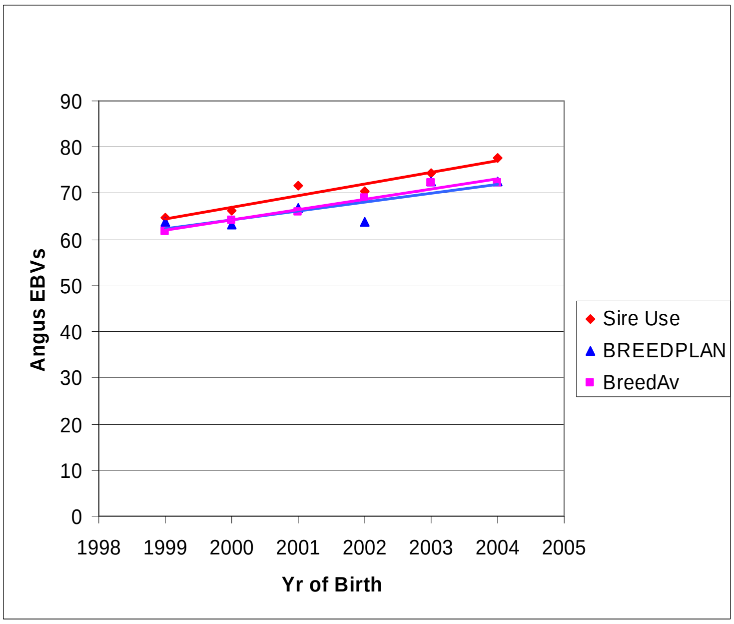
This is not a valid test of the predictive power of pre-test EBVs as the EBVs used in this analysis did include the carcase data. The pre-test EBVs were not used in this analysis for two reasons. Firstly they were not readily on file but more importantly the pre-test EBVs were calculated using a super-seeded version of BREEDPLAN. Changes to the current version of BREEDPLAN include new methods of importing overseas EBVs (EPDs) for imported sires. A recent analysis of the Angus progeny test data (report submitted to MLA by Angus Australia) showed that the superseded EBVs did not predict phenotypes of carcase traits very well. Carcase weight would have been the exception in this analysis as it was generally unaffected by the change in BREEDPLAN versions.

While this is not a proof that EBVs predict phenotype it is verification that the EBVs are describing the genetic effects being seen in the progeny of sires. It answers the industry criticism that the EBV calculations do not reflect the data being submitted. There is suspicion that pedigree information and correlated effects often out weigh the effect of direct data in the EBV calculation. This analysis would refute this criticism and demonstrates that accurate, unbiased carcase data is indeed reflected in the carcase EBVs.

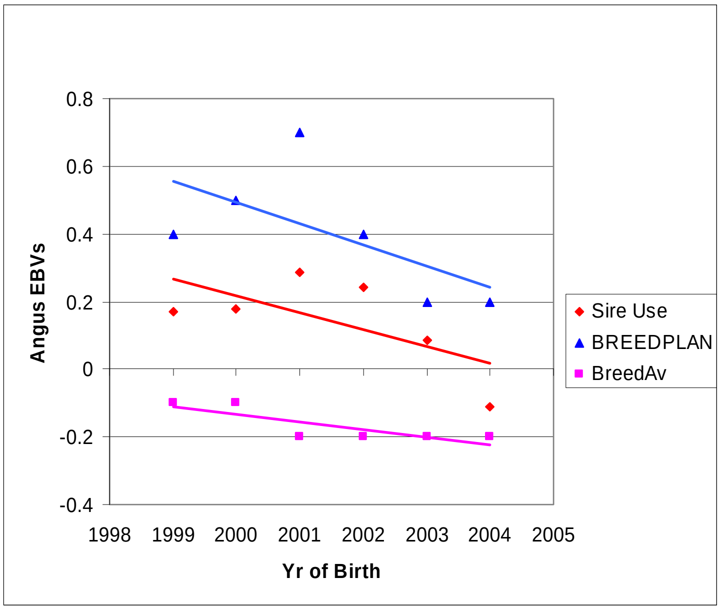
Appendix A: Results for EBVs and indexes for ACR herd 1



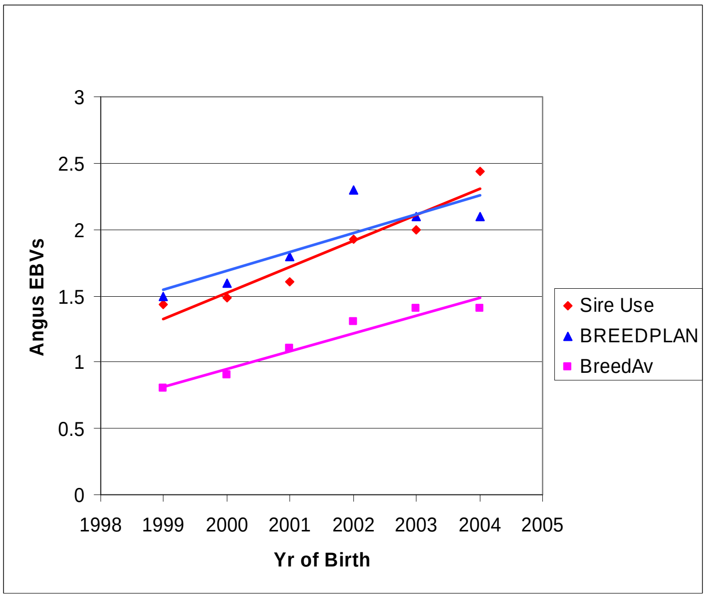
Herd 1 Birthweight



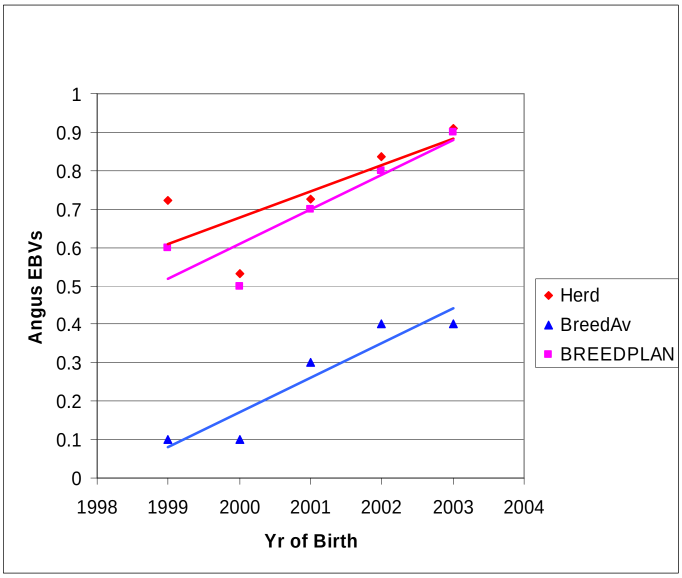
Herd 1 600 day



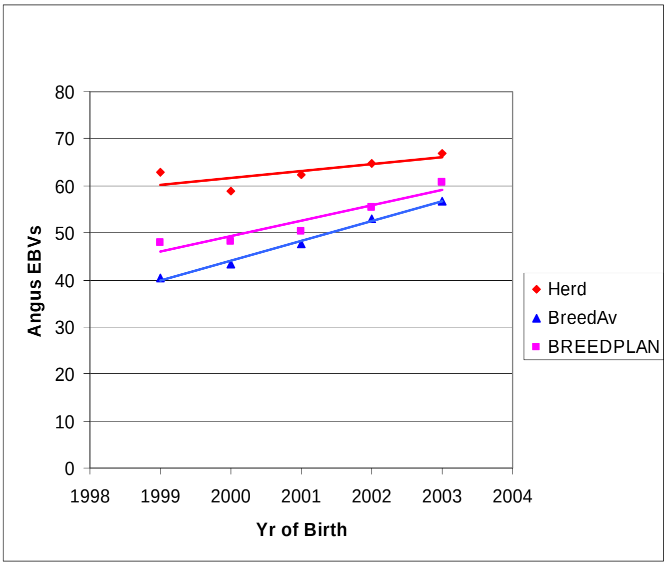
Herd 1 Fat



Herd 1 EMA



Herd 1 IMF

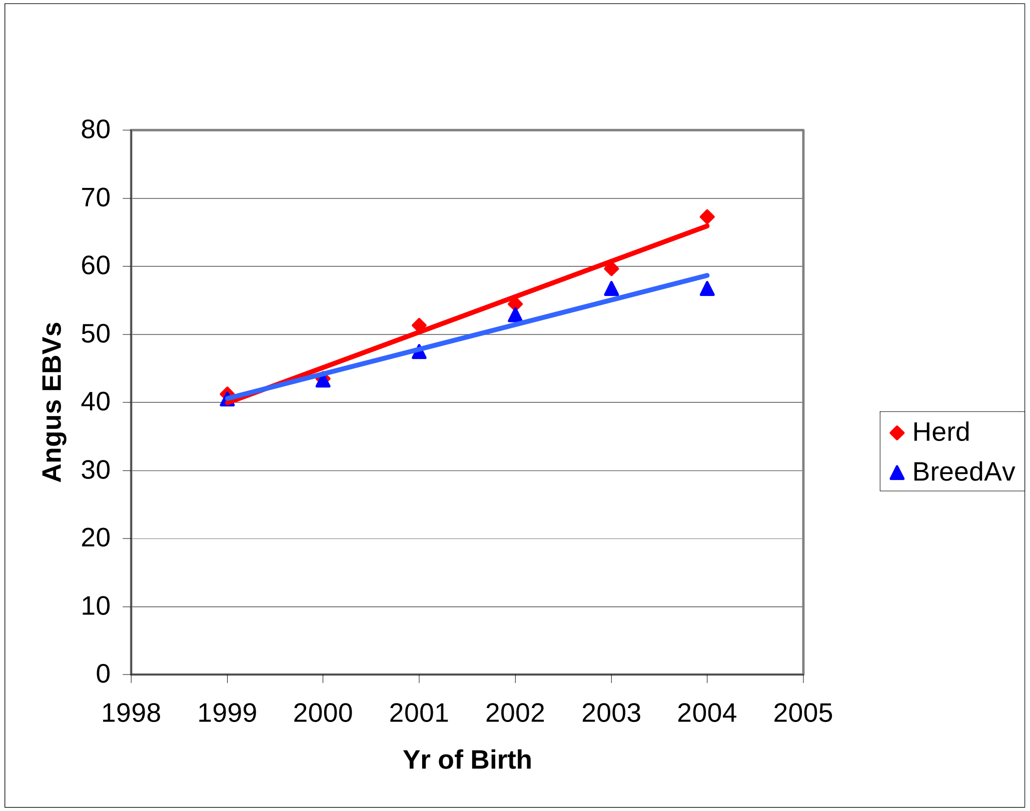


Herd 1 B3 Index

Appendix B: Report for commercial herds

Estimated Herd and Breed (BREEDPLAN) trends for : B3 PT Herd **Balmaha** **Robert Atkinson**

B3



Place cursor here for operating

Sire Tag	First Cavles	Last Calves	B3/EBV
VTMR177	1999	2002	59
VTMU83	2001	2002	75
VTMU84	2001	2002	68
VTMU84	2002	2004	68
VTMU189	2002	2005	66
VTMU214	2002	2003	62
VTMU214	2003	2004	62
VTMU271	2003	2004	80
VTMU271	2004	2005	80
VTMW16	2003	2004	82
VTMW16	2004	2006	82
VTMX65	2004	2007	113
VTMY162	2005	2007	77
VTMY267	2006	2007	80
VTMZ23	2006	2007	79
#N/A			#N/A
#N/A			#N/A
#N/A			#N/A
#N/A			#N/A
#N/A			#N/A
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#N/A			#N/A
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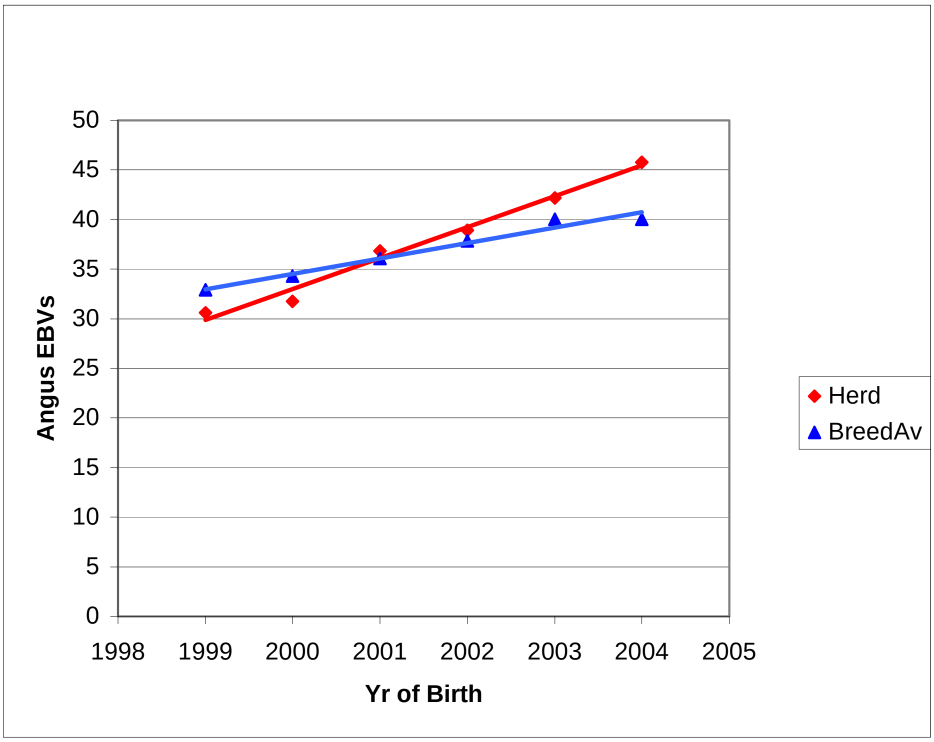
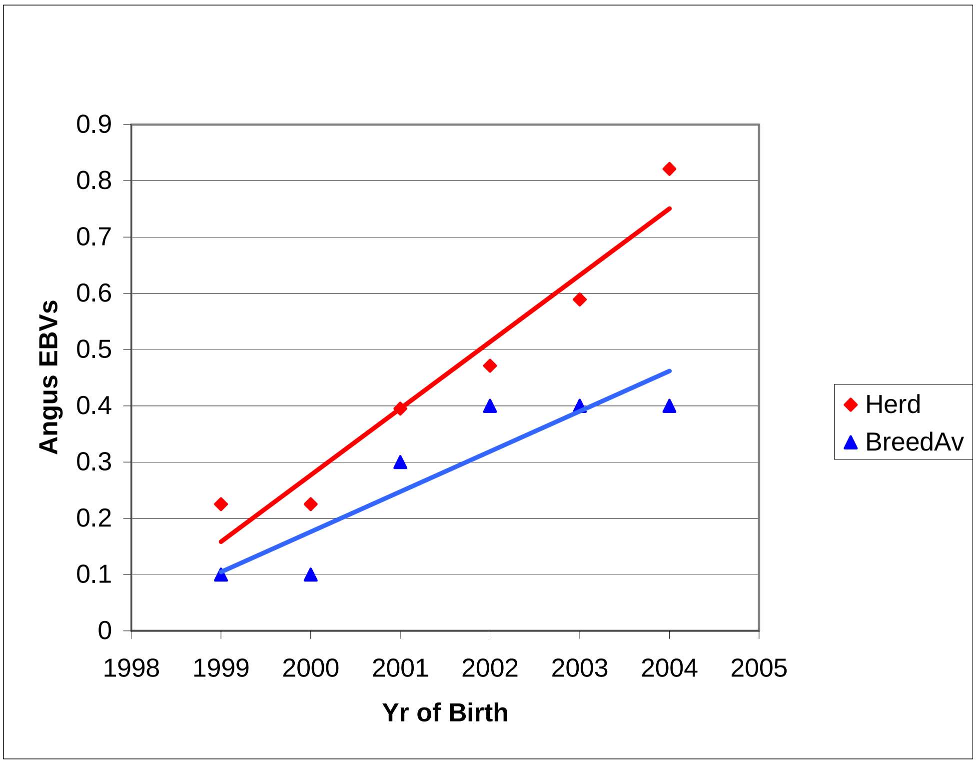
#N/A			#N/A

Sup

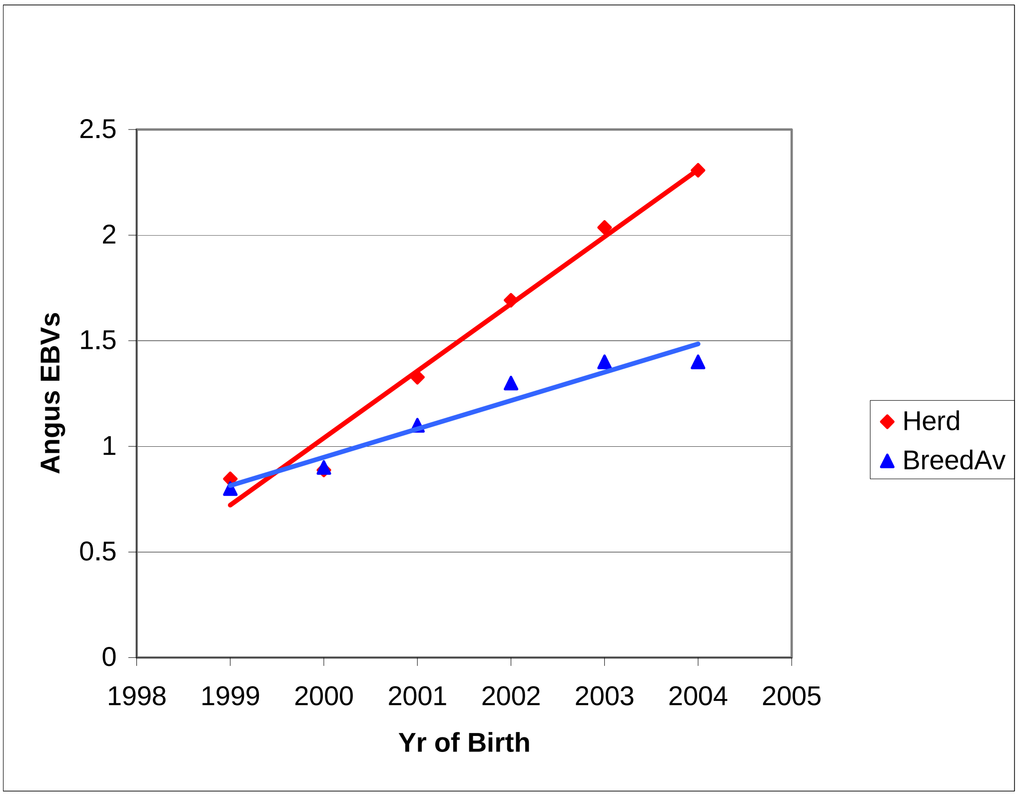


Angus EBVs
50
45
40
35
30
25
20
15
10
5
0
1998
1999
2000
2001
2002
2003
2004
2005
Yr of Birth
Herd
BreedAv

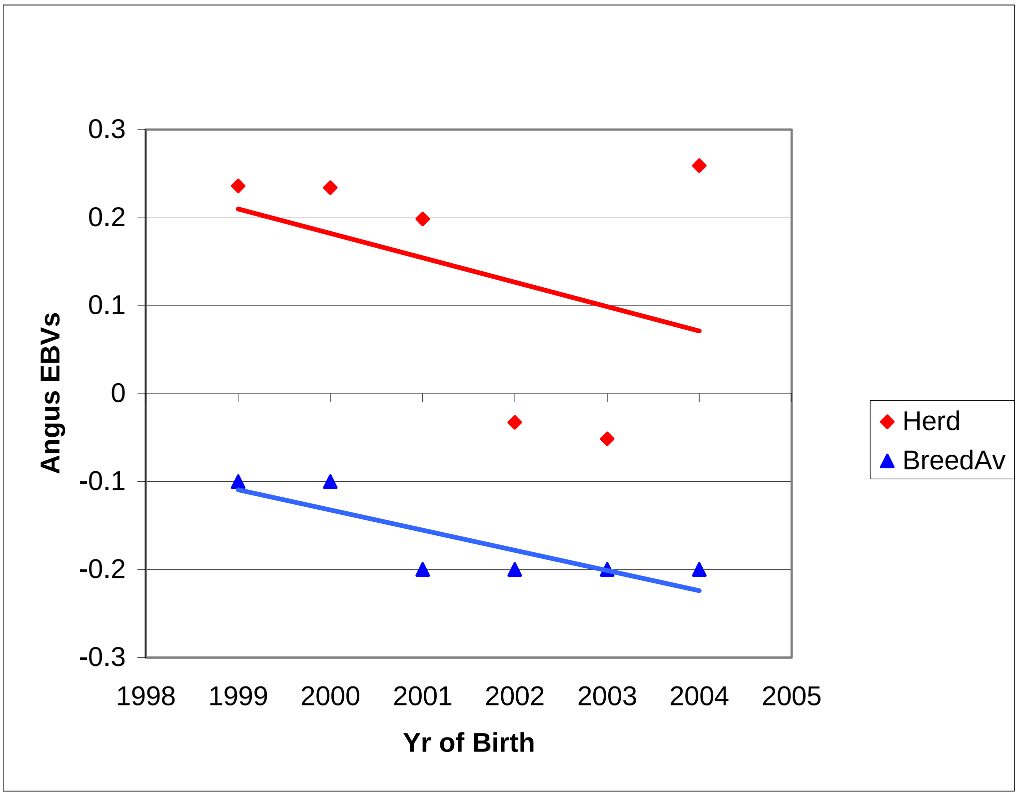
IMF


0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Angus EBVs
1998
1999
2000
2001
2002
2003
2004
2005
Yr of Birth
Herd
BreedAv

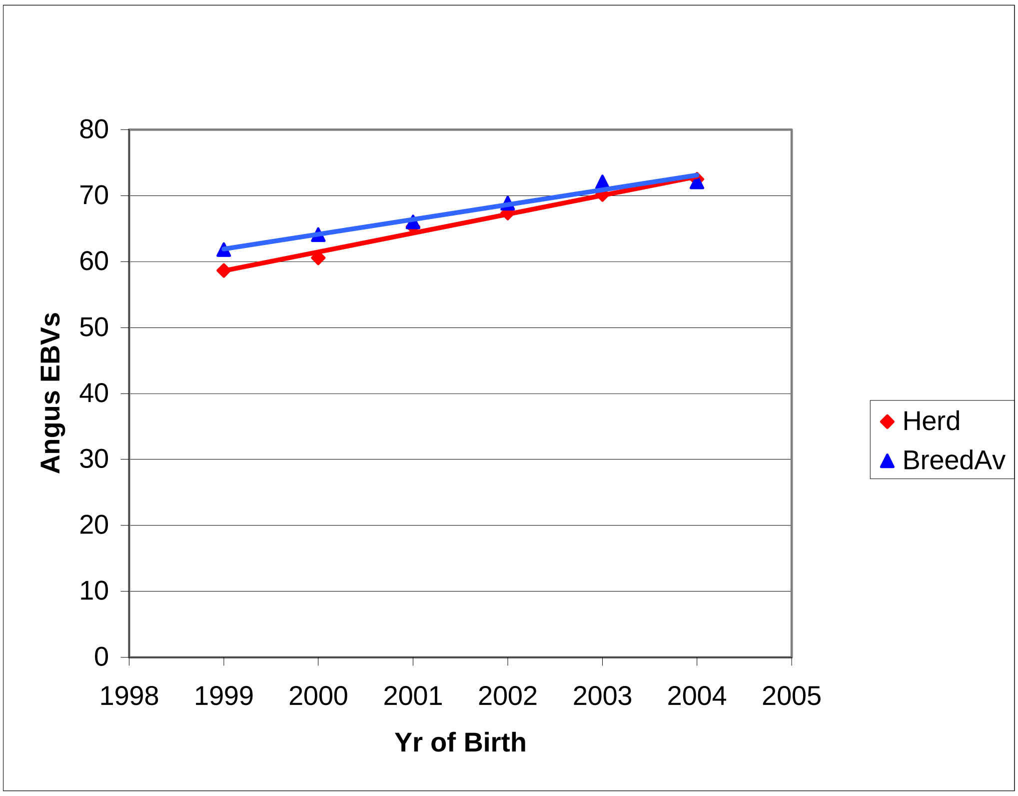
EMA


2.5
2
1.5
1
0.5
0
Angus EBVs
1998
1999
2000
2001
2002
2003
2004
2005
Yr of Birth
Herd
BreedAv

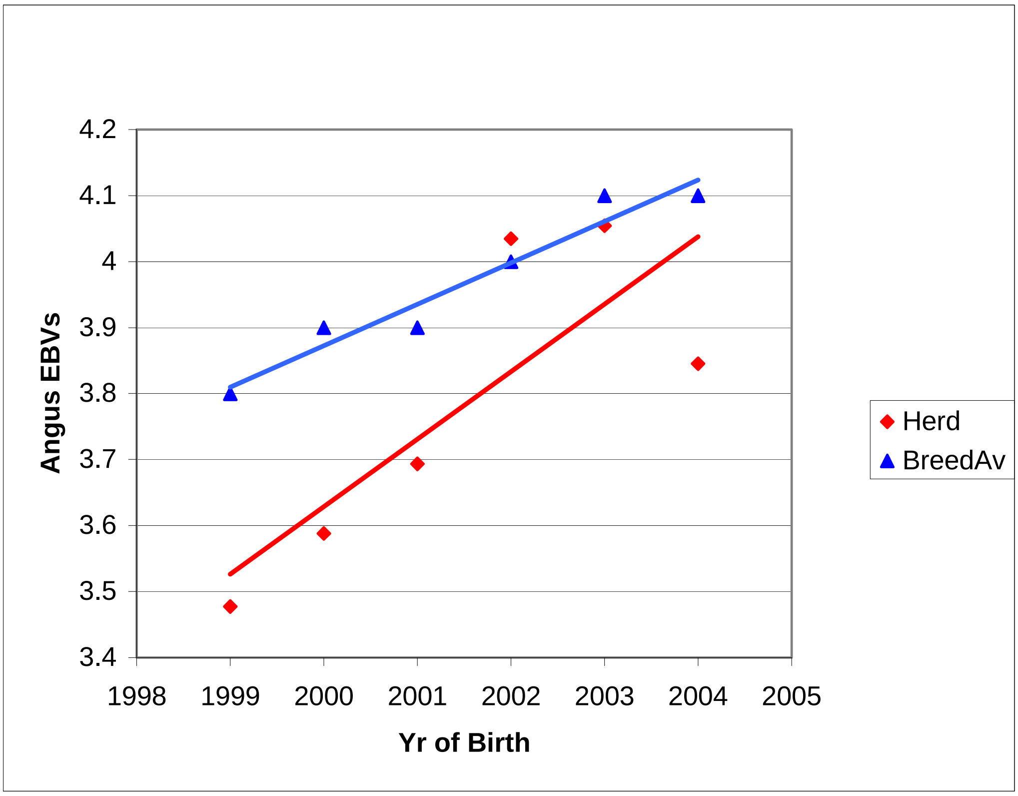
Fat


0.3
0.2
0.1
0
-0.1
-0.2
-0.3
Angus EBVs
1998
1999
2000
2001
2002
2003
2004
2005
Yr of Birth
Herd
BreedAv

600d


80
70
60
50
40
30
20
10
0
Angus EBVs
1998
1999
2000
2001
2002
2003
2004
2005
Yr of Birth
Herd
BreedAv

BWt



4.2
4.1
4
3.9
3.8
3.7
3.6
3.5
3.4
Angus EBVs
1998
1999
2000
2001
2002
2003
2004
2005
Yr of Birth
Herd
BreedAv

Appendix C: Breeding Program Design Initiatives

Tom Gubbins (Te Mania Angus), Wayne Upton (AGBU)
Paper submitted to AAABG conference, Armidale, NSW, September 2007.

Summary

This paper highlights an example of a seedstock operation practically implementing technologies to improve the genetic advancement of its herd and the profitability of its clients. Gaining access to technology is just one side of the coin, using it to its best potential is the other.

Introduction

The seedstock sector of the Australian beef industry is large and complex creating an extremely competitive environment in which to run a business. In order to succeed, a seedstock producer needs to pull out all the stops.

The challenge for any seedstock producer is to breed profitable animals for their clients. To do this they need to embrace all the technology that the seedstock producer sees as relevant and ensure that their system and processes are set up in such a manner as to utilize the technology to its maximum potential.

Client loyalty is very important to continued market share and there are many different approaches to gaining and maintaining that loyalty.

Te Mania Angus, as one of the largest Angus seedstock businesses in the southern Australian beef industry, has chosen to promote its product based on genetic merit. To do so, Te Mania Angus has been at the forefront of the adoption of genetic technologies and strives to maintain constant genetic improvement.

Genetic merit is largely measured in terms of the published Angus long fed index (Japanese B3). Genetic merit for the whole beef supply chain is considered, hence the use of the B3 index that includes values for the commercial breeder plus operators further down the beef supply chain. However, some Te Mania Angus clients produce cattle for a different market and so progress in all indexes is monitored.

A novel approach to building client loyalty was the establishment of Team Te Mania in 1995. The Team is an integrated approach to the supply of genetic material to commercial breeders and unified marketing of the Te Mania bloodline through the beef supply chain. The Team also plays a major role in the genetic improvement program through assistance with the progeny testing of young bulls.

This paper discusses some design initiatives used by Te Mania Angus to maintain consistently high genetic progress and to remain at the forefront of the industry.

Te Mania Angus Breeding Program

Te Mania produces 1200 registered Angus calves per year, with nearly 50% of these calves produced by embryo transfer from high genetic merit females and approximately 80% of the remaining registered females are joined to AI sires.

A recently released program TakeStock® (reported by Johnston and Moore 2005, as StockTake) analyses genetic progress made in seedstock herds and the variables that have contributed to this progress. These results show that the average index value for Te Mania Angus is in the top 5% of the breed (5% is the highest percentile bracket reported). It also recorded that the dams used for ET were a massive $5.00 on index value above the breed average for ET dams. Sires were $3.00 above breed average. TakeStock further reports nearly $5.00 per year improvement in average B3 index over the last five year period (see Figure 1). This is again well above the average for the breed.

With such high average performance compared to the breed, one of the problems faced by Te Mania Angus is finding sires that are superior to the animals within the herd. The definition of selection differential used in TakeStock is the average genetic merit of sires used, compared to the average genetic merit of male calves born in the herd three years previous to the calf crop being evaluated. The logic for this definition is that those calves could have sired the calf crop under evaluation and therefore form a fair base to evaluate the bulls being used. It should also be obvious that the same sires used in the Te Mania Angus herd will have a lower selection differential than if they were used in a herd with a lower average genetic merit because the base for comparison would be lower.

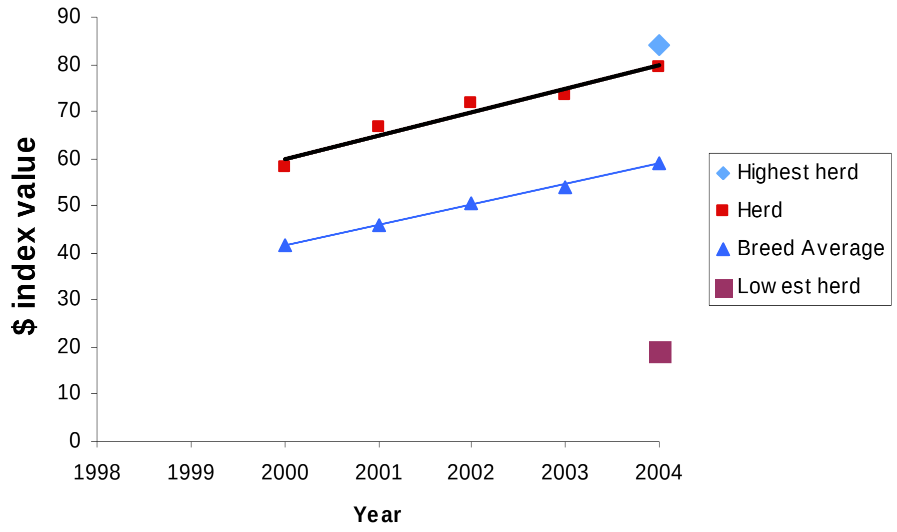


Figure 1: Genetic progress in average B3 index values over the 5 year period 2000 to 2004

Te Mania Angus uses two approaches to finding sires that will maintain or increase genetic progress. Artificial insemination is used to introduce high genetic merit outside sires and the best of the home bred young bulls are used at an early age. The AI sires are generally high accuracy and can be used with confidence but the young homebred sires come with the risk associated with lower accuracies. Risk is managed by using a reasonable number of the young bulls. Key to success of this program is that the young bulls are simultaneously the subjects of a progeny test program that is conducted in eight of the Team Te Mania herds.

Progeny Testing. Selected team herds are committed to the progeny testing program of young Te Mania Angus bulls. Approximately 20 bulls per year are test mated in six fully Breedplan recorded herds. Sires are selected annually for testing based on their index values plus a visual inspection for structural soundness. Some attempt is made to use a wide representative of sire lines in the young bulls. Sires are repeat mated across years to ensure across year linkage and linkage across herds is by AI from some of the young bulls.

In the progeny test herds all male calves are castrated and the full complement of weights (including birth weights) are recorded along with scans taken on both sexes. Heifers are fully recorded for calving ease and days to calving. The majority of steers are followed through to slaughter and carcase records submitted for BREEDPLAN analysis.

Proof of the value of the progeny testing can be seen in the examination of the number of young bulls from various stud herds with above 70% accuracy for IMF EBV as shown in figure 2. To set the cut-off at 70% is rather arbitrary, but it is a figure that is generally accepted by the industry and it usually will require the bull to have progeny to achieve this accuracy. The figure shows that the number of Te Mania Angus 2003 drop bulls at greater than 70% accuracy is 21, well above any other stud. Even if calculated as a percentage of male calves born the number is more than twice the next best herd.

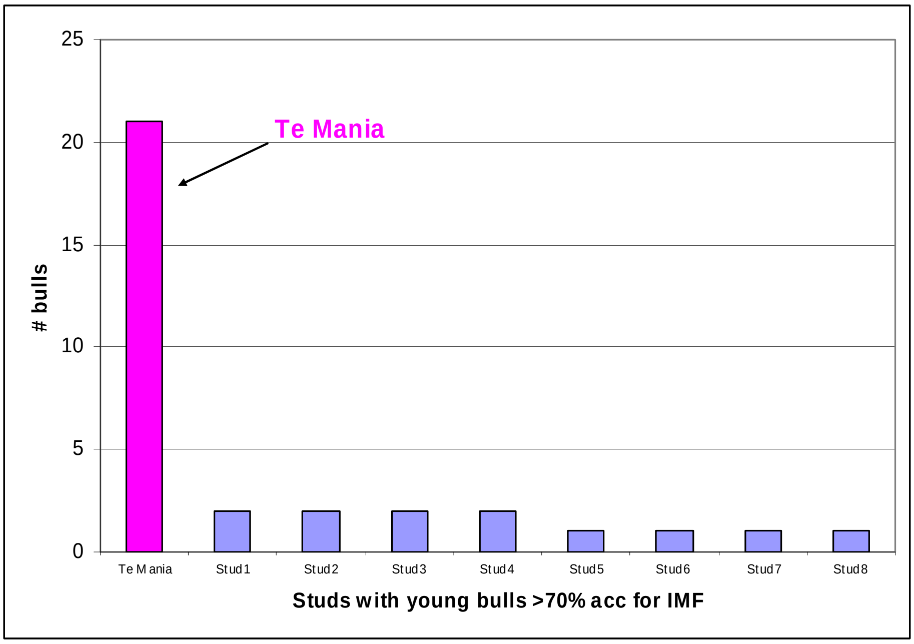


Figure 2: Number of 2004 drop bulls with greater than 70% accuracy for IMF EBV.

However the length of time from first using the bulls at 15 months of age until a reasonably accurate proof is available is considerable. Take for example the 2003 drop bulls; they were first used in 2004 but the accuracy is not evident until 2007. This lag period has to be considered in planning genetic improvement and Te Mania Angus are still trying to decide how to best capitalize on this information. Semen storage is practiced for most of the progeny test bulls and is thought to be the best option long term to allow the better bulls to be used once the results of progeny test are included. Te Mania Angus is fortunate that for young bulls that are used in the Te Mania parent herd there is the option to promote the daughters of these proven sires to elite donor level. High merit young bulls that are used only in progeny test herds must be brought back into the parent herd.

Choosing the Right Objective. Te Mania Angus has been using BreedObject since it was first introduced to the beef industry. In the early days, workshops were conducted with key clients to determine the most appropriate index for their commercial needs. Results of these workshops were amalgamated into an index used by Te Mania for selection. When the standard B3 index was introduced it was found to be closely aligned with the Te Mania index and was adopted as the primary index for selection and marketing purposes.

In later years, closer contact with Team members and feedlots and processors has encouraged development of a customized index that is used for selection in conjunction with the Angus B3. Differences between the indexes are subtle and reflect slight changes encouraged by client information. Until this year, this index was not used for marketing as the two indexes are closely related and the confusion created by publishing another index was not warranted. Now that a better understanding of the Jap B3 index exists in the winder industry, it was decided that the Te Mania Index would be provided in sale and semen catalogues.

Total Genetics Resource Management (TGRM). Te Mania Angus was one of the first to use the program known as TGRM (Meszaros, 2002) and have continued to use it in its commercial form, BreedExact from Elders. It is considered that this program value adds to the work of reporting data and EBV calculation by making the mate allocation more precise.

Scale of Operation. The Te Mania Angus herd has grown significantly over the last 10 years. The females now all run on a separate property “Woolongoon” near Mortlake.

Running the cows in a commercially economic environment places the animals in a confined habitat. This habitat gives the herd the limitations in which it must perform profitably. Cattle which can not perform profitably are culled. This habitat becomes a filter to ensure any adverse genetics can not slip through the scrutiny of genetic selection.

Cows run in large mobs of up to 600 keeping the contemporary groups together.

Not all Beer and Skittles. Te Mania Angus has taken the approach that if technology is available it should be evaluated for its role in the genetic improvement program. Not all initiatives undertaken have paid dividends. Net Feed Intake (NFI) is one such example. While it is acknowledged that feed intake is an important trait in the beef cattle industry, attempts to calculate NFI EBVs appear to have ‘run up some dry gullies’. Latest information is that the Insulin Like Growth factor 1 test is not as valuable as first thought and Te Mania Angus is re-evaluating its use of this test.

Gene Markers. At this point gene markers have not been used extensively in the selection program however hair or semen samples have been stored on all important animals in the pedigree and will be tested at a point when it is considered warranted.

Team Te Mania

Team Te Mania is a partnership of Australian beef cattle producers who work together to produce high quality beef cattle and collectively market through a nationally recognised brand.

Team Te Mania is about starting producer members along the path from being price takers to price makers.

Team members have access to the latest genetics of Te Mania Angus through a bull leasing program and discounted artificial insemination. The bull leasing program is backed by a 48-hour replacement guarantee.

One of the major advantages of team membership is that lease bulls are from the top of the pack, ie. members select their bulls prior to clients who purchase their bulls out-right (although only half a flush is made available to the Team to ensure bull sale clients are able to gain access to the elite genetics also).

One of the highlights of membership is the annual meeting which offers technical updating plus an exchange of ideas and the opportunity for direct feedback to the seedstock herd. Focusing on efficient management practices and cutting edge genetics Team Te Mania members target the lucrative B3 market.

They work together to further advance the fertility and performance of their herds, achieving more cattle reaching commercial targets, in a shorter period of time from conception to turn off.

In turn, Te Mania Angus – the nucleus herd – benefits from vital production feedback used to further fine-tune the genetic program.

This integrated chain, commences with extensive structural assessments and focus on high performance commercial traits at Te Mania Angus.

Team Te Mania offers a sophisticated marketing program which includes feature female sales of surplus commercial breeding stock which are highly sought after.

Established in 1995, this commercial alliance incorporates breeding stock throughout Victoria, New South Wales and South Australia.

Currently there are some 36 herds mating 16,000 females.

For Te Mania Angus, the Team offers two major advantages, it helps to create client loyalty plus it allows direct feedback from clients on the requirement of the genetics. While the B3 index is the primary index used to monitor progress, for selection purposes a customized index has been developed that includes some slight modifications to cater for commercial breeders and feedlotter requirements.

Progeny Testing
Team Te Mania has two commercial management programs.

1. Production herds
The minimum recording requirements of Team Te Mania progeny are -
• Month calf was born, and
• Sex of calf.

2. Progeny Test herds
Registered with the Angus Society on the ACR (Angus Commercial Register), these herds submit performance data to Group Breedplan. Management requirements are:
• Single sire mating
• Artificial Insemination, to ensure linkage with other Team Te Mania herds
• Female identification and joining dates
• Identification of all calves
• Birth date, weaning weight and post weaning weights.

Cattle within the progeny test program are scanned for IMF% (Intra Muscular Fat) and EMA (Eye Muscle Area), paid by the Team Te Mania Research and Development Fund.

The progeny of all Team Te Mania semen and lease bulls become the property of the Team member.

All male progeny must be castrated.

Conclusion
It is very important for any seedstock herd to be early adopters of technology, for it gives them the opportunity to be at the forefront of any new developments. The result is faster genetic improvement and more profit for their clients.

Being early adopters of technology comes with some risks as the technology has not had the practical implications to iron out any unforeseeable “bugs”.

While implementing breeding theory that makes positive contributions, seedstock herds must be mindful of not effecting unknown natural breeding pressures that make positive contributions. To do this cattle need to be kept in a management system that will instantly report if any theory has been applied to the system which in practice will not work.

The technologies that are being developed by our industries scientists and others, are making a positive and profitable contribution to farmers, feedlotters, processors and to the nations of Australia and New Zealand.

Attachment to Final PIRD report Project Code 2003/V08

In our second progress report dated 31st March 2005 we advised that the services provided by LR.com were not meeting the needs of what we were trying to achieve and that we had engaged the services of Sapien Technology Pty Ltd to custom build a data collection system.

Sapien Technology has custom written a system to capture carcase data resulting from progeny out of the ACR recorded herds. The system is built from a combination of access database and excel macro's and is designed to import, check and validate carcase data from feedlots and then has the ability to format data for direct submission to Breedplan.

To date approximately 800 animals with full sire identified carcase feedback have been submitted to Breedplan via this system.

The language of the industry has not worked in our favour, partly assisted due to the variety of markets that the Australian industry supplies and the importance that each of those markets places on certain traits, ie for the export market the importance of marble score. To highlight this issue Breedplan accept MSA marble scores to 1/10 of a whole number whereas AUSMEAT graders provide whole number scores and more recently we have been told that MSA are no longer providing scores to 1/10's, they now only provide the US scores which are three digit integers eg. 325. This highlights a broader issue that has confronted the industry and has most certainly presented some issues for our project. The problem of a consistent, common language needs to be addressed.

In short, yes the system records what we setout to record. However due to the complexities of the format, ie language, of the raw carcase data creates some problems with the data checking facilities of the program. The system requires the operator to have intimate industry knowledge.

The prototype system is operational but to capture the full benefit from this system there needs to be an increased willingness of the major industry players to adopt a common industry standard for the format and language of carcase information and for Breedplan to be more in synch with them. This program could be further developed for wider industry use.

In addition to the above software, Wayne Upton has written software that assists us to asses the genetic progress of member herds on the basis of using recorded genetics using the EBV's which in part have derived from carcase data collected and submitted through the above system. *The ability of this software has been demonstrated elsewhere within this final report.*