Durham Project providing direct benefits to Shorthorn breeders.

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The Durham progeny test project was set up in 2000 to further the Shorthorn breed through a range of research, breed development and educational activities.

An interim review of the project by the Animal Genetics & Breeding Unit (AGBU) at the University of New England clearly identifies that the project has generated important genetic information not otherwise available to the breed, and is building the breed's platform for ongoing genetic development.

This is particularly so for carcase traits such as marbling, which contribute so much to the breed's competitive advantage in the marketplace.

The review shows;
* scanning is an effective tool for improving marbling performance of the breed
* the project has greatly increased the number of high accuracy sires available within the breed
* Shorthorn EBVs & Indexes are soundly based and accurately predict progeny performance
* non-parent EBVs of well-recorded young sires reflect their progeny-proven EBVs
* the effect of EBVs and gene markers in explaining phenotypic variation within the breed

Relationship between intramuscular fat & marble score.

As marbling cannot be measured in the live animal, we rely on using ultra-sound scans to predict the percentage of intra-muscular fat (IMF) in the live animal. This information is then used to estimate the IMF% in the carcase, as a de-facto estimate of marbling (assuming that carcase IMF% and marbling are closely related traits).

The Durham project has provided the opportunity to test this relationship through the measurement of both IMF and marble score of carcases from the project.

The results show a positive relationship between the two carcase measurements – as IMF% increases, so does marble score.

Given a genetic correlation of some 90% between scan IMF% and carcase IMF%, the Durham project shows that scanning is an effective tool for genetically improving marble score in Shorthorn cattle.

The Durham project has generated high accuracy EBVs for IMF%.

The accuracy of EBVs increases significantly as progeny information becomes available, and the Durham progeny test has provided most of the breed's high accuracy sires for important carcase traits such as marbling.

Of the 70 Shorthorn sires with an accuracy of greater than 80% for IMF, 61 of those sires (87%) are either a direct or associated result of the project., for example;

Total number of high accuracy IMF% sires	70	
Durham influenced sires	61	
- Durham progeny test sires		29
- sires of progeny test sires		16
- progeny of test sires		1
- CRC test sires		9
- sires of CRC test sires		4
- half-sib of Durham test sires		2

Without the Durham project, the breed's inventory of high accuracy sires would be sadly depleted, thereby reducing the opportunity for breed development and genetic improvement.

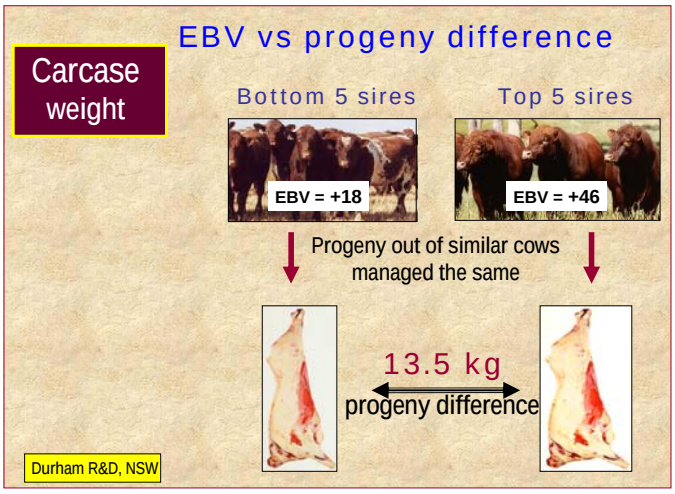
Shorthorn EBVs predict progeny performance.

When using EBVs to select breeding stock, we do so on the understanding that differences in EBVs between selected animals will be reflected in differences in progeny performance.

The theory tells us to expect differences in progeny performance to be 50% of the EBV difference of the animals being compared. Does the theory work in the field ?

In the illustration below, we have EBVs for Carcase Weight of 2 groups of Durham sires, the top 5 sires and the bottom 5 sires. With an EBV difference of 28kg (46-18), we expect a progeny difference of 14kg (28/2).

The result of 13.5 kg demonstrates that the Shorthorn EBVs are an effective selection tool, accurately predicting differences in progeny performance between sire groups.



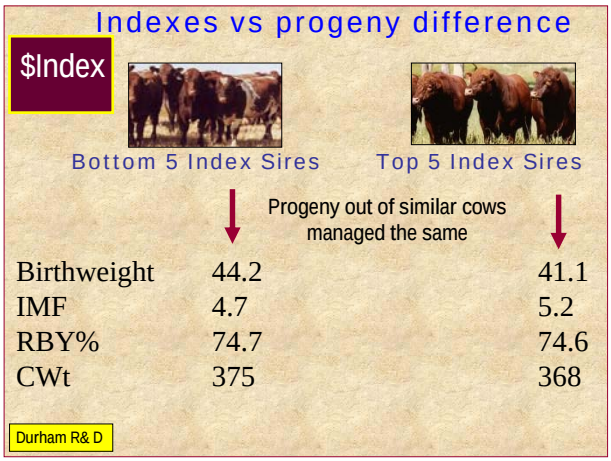
Similar relationships were shown for other traits.

Shorthorn Indexes are soundly based, and predict commercial value

Indexes are designed as a selection tool for commercial breeders, and are market/environment specific. The index applies a weighting to a range of birth, growth, carcase and fertility EBVs, based on relative economic value of those traits to a target production system.

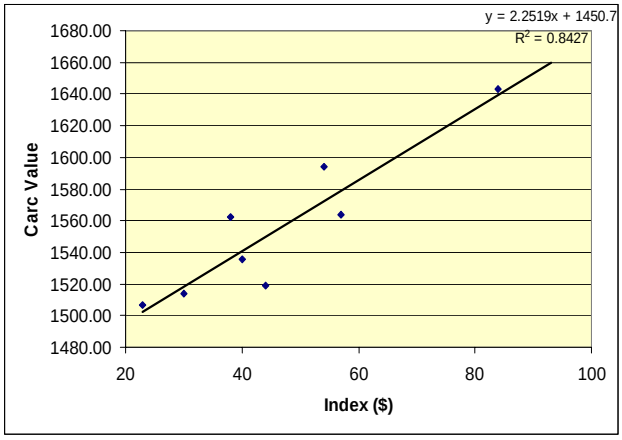
It is important to know that Indexes do as they say they do – that is, apply balanced selection across a number of traits that influence commercial herd profitability. The Durham project clearly demonstrate that this is so.

When comparing top and bottom indexing sires (Shorthorn Maternal Export Index), progeny from the top indexing sires had lower birth-weight, higher IMF%, constant yield and only marginally lower carcase weight when compared to progeny from lower indexing sires. This is a desired outcome for a self-replacing Shorthorn herd producing for the grain-fed export market.



The next illustration shows the relationship between B3 Export Index Value of sires, and difference in carcase value of progeny. As the index value of sires increased, so did the processor-determined carcase value of their progeny (a factor of carcase weight, fatness and marble score).

Av, carcase value – Shorthorn B3 index sire progeny groups



Durahm Project

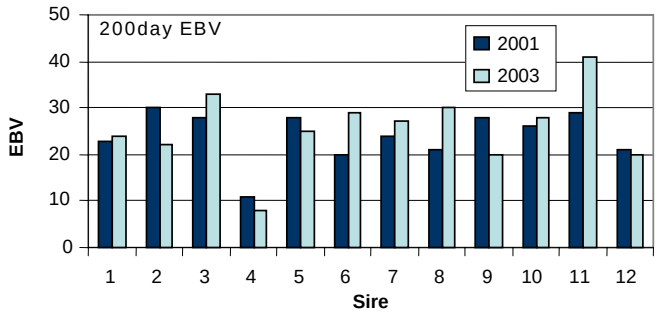
The Durham project clearly demonstrates that Shorthorn indexes are soundly based and are focused on commercial profitability.

EBVs of young sires reflect progeny-proven EBVs

The above demonstration of EBVs and Index Values accurately predicting differences in progeny performance were made from groups of high accuracy sires – can we expect a similar level of prediction from young sires with non-parent EBVs?

As progeny information becomes available, we expect the accuracy of a young sire's EBV to increase, and we know that his EBVs might change as well. If the non-parent EBVs change, is the bull still as good as we first thought?

The following illustration compares the EBVs of 12 Durham sires, before (2001) and after two drops of progeny were recorded (2003).



With two years of progeny data, the non-parent EBVs did change, some upwards and some downwards as we have been told to expect, however the average EBV of the sires did not change, and the bulls maintained their relative ranking – no top bulls become duds, nor did any of the bottom bulls become high-fliers. The good bulls were still the good bulls.

Effect of EBVs and gene markers in explaining phenotypic variation.

The Durham results show that EBVs effectively explain phenotypic variation in progeny for Marbling, Intra-Muscular Fat % (IMF%), Net Feed Intake (NFI) and Daily Feed Intake (DFI), verifying the heritability (genetic influence) of those traits in the Durham population, and the effectiveness of EBVs as a selection tool.

Gene markers for Marbling, NFI and DFI used to date within the same population have not explained any significant amount of phenotypic variation for those traits. The effect of Tenderness markers was not able to be verified using the Durham dataset.

The frequency for Marbling, IMF, NFI, DFI and Tenderness markers evaluated within the Durham population were found to be either extremely high or extremely low. This lack of variation gives little opportunity for making genetic improvement in those traits using currently available markers as a selection tool.

Note: These results may vary from results obtained with other breed and/or environment, carcase end-point and population size combinations.

Conclusion.

The Durham project has provided important genetic information about the Shorthorn breed that would not otherwise been available. This information provides the platform for on-going breed development and genetic improvement.

The project has reinforced the benefits of Shorthorn Breedplan EBVs as a selection tool, and that the breed's Selection Indexes are soundly based. Shorthorn breeders can use these tools with confidence in furthering their breeding goals.

The project has also provided Shorthorn breeders with a large number of high accuracy bulls to facilitate an increased rate of genetic improvement, particularly for carcase traits that will increasingly determine the breed's competitive position in the market place.

The future of Shorthorn cattle will be largely influenced by the uptake and application of this information generated by the Durham project.