AGBU
ANIMAL GENETICS AND BREEDING UNIT
A joint unit of NSW DPI and UNE

Technical Information Note II/1994

The Value of Scanning Yearling Bulls and Heifers

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Scanning young bulls and heifers for Eye Muscle Area (EMA) and Rump and Rip Fat have become an integral part of the performance recording system in many BREEDPLAN herds. However this technology is relatively expensive as accredited scanners have to come onto the property to undertake the task. A question therefore often asked is: "Does it pay?" As part of the recent work on breeding program design at AGBU we have researched this and describe the work here. A lengthy scientific paper on this subject has been published in the Australian Journal of Agricultural Research Vol:45,8.

Population and Breeding Objective

In the Technical Information Note I/1994 the population and the Breeding Objective were described and will be expanded a little here. The assumption was made, that the 10,000 breeding cows that form the breeding unit are distributed across 100 herds with 100 cows each. As no progeny test was incorporated, exchange of genetic material between herds was assumed to be by top bulls only and by AI from the best young bulls. If this is organised it will create sufficient links between the herds. This breeding unit has a technical officer employed who is assisting the breeders in technology transfer and interpretation of results. The cost for this service was included in the fixed costs of the program.

Investigated Recording Schemes

In the basic recording scheme only weights (including birth weight) were recorded. This was compared with two scanning scenarios, scanning of young bulls only and scanning of bulls and heifers. Rib and rump fat and eye muscle area measured by scanning were assumed genetically correlated with the traits in the objective as shown in Table 1.

Table 1: Assumed genetic correlation between traits in the breeding objective and selection criteria for carcase quality

Trait	Dressing %	Saleable Meat %	Fat Depth rump
Rib Fat	0.15	-0.60	0.80
P8 Fat	0.15	-0.60	0.80
EMA	0.20	0.40	0.0

Both fat measurements are negatively correlated with saleable meat percentage and slightly positive with dressing percentage. The 0.80 correlation between the fat records and fat depth in the breeding objective indicates that we don't measure on live yearling animals exactly the same trait as on the steer carcases. The measurement of eye muscle area has a low genetic correlation with dressing percentage and a moderate correlation with saleable meat percentage.

Cost of Recording

The costs of performance recording are shown in Table 2. For the scanning work by accredited scanners we have calculated $11.5 per scanned animal. These costs include the costs of travel for the scanner, but again assume that scanning is coordinated with other necessary handling of the animals.

Table 2: Costs of performance recording per animal

Cost factor	Recording Costs $
Fixed costs*	10.0
Birth weight	3.0
Weaning weight	1.0
400-Day weight	1.5
600-Day weight	1.5
Scanning	11.5

* per cow in breeding unit

Results

Including scanning for fat depth and eye muscle area in a recording scheme will increase the accuracy of selection for the breeding objective (Table 3).

Table 3: Accuracy of selection for the Breeding Objective for young bulls and first calving cows

Recording scheme	Young Bulls	2 year old cows
Standard weights	0.21	0.21
Weight & scanning, bulls only	0.26	0.23
Weight & scanning, both sexes*	0.27	0.27

As the breeding objective is the same as was assumed in the investigation for fertility traits, it was expected that the accuracy of selection of young animals will not be high. Scanning bulls only has increased the accuracy of selecting bulls from 0.21 to 0.26 or by 24% and has also resulted in an increase of the accuracy in their half sib sisters from 0.21 to 0.23. Including scans from heifers will further increase the accuracy for both sexes to 0.27.

The benefits from selection within seedstock herds are transferred to the commercial herds by the sale of bulls. One year of selection causes, after a lag of several years an improvement in the commercial population that lasts for many years. By discounting these gains to a present day value, the benefits or returns can be compared with the cost of performance recording and selection.

The return and the profit from scanning have increased above that for recording weights only as can be seen from Table 4.

Table 4: Cost and returns of performance recording per cow in the total population

Recording scheme	Variable Costs	Returns	Profit*
Weight only	0.28	8.14	6.81
Weight & scanning, bulls only	0.50	9.96	8.40
Weight & scanning, both sexes*	0.72	10.43	8.66

* Profit = Return - Variable Costs - $1.05 (fixed costs)

Returns per cow increased by $1.82 in the population of 200,000 when only bulls are scanned and by an additional $0.47 when heifers are also scanned. While the cost of scanning will double, which might not be totally correct (travel costs stay the same) the increases in returns of $0.47 by including heifers in the scanning program still outweigh the additional costs of $0.22. This example clearly shows the diminishing returns from increasing performance recording, as well as the reduced cost benefit ratio of recording scans compared with recording fertility, 1:4.2 versus 1:43, respectively. The difference between bull and cow scanning is because bulls can be more highly selected and that they are transferring genetic gain into the commercial herd directly, thus reducing the effect discounting has on future returns.

The cost of performance recording seems very low as they have been expressed on a per cow in the population basis. Table 5 presents these values on a per cow in the breeding unit and on a per bull sold to the commercial breeder basis. Expressed in this way the costs appear considerably higher. On a 100 cow herd the estimated fixed costs (Pedigree recording and technical support) are $2,100. The variable performance recording costs are estimated to increase from $ 560 to $1440, if scanning both sexes is included in the recording scheme.

On average each 100 cow herd will sell 11 bulls to the commercial sector. With weight and scanning records included the cost of performance recording in the herd would be $130 per bull sold.

Table 5: Estimated cost of performance recording

	Per Cow in Breeding Unit		Per Commercial Bull	
Recording Scheme	Fixed costs	Variable costs	Fixed costs	Variable costs
Weight only	21.0	5.6	189.4	50.5
Weight, scanning bulls only	21.0	10.0	189.4	90.2
Weight, scanning both sexes	21.0	14.4	189.4	129.9

Similarly to the recording of fertility traits the absolute genetic gains per year that is made in the traits of the breeding objective have changed with the inclusion of scanning in the recording scheme (Table 6).

Table 6: Predicted genetic gain per year for selected traits in the breeding objective

Trait	Unit	Recording Scheme	
		Weight	Weight & Scanning both sexes
Sale weight direct	kg	2.91	2.40
Sale weight maternal	kg	0.04	0.05
Cow weight	kg	2.86	2.45
Dressing percentage	%	-0.01	-0.01
Saleable Meat %	%	0.0	0.15
Fat depth	mm	0.03	-0.09
Cow weaning weight	%	0.07	0.4
Bull fertility	mate	0.20	0.13
Cow survival rate	%	0.01	0.00

Genetic gain in the weight traits is reduced and saleable meat percentage will increase. This increase is mainly caused by a reduction of fat depth, which is negatively correlated to saleable meat percentage. The effect on fertility is negligible.

By combining the annual genetic gains in table 6 with the economic weights for each trait, one can calculate the annual genetic gain in dollars per cow. This is $1.43 if only weights are recorded and increases by $0.35 (bulls only) or $0.46 (bulls and heifers) if scanning is carried out. Recording fertility traits affects annual genetic gain more than scanning because fertility traits have high economic weights. (See TIN 1/94). However, improvements in carcase characteristics are realised earlier than those in female fertility, and are therefore less discounted.

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