

## Is the Durham project generating sufficient progeny to produce an EBV with reasonable accuracy?

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There are two components to this question: the first is how many progeny are there by each sire: but the second is just as important and that is how effective is the information from those progeny (effective progeny number).

### Number of progeny:

The accuracy of the assessment of a particular trait (or accuracy of the EBV) will depend on the heritability of the trait and the number of progeny. If a trait is lowly heritable then it takes more progeny to increase the accuracy as shown in figure 1. But there is a marginal rate of return. For a trait of 40% heritability (similar to carcass IMF), the first ten progeny will result in an accuracy of around 73%, the next ten progeny increase it further but only to 83%. For a trait that is lowly heritable eg. calving ease it takes more progeny to produce an EBV with the same accuracy. In fact as shown in the graph it takes a large number of progeny to get a trait like calving ease up to 90% accuracy.

The interests of breed improvement will be best served by testing more young sires but the interests of the individual sire leans towards more progeny from the individual sire. The compromise of 15 steers and 15 heifers (total 30 calves) that the Durham directorate has decided on is quite sensible when one examines this data. Remember that the scans on the heifers also adds IMF information, so the accuracy on the sires tested through Durham with 15 steer progeny will be higher than the 79% predicted by this graph. Brad Crook showed that already with only 5 progeny slaughtered the accuracy is over 60%; because of scanning and other pedigree information (see Table 1).

Figure 1: The effect of progeny numbers on accuracy of EBVs

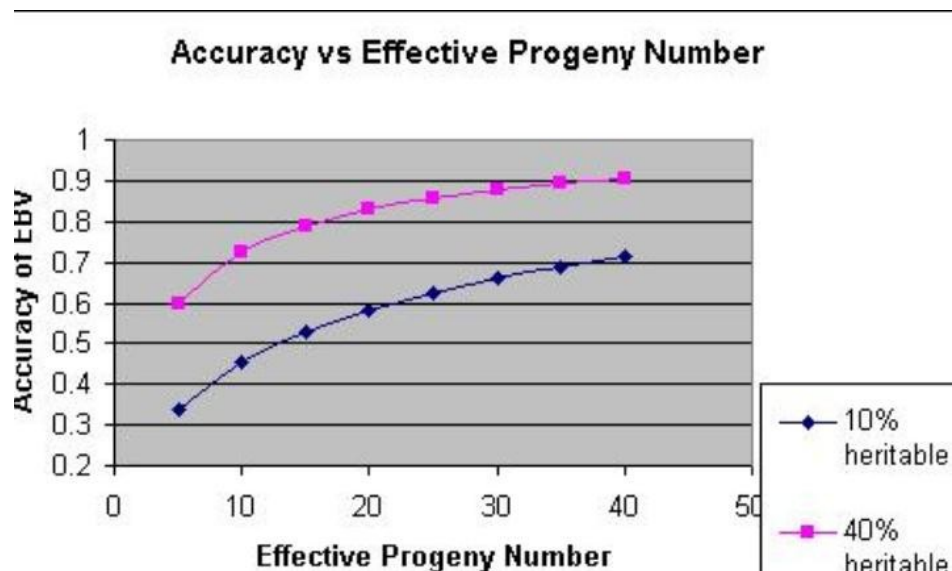


Table 1: Accuracy of IMF EBV for some of the 2000 Durham test sires

Durham Sires Accuracy Jan 2003 Scan/Carcase Progeny

Linsmau Elnino F39 69% 5/7

Narralda Universe T4 68% 4/4

Mining Vale TN Titanic T49 68% 5/5

Sprys Grandslam T58 66% 4/4

NB The accuracies shown in this table include only the scans on the steers and the carcass marble score on the steers plus ancestor pedigree information where available. At the point of calculating these accuracies the heifer scans (sisters of the steers) had not been submitted.

Effective progeny number: Information is effective if the individual is fairly compared to other animals. In the case of progeny testing, the sire progeny need to be compared equally (without bias) to progeny from other sires. If management groups are not well balanced then valuable information can be devalued. Table 2 shows some effective progeny numbers for test sires given a variety of total number of progeny within the management group. There are some important points to be made from these figures.

- If one sire dominates a group then the relative efficiency of information is reduced eg. If a test sire has 10 progeny in a group total of 20, then his effective progeny number is only 5.
- But if there is only a small number of progeny from a particular sire in a group then the relative efficiency is higher eg. 1 progeny per sire in a group total of 20 has effective progeny number of 0.95.
- Effective progeny numbers can be cumulated across groups; eg. If the test sire had 1 progeny in each of 10 groups of 20 then total effective progeny number is 9.5 instead of 5 as it would be if all the progeny were in one group.
- In the extreme where only one sire is used in a group the effectiveness of the information is zero; eg. 1000 progeny from one sire in a group of 1000 steers does not yield any valuable information. There is no way of separating the effect of the sire from the effect of feed and management.

**Table 2; Effective progeny number for test sires given the different management group combinations**

No Progeny by test sire

Total No Progeny in group

Effective Progeny No for Test Sire

1 10 0.9

5 10 2.50

10	20	5.00
15	30	7.50
20	40	10.00
1	20	0.95
5	20	3.75
10	40	7.50
15	60	11.25
20	80	15.00
1	1000	1.00
5	1000	4.98
10	1000	9.90
15	1000	14.78
20	1000	19.60
1000	1000	0.00

One of the strengths of the Durham project is the ability and desire of the management to ensure that within reason the information coming from the project is as 'effective' as possible. For example when a group of steers needed to be split for feeding purposes at the Tullimba feedlot (Net Feed Efficiency Testing) then care was taken to ensure that as many sires as possible were represented in each group. Such is the advantage of the Durham project where maximum dollar return may be sacrificed to maximise value of information. In a commercial operation the first consideration will always be economic return and a management group may be dominated by one superior sire.

Figure 1: The effect of progeny numbers on accuracy Posted By: Mr GRAEME MITCHELL

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