

ACCOUNTING FOR CULLING WHEN EVALUATING FINAL WEIGHT RATIOS .

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The National Beef Recording Scheme procedure involves weight recording calves at about 200 days and again at a later age (365, 420 or 550 days). If say 90 percent of the bull calves are culled on 200-day weight, then the average genetic merit of the 10 percent which survive to a later weighing will be well above what it would have been if all calves weighed at 200 days had been retained. Age adjusted Final Weight Ratios can only be used to compare calves belonging to the same herd-year-season-sex final weight management group (batches) when different levels of culling have been applied to different batches.

In practice, selection decisions using Final Weights have to be made across batches. In addition, a breeder who is culling on weight is unfairly penalised when marketing bulls. Hence, an adjustment for the effects of culling at 200 days would be of benefit.

INDIVIDUAL WEIGHT RATIOS

The following method, which accounts for the effects of culling prior to final weighing, has recently been introduced into NBR:-

$$\text{Adjusted Final Weight Ratio} = \frac{\text{AFW}}{\text{AAFW} - m(\text{AWWDEV})}$$

AFW is the Adjusted Final Weight for the individual calf.

AAFW is the average AFW of all calves in the herd-year-season-sex final weight management group. When there are fewer than 10 calves included in this average, the ratios are not printed out.

AWWDEV is the average deviation of the Adjusted Pre-Weaning Weight of selected calves from their respective herd-year-season-sex pre-weaning weight management group average.

m is the phenotypic regression of Final Weight on 200-day weight. Although the value of m currently being used is 0.82 for all breeds, it is intended to revise this figure when sufficient data is available for individual breeds.

If the poorer animals in a 200-day Weight batch are not recorded at Final Weight, then the above formula will boost the average Adjusted Final Weight Ratio (AFWR) above 100. Conversely, if some of the better calves are removed from a batch (e.g. for special feeding) then the average AFWR of the remaining animals will now be below 100.

FINAL WEIGHT RATIOS FOR SIRE PROGENY GROUPS

The new NBRS sire evaluation procedure simply involves averaging these AFWRs for each sire (Method A). This procedure is a reasonable one providing the effect of culling prior to the final weighing is similar for each sire progeny group (i.e. there is no differential culling).

An alternative method (Method B) was derived for combining 200-day and Final Weight data for sire progeny groups in such a way as to make allowance for any 'differential culling'. However, this method is much more complex (see Appendix 1) than simply taking the average AFWR of all progeny for a sire (i.e. Method A).

A set of 29 A.I. progeny groups from NBRS herds was analysed for Final Weight Ratio using the two methods described above and also using a sophisticated BLUP model (Graser, 1982).

The correlation between the BLUP estimates of the sires and those obtained from Method B was approximately 0.4, while the corresponding figure for Method A was 0.3.

Method B has not been introduced partly because of its much greater complexity and partly because its correlation with BLUP results is not substantially better than Method A. In addition, non-random mating will often invalidate progeny results irrespective of how sophisticated the computing procedure.

REFERENCES

- GRASER, H.-U. (1982). *2nd World Congress on Genetics Applied to Animal Production*. (In Press).

APPENDIX 1

ADJUSTED FINAL WEIGHT RATIOS USING AN ALTERNATIVE PROCEDURE
(METHOD B) TO THAT CURRENTLY USED IN NBR

Let $AFW_i = AAFW_i - m(AWWDEV_i)$

$AWWDEV_i$ is calculated in the same way as $AWWDEV$ in the text except only records of paternal-half-sibs occurring in a given herd-year-season-sex-preweaning management group are included.

$AAFW_i$ is calculated in the same way as $AAFW$ but only records of animals contributing to $AWWDEV_i$ are used.

m is defined as before.

Using this, the Method B Adjusted Final Weight Ratio for the i^{th} sire ($AFWRB_i$) in a given herd-year-season-sex-preweaning weight group - final weight management group (sub-batch) is:

$$AFWRB_i = \frac{AFW_i}{(AFW_1 + AFW_2 + \dots + AFW_{ns})/ns}$$

ns is the number of sires in the sub-batch for which $AFWs$ can be calculated.

When a sire has progeny in a number of sub-batches, an average of his corresponding $AFWRBs$ is calculated. The average is weighted according to the number of progeny in each sub-batch.