REPEATABILITY OF WEANING WEIGHTS AND WEIGHT GAINS IN BEEF CATTLE

G.W. SEIFERT*, D.C. NICOL** and H. HIGGS***

SUMMARY

Repeatabilities of weaning weights from a Belmont Red herd ranged from zero to 0.286 according to the correction factors applied to the data. Repeatability was highest when the data were corrected for sex of calf, year of birth, day of birth and sire. Repeatability of day of birth was 0.309. Correlations between weaning weight and post-weaning gain were very low and ranged from r = -0.085 to r = 0.005.

INTRODUCTION

Culling cows and calves on the basis of the calves' weaning weight is recommended (Daly 1977). The National Beef Recording Scheme (NBRS) provides its members with estimates of the most probable producing ability (MPPA) of cows based on weaning weight adjusted by the number of calves and a repeatability factor of 0.4 (NBRS Recording Manual). By inference beef producers are encouraged to retain those cows that have high MPPA ratios. Experience with producers has been that they are receptive to this approach. Published estimates of repeatabilities for weaning weights for tropical breeds, or from Australian herds generally are not available. Overseas estimates are therefore used.

This paper examines repeatabilities of weaning weight in a small, intensive, well-managed Belmont Red stud herd.

MATERIALS AND METHODS

Data were collected from the "Bangalla" purebred Belmont Red herd from 1977 to 1980. "Bangalla" is situated on the Mary River, 10 km south of Maryborough, Queensland. Mean annual rainfall is 1200 mm with 70% falling during November to April. Mean daily maximum temperatures vary from 29.8°C (January) to 21.2°C (July) with an annual mean of 26.3°C (Anon 1975).

Improved tropical pastures stocked at 2.26 beast per ha provided the major portion of the grazing. During winter 4 ha of irrigated rye grass were grazed for one hour daily to supplement the tropical pastures.

Calves that had a mean day of birth of October 3 ± 37 days were weaned at an average age of 204 days usually in mid-April. Final live weights at 510 days were recorded for 32 bulls. Weaning weights were analysed by least squares (Harvey 1960) to obtain correction factors for years, sex, sire and interactions and linear and quadratic effects for day of birth. The weaning weight data were adjusted for dam age before analyses using the NBRS adjustments because not all dam ages were represented.

Repeatabilities of 117 weaning weights of calves from 61 cows were obtained from intra-class correlations. Estimates of the variance components were obtained from hierarchial analyses of variance by equating the mean squares to the expected mean squares. Correlations between weights and gains of the bulls were obtained by computing covariances and variances within years and pooling these for the overall correlation.

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RESULTS AND DISCUSSION

The average weaning weight for age (WWA) corrected for dam age was $1.01 \pm 0.169$ kg per day of age. The effects of sire, sex, and years were significant ($P < 0.01$) while the first order interactions were not. Both linear ($b_1 = 2.9927 \times 10^3$ WWA/day of birth, $P < 0.01$) and quadratic ($b_2 = -1.318 \times 10^{-5}$ WWA/(day of birth)$^2$, $P < 0.05$) day of birth effects were significant. The repeatabilities of weaning weight following various adjustments are given in Table 1. The repeatabilities of weaning weight and WWA, uncorrected for known fixed effects or corrected for only sex, year or dam age were very low. Corrections for sex, year, and dam age simultaneously improved repeatability, but the inclusion of day of birth adjustments lowered the repeatability.

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<tr>
<th>Trait</th>
<th>Repeatability</th>
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<tbody>
<tr>
<td>Raw weaning weight</td>
<td>0.072</td>
<td>0.1372</td>
</tr>
<tr>
<td>Weaning weight for age (WWA)</td>
<td>0.000</td>
<td>0.1388</td>
</tr>
<tr>
<td>WWA corrected for sex</td>
<td>0.031</td>
<td>0.1382</td>
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<tr>
<td>WWA corrected for year</td>
<td>0.161</td>
<td>0.1335</td>
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<tr>
<td>WWA corrected for dam age and year</td>
<td>0.285</td>
<td>0.1250</td>
</tr>
<tr>
<td>WWA corrected for sex, year, day of birth</td>
<td>0.161</td>
<td>0.1335</td>
</tr>
<tr>
<td>WWA corrected for sex, year, (day of birth)$^2$</td>
<td>0.181</td>
<td>0.1324</td>
</tr>
<tr>
<td>WWA corrected for sex, year, day of birth and sire</td>
<td>0.286</td>
<td>0.1249</td>
</tr>
<tr>
<td>Birth day</td>
<td>0.309</td>
<td>0.1228</td>
</tr>
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</table>

The repeatability of day of birth of 0.309 was higher than the repeatability of weaning weight. The significant repeatability of day of birth indicates that cows tend to maintain their order of calving within the calving season. The significant effect of day of birth on weaning weight, its relatively high repeatability and the lowering of the repeatability estimate of weaning weight when the data are corrected for day of birth, indicates that the repeatability of weaning weight unadjusted for significant day of birth effects is in part due to the repeatability of day of birth. Cows culled on the weaning weight of their calves may therefore in part be culled for day of birth effects.

In the bulls, weaning weight for age was very poorly correlated with post-weaning gain irrespective of the type of correction. Correlations ranged from $r = -0.085$ for raw weaning weight to $r = 0.005$ for WWA corrected for dam age. As would be expected, weaning weight was highly correlated with final weight ($r = 0.881, P < 0.01$) and also WWA with final weight for age ($r = 0.697, P < 0.01$). These correlations were very similar to those reported by Seifert (1975).

These limited data indicate that repeatabilities for tropical cattle may be lower than those reported for temperate breeds, but more estimates are required. Therefore the use of weaning weight as a criteria for culling cows may not be very reliable and culling on other production criteria may be more worthwhile. The variability of estimates from the same data also point to the need for adjustments for known environmental effects if cows are to be culled on the weaning weight of their calves.

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REFERENCES


