Genetic correlations between performance of individually fed and feedlot fed bulls

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The performance of Bonsmara bulls tested in Phase C of the South African Performance Testing Scheme (intensive test in which individual feed intakes are measured) was compared with the performance of the half-sib bulls tested in Phase D (comparable to commercial feedlot conditions). Birth weight and yearling weight did not differ significantly between bulls tested in the two phases. Although bulls entering Phase C were selected for weaning weight, the ADG (average daily gain) and Kleiber ratios (ADG/yearling weight) of bulls in Phase D were significantly higher than those of bulls in Phase C. Preweaning performance should thus not be used to predict postweaning performance. As the genetic correlations between half-sibs in Phases C and D for yearling weight (1.104 ± 0.141), ADG (1.008 ± 0.005) and the Kleiber ratio (0.777 ± 0.179) were close to unity, it is concluded that the progeny of bulls performing well in Phase C will perform well under intensive feedlot conditions.

Die prestasies van Bonsmarabulle wat in Fase C (intensiewe toets waar individuele voerinnames gemet word) en Fase D (verge-lykaar met kommersiële voerkrake) van die Suid-Afrikaanse

Prestasietoetsskema getoeis is, is met mekaar vergelyk. Geboorte-
massa en jaarmassa het nie betekenisvol verskil tussen bule wat in die twee fases getoeis is nie. Hoewel bule vir Fase C gesele-
teer is vir speenmassa, was die GDT (gemiddelde daa.glikse
toename) en die Kleiberverhoudings (GDT/jaarmassa van bule in Fase D betekenisvol hoër as die van bule in Fase C. Voorspense prestasie behoort dus nie gebruik te word om naspeense prestasie te voorspel nie. Aangesien die genetiese
korrelasies tussen halfsibbe in Fases C en D vir jaarmassa (1.104 ± 0.141), GDT (1.008 ± 0.005) en die Kleiberverhouding (0.777 ± 0.179) naby een was, kan afgelei word dat die nageslag van bule wat goed presteer in Fase C, goed sal presteer in intensiewe voerkrake.

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tested in Phases C and D. However, the Phase C tested bulls had a significantly higher weaning weight (linear age-corrected to 205 days) than the Phase D tested bulls owing to selection of Phase C bulls on the basis of weaning weight. Yearling weight (linear age-corrected to 365 days) did not differ between the two sets of bulls.

There were significant differences in average daily gain (ADG) between 205 and 365 days and the Kleiber ratio (ADG/yearling mass$^{0.75}$) between bulls tested in Phases C and D, with Phase D tested bulls having a higher performance than Phase C tested bulls. This may indicate that preweaning performance should not be used to predict postweaning performance. It has been shown that the Kleiber ratio is a good estimator of efficiency of feed utilization (Roux & Scholtz, 1984; Scholtz & Roux, 1988; Bergh, 1990).

Genetic correlations had to be estimated between the same measurement in different bulls and not as usual between different measurements in the same animal. The genetic correlations between yearling weight, ADG and the Kleiber ratio of bulls tested in Phase C and their half-brothers tested in Phase D were estimated by unweighted means according to the method of Robertson (1959), as the variances for the traits between the two sets of bulls did not differ. The estimated genetic correlations are listed in Table 2. Although the numbers involved are small, the balanced nature of the final dataset was such that fairly small approximate standard errors were obtained, which indicate that the estimated genetic correlations are reasonably accurate. Pearson (ordinary) correlations were also calculated between the sire means for heifers and bulls.

The genetic correlations between Phases C and D bulls between yearling weight and ADG, respectively, are close to unity and the genetic correlation for the Kleiber ratio does not appear to deviate significantly from unity (Table 2), which indicate that the same genes probably influence performance in the two test Phases (Falconer, 1981). Performance in either Phase C or intensive feedlot conditions can thus be directly compared. Bulls that perform well in Phase C will therefore breed progeny that perform well under intensive feedlot conditions.

### Table 1 Least-square mean (± SD) and F values for half-sib bulls tested in Phases C and D of the Performance Testing Scheme

<table>
<thead>
<tr>
<th>Trait</th>
<th>Phase C bulls</th>
<th>Phase D bulls</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight</td>
<td>40.6 ± 6.3</td>
<td>38.7 ± 6.0</td>
<td>2.49</td>
</tr>
<tr>
<td>Weaning weight</td>
<td>250.0 ± 24.7</td>
<td>237.8 ± 26.2</td>
<td>9.65**</td>
</tr>
<tr>
<td>Yearling weight</td>
<td>400.5 ± 63.8</td>
<td>404.5 ± 68.8</td>
<td>0.01</td>
</tr>
<tr>
<td>ADG</td>
<td>0.941 ± 0.304</td>
<td>1.117 ± 0.311</td>
<td>11.51**</td>
</tr>
<tr>
<td>Kleiber ratio*$^*$</td>
<td>10.28 ± 2.40</td>
<td>11.3 ± 2.8</td>
<td>16.3**</td>
</tr>
</tbody>
</table>

** P < 0.01.

*$^*$ Kleiber ratio = (ADG/yearling weight$^{0.75}$).

### Table 2 Genetic correlations (± SE) between production traits of half-sib bulls in Phase C and the intensive Phase D of the National Performance Testing Scheme

<table>
<thead>
<tr>
<th>Trait</th>
<th>r$_P$</th>
<th>Pearson r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearling weight</td>
<td>1.104 ± 0.141</td>
<td>0.880*</td>
</tr>
<tr>
<td>ADG</td>
<td>1.008 ± 0.005</td>
<td>0.741</td>
</tr>
<tr>
<td>Kleiber ratio</td>
<td>0.777 ± 0.179</td>
<td>0.519</td>
</tr>
</tbody>
</table>

* P < 0.05.

### References


