RELATIONSHIPS BETWEEN BODY WEIGHT, CONDITION SCORE AND HEART GIRTH CHANGES IN BORAN CATTLE

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SUMMARY

Body weight, heart girth and condition score were monitored in 75 Boran cows over an eight-month period. Condition score was highly correlated with both weight and heart girth when these variables were measured at the end of the dry season. Over the whole period the correlation coefficient between weight and condition score was \( r = 0.76 \) and the relationship was linear. When the data were broken down by lactation status the correlation between condition score and weight of lactating cows was lower but was improved by adjusting for differences in cow weight. Heart girth and condition score over the whole period were linearly related as was heart girth and weight. A change of one point in a nine-score system was equivalent to a change of about 24 kg.

INTRODUCTION

The use of a condition score as a subjective and rapid assessment of levels of body reserves has been widely used in cattle and a number of scoring systems have been advocated (van Niekerk and Louw, 1982; Buxton, 1982; Lowman, Scott and Somerville, 1976; Nicholson and Butterworth, 1985; Pullan, 1978; Wellington, 1981). The condition of breeding cattle has been shown to have a marked influence both on success at mating (van Niekerk, 1982a and 1982b; Harwin, Lamb and Bisschop, 1967; Reed, Doxey, Forbes, Finlay, Geefing, Smith and Wright, 1974; Steenkamp, van der Horst and Andrew, 1975) and on subsequent milk yield (Frood and Croxton, 1978). Nicholson and Sayers (1987) described how condition scoring can be used sequentially to monitor changes as a result of differences in treatment, season or physiological status.

While several authors have demonstrated the relationship between weight, heart girth and condition score few attempts have been made to quantify condition score change in terms of gain or loss in body weight. Dunn, Riley, Murdock and Field (1983) and Nelson, Short, Reynolds and Urick (1985) reported correlation coefficients of 0.59 and 0.62 respectively between weight and condition score and 0.59 and 0.60 respectively between heart girth and condition score. Thompson, Theuninck, Meiske, Goodrich, Rust, and Byers (1983) recorded correlations of 0.65 to 0.75 for weight with condition and 0.51 to 0.79 for heart girth with condition.

All these workers measured the variables at one time. Buxton (1982) reported that a change of one condition score using an eight-point system was equivalent to approximately 30 kg. This was using \( Bos taurus \) cows and no indication of liveweight was given. The purpose of this paper is to demonstrate the relationship between changes of the three variables over time. Where the variation in liveweight at any one condition score is high the correlation between weight and condition score is unlikely to be high. An animal with a small frame may be in excellent condition with a low body weight while a large animal may be in very
poor condition. Such a situation is common in Africa where absence of selection results in a large variation in adult body size.

Since condition scoring is a subjective technique the method must be scrutinised for reliability and reproducibility and reference should be made to Nicholson and Sayers (1987) for reliability and reproducibility tests.

MATERIALS AND METHODS

At the start of the trial 100 cows were weighed, scored for condition and their heart girth was measured with the animals in the correct posture with forelegs together and head up in order to establish the relationship between the variables prior to examining the changes over time. A further 50 lactating and 25 dry Boran cows (Bos indicus) were weighed monthly over an eight-month period. At the same time their heart girth was measured and a condition score assigned after visual assessment using the nine-point scale of Nicholson and Butterworth (1985) which takes into account the larger variation in body condition found in African cattle. The eight-month period covered from the end of the rainy season through the major part of the dry season (September 1984 to April 1985).

Condition scores were correlated with weight, metabolic weight ($W^{0.75}$), heart girth and heart girth squared on two occasions during the eight-month period to coincide with the highest (October) and lowest (March) weights and condition scores. The changes in condition scores between these two extremes were then correlated with absolute and percentage changes in the other variables. All variables were then included in a stepwise multiple regression analysis. Adjustment was made for differences in body size by calculating the deviations in weight and heart girth from the means for animals assigned the median condition score (5) on the nine-point scale (1 to 9). These differences in weight and heart girth were then correlated with condition score for all animals, for lactating and dry cows separately and by weight class.

RESULTS

Correlation coefficients between condition scores and other variables on the two occasions are shown in Table I. All coefficients were highly significant ($P < 0.001$) and did not increase when $W^{0.75}$ or heart girth squared ($HG^2$) were used. Date 1 is in the early dry season when cows were in optimum condition while date 2 is in the late dry season when condition scores were at their lowest. On both occasions the equations given by the stepwise multiple regression of condition on weight, $W^{0.75}$, heart girth, $HG^2$ and lactation status included only weight and lactation status as significant variables. Heart girth, $HG^2$ and $W^{0.75}$ did not account for significant further variation.

<table>
<thead>
<tr>
<th></th>
<th>Weight</th>
<th>$W^{0.75}$</th>
<th>Heart girth</th>
<th>$HG^2$</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition score (date 1)</td>
<td>0.56</td>
<td>0.56</td>
<td>0.51</td>
<td>0.51</td>
<td>73</td>
</tr>
<tr>
<td>Condition score (date 2)</td>
<td>0.86</td>
<td>0.86</td>
<td>0.78</td>
<td>0.78</td>
<td>74</td>
</tr>
</tbody>
</table>

TABLE I

Correlation coefficients