A NEW TECHNIQUE FOR MEASURING TEMPERAMENT IN CATTLE

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SUMMARY

Following an observation that docile animals vacate a weigh scale at a slower rate than others, the temperaments of 6 month and 18 month bulls and heifers of two genotypes were assessed by electronically recording the time taken for animals to cover a predetermined distance after vacating a confined area. This measurement is known as a Flight Speed. In general, there were no differences between Africander-cross and Africander-cross x Brahman-cross genotypes at either of the two ages, though there were large differences between sire progeny means within each of the genotypes, particularly at the younger age. The sex effect was not significant at weaning, but became more significant (P < 0.01) at 18 months of age with bulls being more temperamental than females. Heritability of Flight Speed varied with age, being high (0.54) at weaning to moderate (0.26) at 18 months when sexes were combined. There were no sex differences in heritability at weaning, but at the later age heritability was 0.44 in males and 0.21 in females.

As part of an artificial insemination program the temperaments of 110 non-lactating cows and heifers were assessed to determine whether temperament had an effect on resultant conception rates. Docile animals recorded significantly more (P < 0.05) oestrus detections, but did not differ from less docile animals on associated reproductive traits. It was concluded that docile animals were more tolerant of an observer than their more temperamental contemporaries.

Keywords: temperament, beef cattle, heritability, artificial insemination

INTRODUCTION

Despite the fact that cattle producers have long regarded the behaviour of cattle as an important trait (Elder et al. 1980a, 1980b; Hassall 1974), little scientific research has been conducted on temperament in cattle. This is largely due to the lack of simple, meaningful measurements of temperament. Recognizing that cattle handling problems may result from temperamental behaviour in different situations such as in a paddock and a crush, Forderly et al. (1982) developed a series of temperament tests. Two of these tests, the Crush' test, and the Flight Distance test were repeatable and accurately identified 'trouble-makers' in crush and paddock situations respectively. However, the Flight Distance test was difficult and time-consuming to implement, could not be incorporated easily into routine management procedures and would not be acceptable to cattlemen because of the risk of damage to yards and injury to both cattle and the observer.

Following an observation that some animals remain calm while being weighed, it was noted that others vacate a weigh scale much more rapidly than their more docile contemporaries. Subsequently a simple electronic system, known as a Flight Speed test, was devised to measure the time taken for an animal to cover a

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set distance after leaving a confined area. The system incorporates two light beams focussed on infra-red reflectors with a trigger on/off mechanism as the light beams are broken. The time for an animal to cover the distance of one crush-length after leaving a weigh scale is recorded in tenths of a second. Initially this distance was around two metres, but recently a standardized distance of 1.7 metres has been adopted. This distance was selected on the basis of practicality, being slightly less than a normal crush length.

This paper compares Flight Speed scores with Fordyce et al.'s Flight Distance test and examines the effects of sex, genotype, sire and age on Flight Speed. Flight Speed scores were also used to determine whether temperament had an effect on the success rate of an artificial insemination (AI) program as is often claimed by experienced inseminators.

MATERIALS AND METHODS

Animals

For the initial testing of the Flight Speed system, male and female calves of two genotypes from the 1985, 1986 and 1987 calf drops at the National Cattle Breeding Station 'Belmont' were used. The genotypes were an Africander x Hereford-Shorthorn cross (AX) and a reciprocal cross between the AX and an analogous Brahman-cross line (AXBX). All cattle were subject to normal station management practices with no experimental pre- or post-weaning treatments superimposed. However, the cattle were handled more regularly than most commercial cattle.

The subsequent use of Flight Speed scores to determine the effects of temperament on the outcome of an AI program was undertaken on a commercial cattle property 38 km north-east of Rockhampton using infrequently-handled Belmont Red and Belmont Red x Brahman cross non-lactating cows and heifers.

Data collection and analysis

At 'Belmont' the following data were collected:

(i) 1985 Bulls and heifers Flight Speed and Flight Distance measurements were taken on 292 animals at 18 months of age.

(ii) 1986 Bulls and heifers Flight Speed measurements were taken on 267 animals, at weaning (approximately 6 months of age) and at 18 months of age.

(iii) 1987 Bulls and heifers Flight Speed measurements were taken on 294 animals at weaning.

The Belmont Flight Speed data were analysed by least squares methods to account for sex, genotype; sire within genotype and first order interactions. Years were also incorporated into the model for Flight Speed at weaning (1986 and 1987 drops) and 18 months (1985 and 1986 drops). Estimates of the heritability were obtained for each sex by partitioning variation in Flight Speed scores into that due to sire, animal and age in a completely random hierarchical model. Flight Distance scores were analysed in conjunction with Flight Speed scores in the 1985 drop animals to obtain correlations between the two temperament measures.
On the commercial property, Flight Speed measurements were taken prior to commencement of an oestrus synchronization program and again 4 weeks later after insemination had taken place. During the 4 week interval between Flight Speed scores, the cattle were handled intensively both in the paddock and in the yards.

Flight Speed measurements were fitted as a covariate in a least-squares model using data obtained from the commercial property. Factors analysed included ovarian activity, uterine tone, size of reproductive tract and cervical deformities which were all determined by rectal palpation. Other factors were visual detection of oestrus by an observer, site of insemination, presence of mucous and conception rate.

RESULTS AND DISCUSSION

A comparison of Flight Speed and Flight Distance scores using data from 292 animals resulted in a correlation coefficient of \(-0.45\) \((P < 0.001)\) indicating the fastest animals in terms of Flight Speed were also the least approachable in terms of Flight Distance. Subjective reports from stockmen indicate both tests accurately identify problem animals in the paddock situation with the Flight Speed test having the added advantage of being able to distinguish good and excellent temperaments in cattle;

Table 1: Effect of sex and genotype on Flight Speed at weaning and 18 months

<table>
<thead>
<tr>
<th></th>
<th>Weaning Number of animals</th>
<th>Flight Speed (seconds)</th>
<th>18 months Number of animals</th>
<th>Flight Speed (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>292</td>
<td>1.14</td>
<td>Male</td>
<td>285</td>
</tr>
<tr>
<td>Female</td>
<td>269</td>
<td>1.20</td>
<td>Female</td>
<td>273</td>
</tr>
<tr>
<td>Genotype</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AX</td>
<td>208</td>
<td>1.13</td>
<td>AX</td>
<td>196</td>
</tr>
<tr>
<td>AXBX</td>
<td>353</td>
<td>1.19</td>
<td>AXBX</td>
<td>362</td>
</tr>
</tbody>
</table>

The sex effect on Flight Speed was not significant at weaning, but reached significance \((P < 0.01)\) at 18 months of age (Table 1). As the males were handled more intensively than the females, this suggests a physiological basis of temperament associated with maturity. There were significant differences between years, probably reflecting the use of slightly different distances for Flight Speed measurements at the beginning of the study. An observed year x sex interaction at 18 months \((P < 0.05)\) reflects more intensive handling of the 1986 bulls since these animals were subjected to extra asters for other measurements.

The effect of genotype (Table 1) was not significant at either age, though there was a significant \((P < 0.01)\) year x genotype interaction at weaning, with the 1987 AXBX calves being more temperamental than the AX calves, while the reverse situation occurred in the 1986 drop calves. No explanation is apparent for this effect. Sire differences were significant for both genotypes, over both years for Flight Speed at weaning, but were significant for Flight Speed at 18 months only in the 1985 AXBX and 1986 AX genotypes, suggesting heritability of Flight Speed could differ between the two ages.
Heritability estimates of Flight Speed differed across ages (Table 2), being high at weaning but moderate at 18 months. Some of the differences may reflect modification of temperament through handling, but the sex effect may also be real since heritability estimates for Flight Speed at 18 months remained high in males but decreased to moderate in females despite the extra handling received by the males.

Table 2 Estimates of heritability of Flight Speed at weaning and 18 months

<table>
<thead>
<tr>
<th></th>
<th>Weaning</th>
<th></th>
<th>18 months</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of sires</td>
<td>$h^2 \pm se$</td>
<td>No. of sires</td>
<td>$h^2 \pm se$</td>
</tr>
<tr>
<td>Males</td>
<td>42</td>
<td>0.48 ± 0.21</td>
<td>38</td>
<td>0.44 ± 0.21</td>
</tr>
<tr>
<td>Females</td>
<td>42</td>
<td>0.58 ± 0.23</td>
<td>38</td>
<td>0.21 ± 0.18</td>
</tr>
<tr>
<td>All</td>
<td>42</td>
<td>0.54 ± 0.16</td>
<td>38</td>
<td>0.26 ± 0.13</td>
</tr>
</tbody>
</table>

Analyses of data collected as part of the AI program indicated that docile animals demonstrated oestrus in the presence of an observer more often than did their more temperamental contemporaries ($P < 0.05$) but did not differ on any of the other associated reproductive traits. As an increase in number of oestrus detections did not result in an increase in conception rate, it is suggested that docile animals were more prepared to tolerate an observer in their midst rather than the alternative interpretation that these animals actually cycled more often than less docile animals. Temperament would therefore become an important consideration for cattle producers embarking on an AI program without the use of teaser bulls or heat-mount paint as an aid to oestrus detection.

These results indicate that Flight Speed scores are an effective method for measuring temperament in cattle and will be useful in future assessments of the effect of temperament on a range of productive traits.

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REFERENCES


