New Zealand Society of Animal Production online archive

This paper is from the New Zealand Society for Animal Production online archive. NZSAP holds a regular annual conference in June or July each year for the presentation of technical and applied topics in animal production. NZSAP plays an important role as a forum fostering research in all areas of animal production including production systems, nutrition, meat science, animal welfare, wool science, animal breeding and genetics.

An invitation is extended to all those involved in the field of animal production to apply for membership of the New Zealand Society of Animal Production at our website www.nzsap.org.nz

The New Zealand Society of Animal Production in publishing the conference proceedings is engaged in disseminating information, not rendering professional advice or services. The views expressed herein do not necessarily represent the views of the New Zealand Society of Animal Production and the New Zealand Society of Animal Production expressly disclaims any form of liability with respect to anything done or omitted to be done in reliance upon the contents of these proceedings.

This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.

You are free to:

- **Share**— copy and redistribute the material in any medium or format

Under the following terms:

- **Attribution** — You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

- **NonCommercial** — You may not use the material for commercial purposes.

- **NoDerivatives** — If you remix, transform, or build upon the material, you may not distribute the modified material.

http://creativecommons.org/licenses/nc ND/4.0/
Differences in grazing and milking behaviour in high and low breeding index cows

C. W. ARAVE\textsuperscript{1} and R. KILGOUR
Ruakura Animal Research Station, Hamilton

ABSTRACT
Daytime grazing activity of 16 high (BI = 123) and 16 low breeding index (BI = 105) cows was observed during 3, 7-day periods in early, mid and late lactation. There were no differences in grazing, lying or standing times between high and low BI cows during early or mid lactation. High BI cows grazed longer during late lactation. There were no differences in daytime drinking frequency.

Individual cow milking times were recorded during 5, 2-day (4 milkings) periods at bimonthly intervals. High BI cows consistently outproduced low BI cows throughout lactation by 3 kg of milk/d. High BI cows had shorter milking times in early lactation but these differences diminished as lactation progressed. No relationships between milking entrance order or milking temperament and breeding index were found.

INTRODUCTION
The breeding index (BI) of a cow is a measure of her breeding value based on the average breeding indices of her sire and dam plus information derived from her own milk production (Rumball, 1975). Preliminary results from high and low BI Jerseys in the same herd indicate that the higher yields recorded with high BI cows are associated with higher body weights, greater feed intake and greater feed efficiency (Bryant, 1981).

Phillips (1978a) reported a reduction in the production response associated with premilking stimulus which he attributed to selection for high production achieved by selection over the last 20 years. In 1958, production increases of up to 30\% could be gained by premilking stimulation whereas present-day cows do not exhibit production responses to stimulation. It is possible that the progeny testing sire selection programme operated by the N.Z. Dairy Board has selected sires whose daughters have more favourable milk flow characteristics.

The objectives of this study were to determine if selection based on BI had concurrently produced differences in grazing activity and milking behaviour.

METHODS
During 3, 7-day periods 16 Jersey cows of low BI (105) and 16 of high BI (123) were observed at pasture between the morning and evening milkings. All cows drinking at the water troughs were noted and at 10-minute intervals all cows were recorded as grazing, standing or lying down.

\textsuperscript{1} Present address: Animal, Dairy and Veterinary Sciences Department, Utah State University, Logan, Utah, USA 84322.

The two groups were balanced for age and, as nearly as possible, for calving date and condition score at calving. Thirty-two cows made up the observed herd at any given time.

Milking characteristics and behaviour were observed during 5, 2-day periods at bimonthly intervals. After entry to the rotary platform each cow's udder was washed. Individual cow milking time was calculated as the time between the attachment of the last teat cup and its automatic removal activated by milk flow. Entrance order was recorded at each milking and a temperament score for each cow was calculated by adding the number of kicks multiplied by 2 and the number of leg lifts.

The cows were normally milked starting at 0730 and 1530. Yields were recorded at each milking and pooled milk samples were analysed for milkfat every 3 and 4 days. The cows were weighed weekly.

The model used in the least squares analysis of grazing behaviour considered effects of BI group, grazing period (linear and quadratic), cows in group and group x period interaction. Dependent variables were grazing, lying, and standing percentages, number of drinks, body weight, milk yield, and fat percentage. The model for analysis of milking behaviour included BI group, milking (a.m. or p.m.) and cows within a group, with lactation length as a linear or quadratic covariate. Repeatability estimates for entry order and temperament score were based on a ratio of variance among cows and total variance.

RESULTS AND DISCUSSION
The percentage of total time spent grazing, standing and lying between a.m. and p.m. milkings in the high and low BI cows is compared in Table 1. There were no differences in grazing times except during the late lactation period when the high BI cows grazed...
TABLE 1 Grazing Behaviour and daily production of high and low breeding index cows (least squares means) during the 1980/1 season.

<table>
<thead>
<tr>
<th>Period</th>
<th>BI</th>
<th>grazing</th>
<th>standing</th>
<th>lying</th>
<th>No. daily drinks</th>
<th>Milk (kg)</th>
<th>Milkfat (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-10/10</td>
<td>50.9</td>
<td>20.7</td>
<td>27.8</td>
<td>14.9</td>
<td>18.0**</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>53.3</td>
<td>16.7</td>
<td>31.0</td>
<td>13.3</td>
<td>15.0</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>66.6</td>
<td>15.9</td>
<td>18.2</td>
<td>9.4</td>
<td>15.2**</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>10-18/12</td>
<td>64.9</td>
<td>16.1</td>
<td>18.8</td>
<td>9.6</td>
<td>12.2</td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>77.1</td>
<td>20.4</td>
<td>2.3</td>
<td>17.4</td>
<td>8.1**</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>73.4</td>
<td>21.9</td>
<td>4.8</td>
<td>18.8</td>
<td>5.2</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>16-24/3</td>
<td>64.9</td>
<td>19.0</td>
<td>16.1</td>
<td>13.9</td>
<td>13.8**</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>63.9</td>
<td>18.2</td>
<td>18.2</td>
<td>13.9</td>
<td>10.8</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

longest \((P<0.05)\). The percentages of time spent standing and lying down at any lactation stage were not significantly different between the 2 groups although there were changes in these parameters during the season. Grazing time increased and lying time decreased \((P<0.01)\). Hancock (1953) noted that with reduced quantities of available pasture, the grazing time of cows was longer, regardless of forage quality. In this study pasture was more sparse in late summer.

Although indoor feeding trials with the same cows showed that the high BI group consumed more food, this difference in intake was not reflected in any total grazing time differences between a.m. and p.m. milkings during early or mid lactation.

The number of drinks did not differ between BI groups but did so between the 3 observation periods. Fewest drinks were recorded between a.m. and p.m. milkings in the mid lactation period during the warmest daily mean temperatures, but the opportunity to drink was present at other times.

High BI cows outproduced low BI cows throughout the lactation by 3 kg of milk/d reflecting the BI index of each of the 2 groups. There were no differences between BI groups or among periods in milkfat percentages.

The high BI cows were heavier \((P<0.05)\), averaging 28 kg more than low BI cows. Over the season body weight followed a quadratic trend, \((P<0.01)\), i.e., least squares means being 360, 369 and 355 kg for periods 1, 2 and 3 respectively. High BI cows did not lose more body weight than low BI cows in late lactation.

Average milking time (Table 2) was shorter for high than low BI cows \((P<0.05)\) and the differences between the 2 groups became smaller as lactation progressed. During late lactation the milk letdown time was rather variable with several cows delaying letdown. Routine stimulation given to cows at this stage may have been insufficient to elicit rapid letdown (Phillips, 1978b; Sagi et al., 1980).

The entrance order for the complete herd was consistent \((\text{repeatability} = 0.40)\). Contrary to some previous reports (Cicogna, 1976; Gadbury, 1975; Rathore, 1978; Soffie et al., 1976) entrance order was not related to milk production in this study. There was no tendency for high or low BI cows to be found to be early or late in the shed entrance order. The temperament score repeatability was 0.41. Temperament and milking time were positively correlated indicating that cows which tend to kick or lift their legs take longer to milk. Docility has been linked with higher production in other studies (Gupta and Mishra, 1978; Kudryzhev, 1962) but did not appear to be a factor contributing to the production differences between the BI groups in this study.

It was postulated that if grazing time differences between high and low BI cows did not show themselves during the daylight between-milking period they would not be likely to be shown at night. Only in the late lactation when pasture was less readily available did the high BI cows graze significantly longer. The frequency of trough drinking was similar for both groups: It is possible that high BI cows graze and drink more in equivalent time periods, which the indoor trials would suggest,

TABLE 2 Average milking times (minutes) for high and low breeding index cows.

<table>
<thead>
<tr>
<th>Date</th>
<th>a.m.</th>
<th>p.m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.10.80</td>
<td>6.7</td>
<td>4.9</td>
</tr>
<tr>
<td>11.12.80</td>
<td>7.0</td>
<td>5.2</td>
</tr>
<tr>
<td>20.1.81</td>
<td>5.3</td>
<td>4.3</td>
</tr>
<tr>
<td>17.2.81</td>
<td>5.6</td>
<td>4.1</td>
</tr>
<tr>
<td>20.3.81</td>
<td>4.8</td>
<td>4.1</td>
</tr>
<tr>
<td>Mean</td>
<td>5.9</td>
<td>4.5</td>
</tr>
</tbody>
</table>

but a more sophisticated study would be required to
determine this.

ACKNOWLEDGEMENTS

The assistance of the staff at No. 3 and No. 5 Dairies,
the help of Dr H. Henderson Ruakura, and the
Biometrics Department, Utah State University, are
gratefully acknowledged.

REFERENCES

Cicogna, M., 1976. Rivista di Zootecnica e Veterinaria, 5:
377.
Congr. Section E: 130.

Kudryzvizev, A. A., 1962. 16th Int. Dairy Congr. Section
D: 565
Aglink No. FPP 168. N.Z. Ministry of Agriculture and
Fisheries.
Washington, DC. p. 34.
Zootechnics. Spain, E-1-3: 53.
Rumball, W., 1975. The calculation of sire breeding
indexes. N.Z. Dairy Board Consulting Officers' Conf.,
New Plymouth (December).
63: 1957.