Differences in grazing and milking behaviour in high and low breeding index cows

C. W. ARAVE[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.

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

1) Present address: Animal, Dairy and Veterinary Sciences Department,
Utah State University, Logan, Utah, USA 84322.

TABLE 1 Grazing Behaviour and daily production of high and low breeding index cows (least squares means) during the 1980/1 season.

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

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 (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; Kudryzvizev, 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.

Date	a.m.		p.m.	
	High BI	Low BI	High BI	Low BI
30.10.80	6.7	8.0	4.9	6.1
11.12.80	7.0	8.0	5.2	5.9
20.1.81	5.3	7.0	4.3	4.7
17.2.81	5.6	5.9	4.1	4.3
20.3.81	4.8	4.7	4.1	4.2
Mean	5.9	6.7	4.5	5.1

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

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REFERENCES

Bryant, A. M., 1981. *Proc. Ruakura Fmrs' Conf.*, p. 145.

Cicogna, M., 1976. *Rivista di Zootecnic e Veterinaria, 5:* 377.

Gadbury, J. C., 1975. *Appl. Anim. Ethol., 1:* 275.

Gupta, S. C.; Mishra, R. R., 1978. In *20th Int. Dairy Congr.* Section E: 130.

Hancock, J., 1953. *Anim. Breed. Abstr., 21:* 1.

Kudryzvizev, A. A., 1962. *16th Int. Dairy Congr.* Section D: 565.

Phillips, D. S. M., 1978a. *Proc. Ruakura Fmrs' Conf.* Aglink No. FPP 168. N.Z. Ministry of Agriculture and Fisheries.

Phillips, D. S. M., 1978b. In *Proc. Int. Symp. Machine Milking,* Louisville, Ky. Nat. Mastitis Counc. Inc., Washington, DC. p. 34.

Rathore, A. K., 1978. *Proc. Ist Congr. Ethol. Appl. 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).

Sagi, R.; Gorewit, R. C.; Zinn, S. A., 1980. *J. Dairy Sci., 63:* 1957.

Soffie, M., Thines, G., De Marneffe, G., 1976. *Appl. Anim. Ethol., 2:* 271.