Rumination Time in Four Breeds of Dairy Cattle [1]

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Abstract

Initial research showed significant differences between individual cattle in their rumination response to equal amounts of cell wall constituent intake. Two further experiments were conducted to determine if dairy cattle breeds differ in their rumination time. In Experiment 2, eight Guernseys had lower ($P < .05$) 24-hour rumination times than did eight Holsteins, eight Ayrshires, and eight Jerseys. When corrected for cell wall constituent intake and body weight kilogram$^{.75}$ the Guernsey average rumination time was lower than the Holstein average ($P < .05$) and the Jersey average ($P < .01$). In a third experiment eight lactating Guernseys averaged lower ($P < .05$) total rumination times, as well as minutes rumination corrected for cell wall constituent intake and body weight kilogram$^{.75}$, than did eight lactating Jerseys.

Introduction

Rumination time in sheep and cattle can be affected by changing the cell wall constituent intake (8, 9), grinding the roughage material (1, 4, 11), or feeding concentrates (2, 3). During several experiments with dairy cattle (9), some consistently ruminated much more than others subjected to the same treatment. These experiments were conducted to determine if there were differences between breeds in normal rumination time.

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Experimental Procedure

An initial comparison involved two heifers; two additional experiments were conducted using 68 individual 24-hr jaw motion recordings.

Experiment 1. The initial comparison was made from data produced by two dairy cows (one Holstein and one Jersey), both subjected to five different treatments. The specific regime in each case was a single meal of a test forage fed to the animals at the 48th hour of a 96-hr fast from normal feeding. Rumination time was recorded throughout the entire period using the methods described by Welch and Smith (7), modified for use with the bovine species.

Experiment 2. Rumination time measurements (24 hr) were obtained from eight individuals from each of the following breeds: Ayrshire, Guernsey, Jersey, and Holstein. The cows were housed in a tie-stall barn and maintained on a conventional feeding program for lactating cattle, with corn silage, hay, haylage, and a 16% protein concentrate mixture fed according to milk production. Feed consumption was measured for each animal studied.

TABLE 1. Response of two cows to five different treatments of roughage feeding.

	Rumination time			
	Cow 3 (Holstein)		Cow 7 (Jersey)	
Treatment	Per 48 hr	CWC intake gram $BW_{kg}^{.75}$	Per 48 hr	CWC intake gram $BW_{kg}^{.75}$
	Minutes			
1	373	18.3	791	25.9
2	251	12.3	584	21.3
3	455	18.5	1,055	26.5
4	272	12.6	561	19.3
5	359	14.6	817	20.5
Average	342[a]	15.3[a]	702[b]	23.3[b]

[a,b] Values for Cow 3 different from those of Cow 7 ($P < .01$).

TABLE 2. Rumination time for dairy cows of four breeds.

Breed	Number of animals	Rumination time: Total 24-hr rumination time	Rumination time: CWC intake gram / $BW_{kg}^{.75}$
		(min)	(min)
Guernsey	8	316[a]	5.28[a,c]
Ayrshire	8	381[b]	7.01[a,b,c,d]
Holstein	8	414[b]	6.78[b,c,d]
Jersey	8	435[b]	9.19[b,d]

[a,b,c,d] Values with no letters the same are different (a,b $P < .05$) (c,d $P < .01$).

Experiment 3. Eight lactating Jersey and eight lactating Guernsey cows were paired according to milk production and feed consumption. Rumination time measurements (24 hr) were made as in the previous experiment.

Cell wall constituent content of the forages was determined by the method of Van Soest and Wine (6) and was estimated as 12% in the concentrate mixture. Analysis of variance was conducted according to the methods of Steel and Torrie (5).

Results and Discussion

Experiment 1. Total rumination times resulting from the test meal feedings were different ($P < .01$) for the two individuals studied in the first comparison (Table 1). When corrected for body weight ($kg^{.75}$), the rumination time per gram of cell wall constituent intake was higher ($P < .01$) for the Jersey than for the Holstein.

Experiment 2. Total 24-hr rumination times were lower ($P < .05$) for the Guernseys than for the three other breeds (Table 2). When corrected for metabolic body size and cell wall constituent intake, the Guernsey rumination times were lower than the Jerseys ($P < .01$) and the Holsteins ($P < .05$).

Experiment 3. The Guernseys again had the lower 24-hr rumination time per unit of cell wall constituent ingested when compared to Jerseys with similar amounts of milk production and feed consumption. This difference ($P < .05$) remained when the values were corrected for metabolic body size (Table 3).

The higher rumination time values for the individual cow comparison are due to the longer recording period following the test meal (48 hr) and the increased rumination per unit of cell wall constituent when less than ad libitum levels of consumption are maintained (10).

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TABLE 3. Rumination time for lactating Jersey and Guernsey cattle receiving similar amounts of feed and yielding similar amounts of milk.

Breed	Number of animals	Body wt	Milk prod per day	CWC intake $BW_{kg}^{.75}$	Rumination time: CWC intake gram / $BW_{kg}^{.75}$
		(kg)	(kg)	(g)	(min)
Guernsey	8	523	16.8	66[a]	5.41[a]
Jersey	8	469	15.2	60[a]	6.60[b]

[a,b] Values with no letters the same are different ($P < .05$).

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