

Milk production, milking frequency and rumination time of grazing dairy cows milked by a mobile automatic system during mild heat stress periods

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INTRODUCTION : Cows milked by automatic systems (AS) are most often confined indoors or have access to pasture only during the day in summer. However, grazing allows decreasing feeding costs and improves animal health and welfare. Little information exists on effects of heat stress on grazing dairy cows milked by an AS. The aim of this study was to determine the effects of heat stress periods on the milk yield, milking frequency, fat protein ratio in milk (F/P) and rumination time of grazing dairy cows milked by a mobile AS located on pasture.

MATERIALS AND METHODS :

- A herd of about 50 dairy cows grazed onto 18 ha of permanent pastures milked by an AS
- grazing period from April to October in a strip grazing with two allocations of fresh grass per day at 6:00 am and 16:00 pm
- cows had to pass in the AS to benefit from the new allocation and had free access to the AS at day and night
- comparison between :
 - mild heat stress : 2 periods of 4 and 7 days - THI >72 during the day and 23.1°C mean temperature in July (J) and in August (A)
 - normal periods with maximum THI 68 and mean temperature 16.3°C (Table 1)
- HR-Tag neck collar recording rumination time and cow activity (SCR, Israel).
- T°, THI, distance from the paddock to the AS, days in milk and lactation number analysed according to a GLM - Milk production, milking frequency, milking visits (result of the sum of milkings, failed and refused milkings), F/P and rumination time (991 data) analysed according a mixed model (SAS, 1999)

Table 1. Some environmental and animal characteristics during periods of normal conditions and heat stress in lactating cows at pasture (mean and standard deviation).

RESULTS AND DISCUSSION :

- grass composition : crude protein, neutral detergent fiber, acid detergent fiber, water soluble carbohydrates (% in DM) and grass digestibility (%) : 16.3 47.8, 27.3 and 79.7 in J and 19.2, 49.6, 26.2 and 80.6 in A.
- grass heights : 10.1 and 8.5 cm at entry and 3.1 and 3.1 cm at the exit, respectively in J and A respectively.
- grass yield :1509 and 1437 kg DM ha⁻¹ in J and A
- calculated sward availability : 14 kg DM per day and per cow.
- 1.9 kg and 2.0 kg concentrate per day during normal and HS periods (Table 2)
- milking frequency and visits significantly higher in HS
- higher milk production in HS can be explained by the increased milking frequency : the cows were attracted to the AS to drink water in big bin located near the AS during HS periods
- decreased daily rumination time in HS not observed since the milk yield in HS cows was not reduced

	THI	Distance (m)	Days in milk (j)	Lactation number
Normal	60.8± 1.4	191 ±79	184± 89	2.83± 1.78
Heat St.	70.5± 2.9	188 ±41	183 ± 90	2.84 ±1.77
P value	<0.0001	NS	NS	NS

Table 2. Daily parameters recorded in cows exposed to normal and mild heat stress at pasture (mean and standard error).

	Milking frequency	Milking visit	Milk prod. (kg day-1)	Rumination (min day-1)	Milk F/P
Normal	1.97±0.04	2.69±0.09	18.5±0.3	418.9± 8.7	1.23± 0.01
Heat stress	2.12± 0.04	2.99±0.09	19.7±0.4	339.2± 9.5	1.17 ±0.01
P value	<0.01	<0.05	<0.01	<0.0001	<0.10

CONCLUSION :

It seems from these first results that rumination, milking frequency and milk performance of grazing cows milked by an automatic system are affected by a mild heat stress at pasture. More observations are needed to precise the impacts of mild heat stress on cow production and traffic.

