

DAILY ACTIVITY OF COWS IN A HERD CHAROLAIS

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Abstract. This study analysed basic forms of behaviour in Charolais cows with regard to season of the year and day. It was found that in each season, resting cows preferred lying on the left side, from 19.7% of the day in summer to 27.6% in winter. Animals rested on the right side slightly less often: 14.0% and 24.7% of the day, respectively. Cows spent most time on feed intake in summer (36.2% of the day) and least time in winter (19.7%). Standing position was most frequent in autumn (31.6% of the day) and least frequent in winter (28%). Water intake by the cows was most frequent during summer, averaging 4.8 times per day. By far the most frequently, cows rested in the lying position during the night. Animals spent from 57.8% to 78.9% of the total feeding time on lying down in summer and winter, respectively.

Key words: behavioural observations, cattle, Charolais

INTRODUCTION

Animal behaviour has been the subject of many observations and detailed studies. Already in the 4th century BC, Aristotle described social hierarchy in a herd of cattle. Animal behaviour is defined in scientific literature as a pattern of activities that are voluntary or instinctive [Sablik et al. 2010]. This notion is inextricably linked to ethology, which deals with observation of individual animals or groups of animals in their environment. Nowicki and Zwolińska-Bartczak [1983] define ethology as the science which seeks to determine patterns in complex forms of

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animal response to environmental stimuli. Ethological studies should fall within the scope of tasks for ensuring welfare in new technological systems while maintaining the high productivity of animals [Neja and Bogucki 2006, 2007]. The behaviour of beef cattle, especially those raised in Poland, has received little study.

The aim of this study was to analyse basic forms of behaviour in Charolais cows raised in a farm located in the Kujawsko-Pomorskie province.

MATERIAL AND METHODS

The study was carried out on a farm located in the Kujawsko-Pomorskie province, Poland. Behavioural observations were made on 15 Charolais cows (2.5 to 6 years of age), performance recorded by the Polish Association of Beef Cattle Breeders and Producers. For easy identification, cows were individually marked with numbers on their backs. Three 24-hour observations were made over 3 successive days in each season of the year. During observations, the following activities were recorded at 15-minute intervals: standing and walking, lying on the left side, lying on the right side, eating, and water drinking. During the tests, the observers kept their distance from the animals to avoid interference with their behaviour. Cattle acclimated to the observer's presence for one day in each season. Cows remained on pasture throughout the year, without overhead protective shelter. Pasture had an area of about 2 ha and was divided into 3 paddocks. Feeding was done twice daily. Cows were supplemented with maize silage during the summer period and with maize silage, haylage and straw in the winter. Animals were allowed continuous access to water from an automatic drinker.

The statistical analysis included the calculation of the mean duration of individual activities performed by the cows with regard to season of the year (spring, summer, autumn, winter) and time of day or night. The numerical data were analysed statistically with two-way analysis of variance and significant differences between the means were determined using Duncan's multiple range test [Statistica 8 2008].

RESULTS AND DISCUSSION

The data presented in Table 1 indicate that in each season of the year, cows preferred to be in a left lateral recumbency when resting, from 284 minutes (19.7% of the day) in the summer to 398 minutes (27.6% of the day) in winter months. Animals spent slightly less time resting on the right side, from 201 minutes (14.0% of

the day) in the summer to 355 minutes (24.7% of the day) in the winter. Compared to other seasons of the year, in winter cows spent significantly more time resting, both on the left and right side.

Table 1. Proportion of time cows spent on different activities according to season of the year and time of day

Tabela 1. Czas wykonywania poszczególnych czynności przez krowy w zależności od pory roku i pory doby

Activity Czynność	N cows – N krów	Season of the year – Pora roku											
		Spring Wiosna			Summer Lato			Autumn Jesień			Winter Zima		
		15			15			15			15		
	\bar{x}	%*	SD	\bar{x}	%	SD	\bar{x}	%	SD	\bar{x}	%	SD	
Left lateral recumbency, minutes per day Leżenie na lewym boku, minut/dobę	Day and night Dzień i noc	292 ^A	(20.3)	158	284 ^B	(19.7)	237	286 ^C	(19.9)	163	398 ^{ABC}	(27.6)	237
	Day Dzień	80	(27.4)	72	84	(29.6)	64	64	(22.4)	58	93	(23.4)	69
	Night Noc	212 ^A	(72.6)	153	200 ^B	(70.4)	118	222 ^C	(77.6)	150	305 ^{ABC}	(76.6)	224
Right lateral recumbency, minutes per day Leżenie na prawym boku, minut/dobę	Day and night Dzień i noc	286 ^{ABC}	(19.9)	160	201 ^{AD}	(14.0)	234	207 ^{BE}	(14.4)	153	355 ^{CDE}	(24.7)	234
	Day Dzień	100	(35.0)	76	80	(39.8)	64	67	(32.4)	63	98	(27.6)	67
	Night Noc	186	(65.0)	146	121	(60.2)	101	140	(67.6)	135	257	(72.4)	222
Feed intake, minutes per day Pobieranie paszy, minut/dobę	Day and night Dzień i noc	435 ^A	(30.2)	61	522 ^B	(36.2)	61	492 ^C	(34.1)	84	284 ^{ABC}	(19.7)	42
	Day Dzień	297	(68.3)	66	302	(57.8)	42	315	(64.0)	47	224	(78.9)	35
	Night Noc	138	(31.7)	61	220	(42.2)	37	177	(36.0)	71	60	(21.1)	22
Standing and walking, minutes per day Stanie i chodzenie, minut/dobę	Day and night Dzień i noc	427	(29.6)	66	433	(30.1)	59	455	(31.6)	63	403	(28.0)	52
	Day Dzień	244	(57.1)	49	254	(58.7)	49	272	(59.8)	46	284	(70.5)	39
	Night Noc	183	(42.9)	47	179	(41.3)	37	183	(40.2)	41	119	(29.5)	40

*% day – % doby.

A, B, C... – Means within lines followed by the same letters differ significantly at $P \leq 0.01$.

A, B, C... – Średnie w wierszach oznaczone tymi samymi literami różnią się istotnie statystycznie przy $P \leq 0,01$.

It is evident from the data in Table 1 that lying on the left side occupied most of the animals' time during winter nights (305 minutes) and the least of their time during summer nights (201 minutes). During the day in winter, cows were in a left lateral recumbency for 93 minutes, which was the longest resting time in this position compared to the other seasons. Cows spent the least time resting on the left side in the autumn (64 minutes). The investigated animals were found to spend most of their time lying on the right side during winter nights (257 minutes per day), and the least time lying in this position during summer nights (121 minutes per day). When analysing lying on the right side during the day, it was found that

cows most often assumed this posture in winter (100 minutes per day on average) compared to only 67 minutes per day in autumn (Table 1).

Similar results concerning the cows' preference for lying on the left side were reported by Neja and Bogucki [2005], who found that animals spent more time resting on the left side in both tie-stall and free-stall barns. Another study demonstrated that Aberdeen Angus cows spent over 80 minutes more lying on the right side than on the left side [Neja et al. 2009]. Neja et al. [2006] showed that cows in a free-stall barn spent 741 minutes (51.5% of the day) lying down. According to Romaniuk and Overby [2004], during a 24-hour period an adult cow generally lies down for 10–14 hours, divided into 15–20 periods. Lying time in cows depends on the type of bedding. In a study cited by Szarek et al. [2010], cows spent most of their time lying in loose boxes on sawdust bedding (656 minutes), followed by lying in a deep-pit open barn with chopped straw bedding (633 minutes) and lying in loose boxes bedded with straw (504 minutes).

Charolais cattle spent most of their time feeding during the summer period (36.2% or 522 minutes/day). Winter was the period when cows spent significantly less time feeding (19.7% or 284 minutes per day) compared to the other seasons.

According to Zwolińska-Bartczak [1992], low air temperature and strong winds in winter months reduce the rate of feed consumption. In a study by Neja et al. [2006], Polish Holstein-Friesian cows had an average feeding rate of 260 minutes (18.1% of the day) in a tie-stall barn and 301 minutes (20.9% of the day) in a free-stall barn. Meanwhile Szarek et al. [2010], who analysed basic behavioural responses of dairy cows, showed that cattle spend about 7 hours/day eating pasture.

As shown in Table 1, the investigated animals spent most time standing in the autumn (455 minutes/day or 31.6%) and least time standing in the winter (an average of 403 minutes per day or 28%).

Sablik et al. [2010] concluded that cattle spend more time resting combined with ruminating. Neja and Bogucki [2006] reported literature data which showed lying time in cows to range from 44 to 65% of the day depending on age, breed, body weight and housing system.

Based on the data presented in Table 1, cows most often ingested feed during the daytime. They spent an average of 315 minutes per day feeding in the autumn, slightly less time in the summer, and the least time in the winter (224 minutes per day). During the nighttime hours, the animals under study were much less active and spent 220 minutes feeding in the spring and only 60 minutes per day in the winter.

Research completed to date has also shown that duration of feeding is determined by season of the year [Bogucki et al. 2008]. Cows spend 56–76% of their

pasture time grazing. Cows are more active eating pasture in the morning, in the afternoon, and before the evening. Around noon, the rate of feed consumption decreases due to higher air temperature [Zwolińska-Bartczak 1992]. When observing the behaviour of cows on pasture, Porzig [1966] distinguished 4 grazing periods, including 3 during the day and 1 at night.

During the day, cows were standing and moving from 244 minutes in the spring to 284 minutes in the winter. At nighttime, the same activity in the spring, summer and autumn was between 179 and 183 minutes long. Again, during the night, cows spent the least time standing (119 minutes) in winter (Table 1).

Sablik et al. [2010] reported that activities in the investigated animals consisted predominantly of eating and moving, which accounted for more than 70% of the observation time.

Table 2 characterizes the frequency of water drinking by the cows according to the season. Cows most often drank water in the summer (4.8 times per day on average). During the autumn, this frequency was smaller at 4 times per day. Charolais cows drank an average of 3.4 times per day in the spring and 2.8 times per day in the winter period. Season of the year created statistically significant differences in water drinking frequency. During the day, cattle most often drank water in the summer (2.8 times per day on average). Water drinking during the day was least frequent in the winter (1.8 times per day). Also during nighttime, cows drank water much more frequently in the summer than in the winter (twice vs. once a day).

Table 2. Frequency of water intake by the cows according to season of the year and time of day

Tabela 2. Częstotliwość pobierania wody przez krowy w zależności od pory roku i pory doby

Activity Czynność	N cows – N krów	Season of the year – Pora roku							
		Spring Wiosna		Summer Lato		Autumn Jesień		Winter Zima	
		15		15		15		15	
		\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD
Day and night Dzień i noc		3.4 ^{AB}	1.3	4.8 ^{AC}	1.4	4.0 ^{BD}	1.5	2.8 ^{ACD}	1.3
Water intake Pobieranie wody	Day Dzień	2.0	0.9	2.8	1.1	2.4	1.2	1.8	1.1
	Night Noc	1.4	0.9	2.0	1.0	1.6	0.9	1.0	0.7

A, B, C... – Means within lines followed by the same letters differ significantly at $P \leq 0.01$.

A, B, C... – Średnie w wierszach oznaczone tymi samymi literami różnią się istotnie statystycznie przy $P \leq 0,01$.

Grodzki et al. [2009] observed that meeting the water requirements is often undervalued as a dietary component. An inadequate water intake has more ne-

gative consequences than a deficiency of protein and energy, because inadequate amounts of water limit feed intake. Daily water requirement of cows varies from several dozen to several hundred dozen litres depending on the type of feed, air temperature and humidity, and milk yield.

CONCLUSIONS

The observed cows spent more time eating, standing and moving than resting lying. In each season of the year, animals showed a preference for lying on the left side. Animals spent most of their time eating in the summer (36.2%) and the least time in the winter (19.7%). Cows most often drank water in the summer (4.8 times per day compared to 2.8 times per day during the winter). Animals spent much more time resting lying during the night hours. During the day, animals spent 57.8 to 78.9% of their time feeding (summer and winter, respectively). Season of the year created statistically significant differences in the frequency of different activities performed by the cows.

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AKTYWNOŚĆ DOBOWA STADA KRÓW RASY CHAROLAIS

Streszczenie. Celem pracy była analiza podstawowych form zachowania krów rasy Charolaise z uwzględnieniem pory roku i doby, utrzymywanych całodobowo i całorocznie na pastwisku. Stwierdzono, że w każdej porze roku krowy preferowały wypoczynek w pozycji leżącej na lewym boku – od 19,7% doby latem do 27,6% zimą. Nieco mniej czasu zwierzęta wypoczywały na prawym boku – odpowiednio: 14,0% i 24,7% doby. Najwięcej czasu na pobieraniu paszy krowy spędzały latem – 36,2% doby, a najmniej zimą – 19,7%. W pozycji stojącej krowy najwięcej czasu spędzały jesienią (31,6% doby), a najmniej zimą (28% doby). Najczęściej krowy pobierały wodę w okresie lata – średnio 4,8 razy w ciągu doby. Zdecydowanie więcej czasu na wypoczynek w pozycji leżącej krowy przeznaczały w godzinach nocnych. Z całkowitego czasu związanego z pobieraniem paszy zwierzęta na tę czynność w ciągu dnia przeznaczały od 57,8 do 78,9% czasu (odpowiednio latem i zimą).

Słowa kluczowe: bydło, charolaise, obserwacje etologiczne

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