

ANALYSIS OF MATERNAL BEHAVIOR OF GOATS AND THEIR OFFSPRING DURING PERINATAL PERIOD

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Abstract. The aim of the study was to analyze maternal behavior of goats and their offspring during the perinatal period, with particular attention to affiliate behavior and agonistic relation towards rest of the fawns and the herd. The research was based on observations carried out in March 2013 on the farm "Nad Arem", located in the Warmia and Mazury voivodeship. The study comprised 4% of the herd of goats which had a population of 230 pieces. The primary criterion for the selection of goats was possibility of observing the moment of birth. The selected goats and their progeny were labeled, so that the observer could easily recognize them. The study was divided into two stages: observation and analysis of animal behavior immediately after birth and one week and two weeks later. During the observation it was found that goats mainly gave birth in a standing position, in the morning. The first step after giving birth was sniffing a young goat, and then the licking. Young animals, after about 20 minutes from birth began to get up and seek contact with their mothers. First sucking had place about 40 minutes after birth.

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Introduction. Adaptation features of goats have made them an inseparable human companion, especially in mountain and desert areas. Starting from the time of domestication about 9000 years BC, when the main purpose was to obtain meat and skins up to the present day, where goats were specialized in the given type of use depending on human needs (Nowicki et al., 1999). There are specialties such as milk, meat, wool, down and multipurpose use type. In African and American countries, emphasis is placed on meat use and later on dairy products, which is why goats of multipurpose use types are commonly used (mainly in North America). On the other hand, Asia is dominated by wool, down and meat types, and slightly in milk. In Australia, goats are bred on a small scale, mainly in the hobby aspect (Niżnikowski et al., 2007). In Europe dominates dairy use of goats. Also in Poland this direction is leading.

According to research of Główny Urząd Statystyczny (GUS) goat headage in Poland is falling. Whereas among consumers, there is an interest in the so-called healthy, organic food, which positively affects the human organism. Hence both milk and its products can successfully replace cow's

milk, especially in the diet of people with milk intolerance (Milewski, 2010). Wójtowski (2013) states that the main races in Poland are White Improved and Colorful Improved, respectively: 39.9% and 21.1% headage of animals under control of milk performance. Except that goats are kept of Saaneńska Goat and indigenous breed: Karpacka Goat, Kazimierska Goat and Sandomierska Goat and also crossbreed goats. White Improved and Colorful Improved goats and Saaneńska Goat belong to the dairy direction of use and the others represent the versatile usable type. In addition, in Poland there is an Alpine Goat with dairy use type (Niżnikowski et al., 2007). This breed, like the Saaneńska Goat, is used to grading-up and improve the milkiness of other breeds.

Literature Review. The concept of behavior is difficult to define unequivocally and exhaustively. There are many meanings of this word in the scientific literature. Most of them describe “behaviors” as the behavior of animals under certain conditions. Behavior can be defined as a link between the environment and the organism, like also between the ecosystem and the nervous system. The ability to observe and measure the behavior of animals makes them valuable information about the behavioral characteristics of a given species (Kaleta, 2007). Behavior as a zootechnical concept comes from behaviour (behavior) and means behavior. In the twentieth century, the concept of behaviorism was introduced, as one of the fields of research in psychology, which deals with the analysis of the reactions of humans and animals to external stimuli (Nowicki and Zwolińska-Bartczak, 1983).

Ethology (from greek ethics- custom, and logo- reason) deals with the behavior of an animal or group of animals in a particular environment. This is a science containing analysis and description of animal habits that are specific to a species (Nowicki and Zwolińska-Bartczak, 1983; Kaleta, 2007). Etiology is also portrayed as objectivist science rejecting subjective phenomena as well as those related to mental processes and limited to objective aggregations of the studied factors (Godzińska, 1997). Herd behavior and social behavior explained by sociobiology and parental behavior (e.g. letting for milking only by their own descendants in sheep) are one of the most important objects of interest in ethology. Particular attention should be paid to farmed animals in high-yield farms which are subject to strong stressors and thereby display behavioral abnormalities that affect their viability as well as production results (Kaleta, 2007). On the basis of the information collected during the study and observation of animals, the characteristic behavior of the species can be determined. They form a etogram, which is an ordered list of types of behaviors and their forms according to function (Kaleta, 2007).

The division of types of behavior is varied. Some scientists believe that various forms result from conditional and unconditional reflexes. Wójtowski (2013) provides the following breakdown of animal behavior: agonistic, affiliate, sexual, maternity, baby goats for their mothers, herds and food. Kaleta (2007) divided the behavior of animals into: orientation and navigation, movement and rest, excretion and comfort, food and anti-predatory and social including: affiliate, agonistic, territorial, reproductive and intercultural, exploration and fun, behavior based reasoning. In addition, he also distinguished the disease behavior. In this thesis, the division was modified according Kaleta (2007). Animals exhibiting tendencies to be among individuals of the same species are defined as social entities and their behavior as social. The decision to identify a particular species as a social animal is made on the basis of detailed research. If the animals of the species meet the conditions, like: establishing a hierarchy in a group, sharing food, a constant composition of a group controlled by its members, etc., You can talk about authentic social life (Kaleta, 2007). Goats are included in the herd animals, each individual has a designated position in herd. In these animals, there is a non-linear hierarchy where one or two plays dominate the rest of the flock and one or two are completely subordinated (Górecki, 2001).

A factor that favors domestication of wild animals was just the group life. Knowing the behavior within a herd in farm animals is conducive to better productive use. Creating production groups should be based on the coherence of the flock, affiliate behavior and as little as possible leading to aggressive behavior. The cooperation of a newly created group of animals depends on the frequency of affiliate behavior involving contact with new members, acceptance and hierarchy (Nowicki and Zwolińska-Bartczak, 1983). The research results shows that heavier goats enter first into the milking stations, but this is independent of the breed (Górecki and Wójtowski, 2004). Goats, as animals living in social groups, tend to have affinity and separation behaviors. The first type of behavior is manifested by maintaining physical contact, mutual care, communication between individuals (e.g. calling the offspring by the mother at the time of feeding) and having fun. In turn, the second type is associated with agonist behavior, that is conflicts and rivalry most often appearing between adults at the time of feeding (Sztynch and Wilczak, 2005; Kaleta, 2007).

Parental behavior is related to the rearing of offspring. Contemporary behavioral sciences, and especially behavioral ecology, point to a broader perspective on the contribution of the parent to the process. Parental care begins at the physiological level, even before conception. The male also participates in the process of creating female germ cells which, thanks to its

presence may be larger with longer survival (Kaleta, 2007). Among animals there is a specific interaction between parents and offspring. Parents have a caring behavior, while young individuals exhibit behaviors demanding care. The quality of parental care after birth in mammals and hatching in birds has become the basis for nesting and precocial. In the first case the young are unable to function independently and need constant care. In the second case the young are born or hatched to a large extent educated and quickly become independent. Among the mammals in the second group are hoofed animals, which can be further divided according to two strategies of behavior. Species that hide their offspring (they visit only at the time of feeding) and those in which youngsters are able to follow their mother at a fast pace. (Kaleta, 2007). Nowicki and Zwolińska-Bartczak (1983) state that the mother's parental motivation creates her behavior towards offspring, and that farm animals (mammals and birds) are characterized by outstanding growth. The maternal instinct is externalized even before the arrival of young. Female ungulates (sheep, cows, mares) move away from the rest of the herd before the onset of labor. Strongly developed maternity behavior provides good young rearing (Yilmaz et al., 2012).

Goats are different from sheep in terms of maternity care. Goats, belong to the species that hides the offspring, so-called "hider", during grazing leave their offspring within the first few days after birth. In the pre-labor period, goats tend to isolate themselves from the flock, for proper maternity care and for bonding with the goat. Maternity care in goats is determined within four hours of childbirth (Yilmaz et al., 2012).

The aim of the study. The aim of the study was to analyze the behavior of maternal goats and their offspring during the perinatal period, with particular attention to affirmative and agonistic behavior towards the rest of the kids and herd.

Material and methods. The study was conducted on the farm "Nad Arem", which is located in the village of Kierżliny in the Warmia and Mazury province, in the period from 01.03.2013 to 18.03.2013. A herd of about 230 alpine goats is kept on the farm. It is focused on milk production and milk products manufactured within the farm.

Studies on behaviorism have been divided into two stages. At the first stage, birth were observed from 1 to 4 March 2013, 8:30 - 15:00. During that period 25 goats gave birth and they were numbered from 1 to 25. In the second stage, the behavior of selected goats and their offspring was observed on 08-11.03.2013 and 16-18.03.2013, from 9:00 to 15:00. Nine goats were selected to close observation (number: 6, 7, 8, 9, 13, 14, 16, 17, 25). The primary criterion for choosing these animals, out of 25 goats, was the possibility of observing the moment of childbirth. Hours of observation of

animal behavior were dependent on the time of their feeding. Feed was given twice a day, 9:00-9:30 (wheat bran and grass silage) and 12:00-14:00 (grass silage). Animals had unlimited access to water. Animals during the experiment (winter) were kept in 350 m² goat house. The study was conducted by direct observation. At the first stage of the study, the observation was about childbirth and puerperium. While in the second stage, the study involved goat behavior in a week and two weeks after childbirth. The researcher measured time on the stopwatch and recorded the occurrence of the behavior, then assigning them to certain types. Goats were observed in order to find as many forms of behavior as possible.

Results and discussion. Among the flock of 230 animals, postnatal observation was included in 4% (9) goat herds. During the observation on 01.03.2013 - 04.03.2013, 25 goats gave birth, of which 8 (36%) had twin litters and 17 (64%) had single litter. The average body weight of the kids was 3.12 kg. The highest body weight – 4.62 kg had a kid from single litter, and the lowest weight – 2.06 kg had a kid from a twin litter. In both cases, they were male. During this observation time, 12 females with an average body weight of 3.01 kg and 21 males with an average body weight of 3.18 kg were born. The results are shown in Table 1.

Table 1 – Body weight of kids born in days 01.03 - 04.03.2013

Number of kids	Kidding date	Kids body weight (kg)	Sex of the kids
1	01.03.2013	3,20	♂
2		2,57	♂
02		2,80	♂
3		2,53	♂
4		4,28	♀
5		4,02	♂
6		3,20	♂
7		2,93	♂
07		3,04	♀
8		3,17	♂
08	3,48	♀	
9	2,21	♀	
09	2,19	♀	
10	02.03.2013	4,62	♂
11		2,55	♀
011		2,67	♀
12		3,39	♂
13		2,97	♂
14		3,08	♀
014		3,35	♀
15		2,99	♀
015	2,74	♂	

16	03.03.2013	4,29		♂
17		3,30		♂
18		3,31		♂
19		2,06		♂
019		2,12		♂
20		3,03	♀	
21	04.03.2013	3,81		♂
22		3,22		♂
23		3,27	♀	
24		3,01		♂
25		3,51		♂

The average body weight of kids from 9 mothers under the strict behavioral observation was 3.13 kg and was therefore close to the average body weight of the kids from all 25 births. Among the observed 5 births were single and the remaining were twin births. From 13 born kids there were 6 females and 7 males. The heaviest male (4.29 kg) was from a single litter, and the lightest female (2.19 kg) was from a twin litter.

Most of the observed births took place between 8:00 and 12:00 (61%), the rest between 12:00 and 14:00 (39%). Similar results were obtained by Ramirez et al. (1995) who showed that the majority of births (75%) occurred between 10:00 and 18:00. More than 90% of goats were born between 6:00 and 18:00. This is also confirmed by the results of Pawlina and Odrowaź (2000), which showed that 60% of goats were born in the morning.

From the 9 goats 8 gave birth in the standing position and 1 in the lying position. Kids were usually born in the head position. Second kid from twin litter of goat number 8 was born by the breech delivery. The time between birth of the first and second kid was about 15 min. This was one of the longest observed twin births and lasted 22 minutes and 14 seconds. The longest single litter lasted 23 minutes and 7 seconds, while the longest twin litter lasted 31 minutes and 22 seconds. The shortest births lasted: single - 9 minutes and 6 seconds and twin 6 minutes and 18 seconds. The birth time was measured from the time of the labor (labor disturbance, mucus and swelling, swelling or follicles) until the prolapse of the offspring. Average duration of observed twin and single deliveries was 19 minutes and 58 seconds and 11 minutes 47 seconds. In studies by Ramirez et al. (1995), longer delivery duration were observed. The average duration of twin deliveries was 30 minutes and 36 seconds, and single delivery lasted 19 minutes and 49 seconds. Table 2 presents birth data from 01-04.03.2013.

Table 2 – Data of births observed in days 01-04.03.2013

Number of goats	Type of gestation	Kidding date	Hour of birth	Sex of kids	Kids body weight (kg)
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6	single	01.03.2013	09:22		♂	3,20
7	twin		10:51		♂	2,93
			10:52	♀		3,04
8	twin		13:06		♂	3,17
			13:21	♀		3,48
9	twin		13:40	♀		2,21
		13:44	♀		2,19	
13	single	02.03.2013	09:35		♂	2,97
14	twin		10:26	♀		3,08
			10:33	♀		3,35
16	single		08:53		♂	4,29
17	single	03.03.2013	12:36		♂	3,30
25	single	04.03.2013	11:39		♂	3,51

Data about observations of the course of goats births are presented in table 3. It shows that the first act after childbirth was sniffing the kid. This is a very important activity because the mother recognizes her young by the smell, and only in the second day the kids begin calling his mother. Sniffing in the case of single births took place on average of 17 seconds, while in twins litter average sniffing lasted 2 minutes and 21 seconds. According to Ramirez et al. (1998) for single and twin births, the time between childbirth and first sniffing lasted respectively 8 minutes and 7 seconds and 9 minutes and 7 seconds. In present study it was found that sniffing the kids had place average 1 minute and 21 seconds after the birth. The earliest sniffing had place after 2 seconds from the end of childbirth, and at the latest after 6 minutes from the end of childbirth.

Table 3 – Results of observations of perinatal behavior of goats

Number of goats	Sex of kids	Activities					
		Sniffing	Licking	First suction		First steps	
		Time from childbirth (h: min: s)	Time from childbirth (h: min: s)	Time from childbirth (h: min: s)	Time duration	Time from childbirth (h: min: s)	Time duration
6	♂	00:00:09	00:00:21	00:09:57	-	00:09:54	00:00:24
7	♀	00:05:58	00:10:02	00:47:52	00:00:13	00:16:53	00:00:29
	♂	00:09:50	00:11:25	00:49:12	00:00:12	00:17:00	00:00:23
8	♂	00:00:02	00:00:07	00:27:28	00:00:32	00:11:55	00:00:20
	♀	00:00:08	00:05:24	00:29:16	00:00:24	00:22:34	00:00:16
9	♀	00:00:02	00:00:05	00:16:50	00:00:21	00:09:02	00:01:00
	♀	00:00:05	00:01:03	00:12:47	00:00:26	00:09:03	00:00:30
13	♂	00:00:30	00:00:58	01:00:38	00:00:20	00:54:50	00:00:20
14	♀	00:00:03	00:00:05	00:34:19	00:01:11	00:29:39	00:00:15

	♀	00:00:05	00:04:39	00:44:15	00:00:30	00:36:37	00:00:10
16	♂	00:00:14	00:00:16	01:59:11	00:00:08	00:59:21	00:00:14
17	♂	00:00:09	00:00:11	00:41:02	-	00:23:47	00:00:23
25	♂	00:00:21	-	00:41:00	00:01:00	00:08:57	00:00:20

The first licking took place average 2 minutes and 40 seconds after birth. The longest time since childbirth to licking was 11 minutes and 25 seconds, and the shortest time was 5 seconds. The goat number 25 only sniffed her kid, and then went away calling him. Odrowąż (1997) found that the level of care depends on the time elapsed between birth and first licking. More caring mothers licked progeny about 2-3 minutes after birth, and less caring after 5-6 minutes. According to Wnuk (1995), the decisive moment for creating the proper bond between mother and her descendant is the first five minutes of life. This results from the studies in which kids taken from their mothers shortly after birth (returned cleaned after five minutes) were rejected. While conversely, kids taken from mothers after five minutes and returned even after two hours were recognized.

After a few dozen minutes after birth (after average 23 minutes and 49 seconds) kids started to get up. The fastest was kid number 25 - he got up after 8 minutes and 57 seconds after birth, the longest it took for a kid number 16 - 59 minutes and 21 seconds and kid number 13 - 54 minutes and 50 seconds after birth. Kids had average stand for 23 seconds. Kids from twin litters had average got up after 19 minutes and 5 seconds after birth, and from single litters after 31 minutes and 22 seconds. Obtained results are not consistent with the observations of Odrowąż (1997), who noticed that kids from single litters stands up faster (after about 12 minutes) than kids from twin litters (after about 24 minutes). She also noticed that first to get up were males and later females. Present study has shown a reverse trend. Males got up about 6 minutes later than females (20 minutes and 38 seconds).

Feeding took place approximately 41 minutes after birth. Females started sucking after 29 minutes and 25 seconds from birth, and male about 20 minutes later. Twins began sucking their mother after average 32 minutes and 45 seconds after birth, and kids from single litter after 54 minutes and 22 seconds. There were no differences at the beginning of the first suckling of twins, as was in Sambraus and Wittmann (1989) study. At the time of sucking, the kid was under the mother's belly, facing the head towards her head, with the exception of kid number 16, who attempted to suck her mother from her hindquarters. The average time taken for eating was 29 seconds. Females sucked their mothers average 20% longer than males (26 seconds).

Kids from twins and single litters sucked their mothers for average the same time (29 seconds).

Conclusion. Based on the results of observations of perianal behavioral goat behavior, it can be concluded that:

1. Most births took place between 8:00 and 12:00.
2. Average time for twin and single births was respectively: 19 minutes and 58 seconds and 11 minutes and 47 seconds.
3. The first activity after childbirth was to sniff the kids.
4. The first laps of licking kids by their mothers occurred on average 2 minutes and 40 seconds after birth, and feeding after another 38 minutes.
5. The kids got up after about 30 minutes.

In conclusion, it can be stated that Alpine Goats show high activity during the perinatal period. This applies to both mothers and their kids. This should be taken into account when planning animal management conditions. Their welfare must be maintained at the right level.

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MONITORING OF RUMINATION LENGTH IN DAIRY COWS

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Abstract. *The aim of the work was an analysis of chosen milk usability indicators of herd of cows kept in a freestanding barn, in which the Lely Astronaut A4 type robot was installed together with a specialist software and QWES-HR device used for registration of feed belching from reticulum to the mandible as well as length of rumination of Polish Holstein-friesian cows. The research was performed in the herd consisting of 62 dairy cows of an average performance of about 9463 kg of milk. The animals were fed with full dose TMR which consisted of: haylage, corn silage, straw, cereal meal, rapeseed meal, soy and mineral-vitamin additives. Milking was performed with the use of LELY ASTRONAUT A4 robot. Each cow had a QWES-HR transponder hanging on the neck which registered neck muscle movements which were responsible for mandible movements thus showing daily rumination length. Three study groups of the examined cows based on rumination length were created i.e. KP group (rumination length below 400 minutes), SP group (from 400 to 500 minutes) and DP group (over 500 minutes). In the research it was shown that the average rumination length of cows of KP group was 336 min/day; SP group - 422 min/day and DP group - 514 min/day. It was also proven that as rumination length increased their daily performance increased as well from 26,95 kg (KP group) to the 31,20 kg (DP group) level. Small changes also concerned components content, which was mirrored in dry weight which was highest in DP group (13,27%). Casein content was highest in cows with the shortest rumination length i.e. in KP group and was 2,72%. Urea in all groups was on the similar level of about 300 mg/l proving little impact of rumination length on its content. The share of protein in feeding dose is of higher importance here. The connection between the age of first calving and the*