

BEHAVIOUR OF SOWS 24 HOURS AFTER FARROWING**B. Krsnik, Irena Petak, T. Balenović****Summary**

A great number of sows' activities are related to the reproduction period. Accordingly, the understanding of their expressed behaviour may give an answer in regard to a better handling of the animal with the aim to achieve the animal welfare and the products of better quality. Thirty sows were under observation, 24 hours after farrowing, in the farrowing crates, and 5 positions and 6 activities were considered. During the research period the sows were mostly lying down, could rarely be found in the sitting position and all activities were only short-termed. Such a poor repertoire with rare activities and rare changes of position are characteristic of this reproduction phase but may also be a consequence of poor environment and disturbed welfare. A shorter period in the farrowing crates before farrowing and a shorter time before the weaning could help the sows welfare and enable them to show more maternal forms of behaviour as well as other forms of behaviour hitherto hindered by the crates.

Key words: behaviour, sows, welfare.

Introduction

The use of farrowing crates in intensive pig production to house sows around the time of parturition started in the course of the sixties in order to decrease the number of piglets crushed by the sows (Robertson et al., 1966; Götz, 1991; Wechsler and Hegglin, 1997). In recent years these crates have been judged to be far from ideal for the sow with respect to the animal welfare (Fraser and Broom, 1990; Marchant and Broom, 1996). The Brambell Committee (1965) pointed to the importance of additional space for farm animals so that they could turn around, groom themselves, get up, lie down and

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stretch. In spite of increased care for animal welfare, however, the farrowing crates are still used for the sows during their pregnancy and lactation period (Cronin et al., 1998; Boyle et al., 2002).

A large number of sows' activities is connected with the reproduction period (reproduction behaviour) such as the possibility (freedom) to move around (to lie down, stand up, sleep, turn around, feed their young), to eat and drink, urinate etc., although such behaviour is greatly affected by the production and technology conditions, including the space, the size of the herd, the way of feeding and watering, visual and other contacts, the change of the light and the dark as well as the microclimatic conditions in the given pen (Krsnik, 1976). Understanding pigs' behaviour offers a very important information on the best way to treat them, how to design farrowing crates, how to determine the location of the feeders and drinkers, how to choose the appropriate flooring material. Accordingly, the observation of pigs in the given conditions enables the prevention of certain problems in the production (Patience, 1998).

Krsnik et al. (1996) observed the sows six hours after farrowing and noticed that during that period the sows were mostly lying down with short periods of sitting and standing up. The same authors described the vocalizations of the sows as well as their tactile communication with the piglets during the first day after farrowing. Their results show that the sows spent most of their time during that period nursing their offspring.

The body position and the activity of the animal represents its physical and its mental state in the given environment (Lou and Hurnik, 1998). Accordingly, in this study, the sows and their activities during the 24 hours after farrowing were observed, in order to obtain the data which may lead us to improve the animal life conditions and welfare.

Materials and Methods

The 30 sows were observed divided in to 6 groups. The selected sows were of different breed and age. Six to eight days before farrowing the sows were transferred to the farrowing pens. They were held in individual farrowing crates, without straw (the crates were 175 cm long and 250 cm wide), divided by two partition walls. The length of the left partition wall was 278 cm and the right one 260 cm. The front width was 55 cm and the back 90 cm. The sows were fed meals and given water by automatic watering system. On the right

side of the pen there was a gas heater for the piglets. The pen was ventilated by artificial ventilation.

Before the observation period the sows became accustomed to the presence of the observers. The observation itself was performed in five-minute intervals during 24 hours. The following behaviour patterns were observed: lying, standing, sitting, eating, drinking, urinating, biting objects, rooting and scratching. The collected data were statistically processed (Analysis of Variance and Tukey HSD test).

Results

The research results are presented in 6 tables and one graph. Tables 1 - 6 show the results obtained by observing the sows and the statistical processing. Graph 1 gives, in percentage, the data on the sows' positions.

Discussion

According to our research the sows took, after farrowing, 5 positions and performed 6 activities. They mostly lay down and their communication was reduced to the communication with the piglets, which conforms with the research of Krsnik et al. (1996). When performing these activities, sows sniffed at the piglets, mostly the piglets' front part and their behind.

The positions when the sows were lying down on their left side, their right side, abdomen, when they were sitting and standing, were observed in other research on sows before farrowing (Krsnik and Yammine, 1992) and after farrowing (Krsnik et al., 1996; 1996; 1997), while Lou and Hurnik (1996) state only 4 positions as they did not separate lying down on the left side from the right side.

The statistical processing of the positions and the activities of the sows shows very small differences, or none at all, between the 6 selected sow groups (Table 1). The sitting and standing behaviour in accordance with the Analysis of Variance has statistical significance when speaking of the 6 groups, while the further analysis of these behaviour, however, by Tukey HSD Test, shows no differences whatsoever (Tables 2, 3, 4). Thus one may conclude that the randomly selected sows, within each group, regardless of its breed, age and the number of previous farrowings, mostly spend their time of 24 hours after farrowing in the same way.

TABLE 1. - COMPARISON OF THE DURATION OF POSITIONS AND ACTIVITIES IN 6 SOWS' GROUPS 24 HOURS AFTER FARROWING

Positions and activities	Group I				Group II			
	$\bar{x} \pm Se$	sd	X _{min}	X _{max}	$\bar{x} \pm Se$	sd	X _{min}	X _{max}
lying	645±47.09	105.30	480	769	685±42.46	94.94	595	837
left side								
right side	523±19.82	44.32	485	595	519±32.04	71.65	425	595
abdomen	157±46.90	104.87	55	302	108±20.11	44.96	65	168
total	1325±14.83	33.16	1292	1380	1312±15.01	33.56	1280	1360
standing	108±14.48	32.39	59	143	117±14.80	33.09	70	155
sitting	7±3.38	7.56	1	20	11±2.76	6.18	5	19
eating	72±12.42	27.77	41	105	84±6.46	14.45	67	99
drinking	4±0.73	1.64	2	6	4±0.37	0.84	3	5
urinating	1±0.24	0.55	1	2	2±0.37	0.84	1	3
biting	1±0.55	1.22	0	3	1±0.58	1.30	0	3
rooting	2±0.68	1.52	0	4	4±2.05	4.58	1	12
scratching	2±0.37	0.84	1	3	1±0.24	0.55	1	2

	Group III				Group IV			
	$\bar{x} \pm Se$	sd	X _{min}	X _{max}	$\bar{x} \pm Se$	sd	X _{min}	X _{max}
	738±37.49	83.84	647	856	765±23.99	53.63	680	814
	563±40.01	89.46	435	645	550±22.14	49.51	508	623
	47±4.99	11.17	32	62	29±3.40	7.60	20	37
	1348±6.00	13.41	1335	1362	1344±3.62	8.11	1339	1358
	105±16.16	36.13	73	167	93±4.16	9.30	77	100
	4±1.16	2.59	0	7	3±0.86	1.92	0	5
	75±5.05	11.28	60	89	79±3.63	8.11	68	88
	3±0.75	1.67	2	6	4±0.20	0.45	4	5
	1±0.24	0.55	1	2	2±0.20	0.45	1	2
	1±0.37	0.84	0	2	1±0.20	0.45	1	2
	2±0.37	0.84	1	3	2±0.55	1.22	1	4
	1±0.24	0.55	1	2	2±0.37	0.84	1	3

	Group V				Group VI				Analysis of variance	
	$\bar{x} \pm Se$	sd	X _{min}	X _{max}	$\bar{x} \pm Se$	sd	X _{min}	X _{max}	F	p
	696±28.53	63.80	608	787	683±29.21	65.32	618	785	1.441891	0.245516
	618±35.93	80.34	499	717	592±28.09	62.81	510	669	1.620095	0.192862
	40±2.84	6.35	31	48	44±3.25	7.27	35	53	5.728259	0.001291
	1355±9.09	20.32	1324	1370	1320±5.18	11.59	1301	1330	3.020056	0.029705
	82±9.79	21.88	65	115	116±5.10	11.39	107	134	1.340843	0.281209
	2±0.93	2.07	0	5	4±0.89	2.00	2	7	2.626819	0.049595
	66±5.18	11.59	56	80	92±6.10	13.65	77	106	1.687874	0.175876
	3±0.49	1.10	2	5	5±0.37	0.84	4	6	1.850602	0.140917
	1±0.20	0.45	1	2	2±0.20	0.45	1	2	1.115789	0.378419
	1±0.37	0.84	0	2	2±0.49	1.10	1	3	0.693333	0.633468
	2±1.17	2.61	1	7	7±2.27	5.07	1	12	1.989655	0.116628
	2±0.40	0.89	1	3	2±0.40	0.89	1	3	1.155556	0.359335

TABLE 2. - TUKEY HSD TEST OF THE "LYING-ON-ABDOMEN" VARIABLE

GROUP	{1}	{2}	{3}	{4}	{5}	{6}
	M=157.00	M=107.60	M=47.200	M=29.200	M=40.400	M=44.400
G_1:1 {1}		0.569886	0.013106	0.003136	0.007653	0.010514
G_2:2 {2}	0.569886		0.356281	0.127609	0.249961	0.309585
G_3:3 {3}	0.013106	0.356281		0.989714	0.999908	0.999999
G_4:4 {4}	0.003136	0.127609	0.989714		0.998928	0.995308
G_5:5 {5}	0.007653	0.249961	0.999908	0.998928		0.999993
G_6:6 {6}	0.010514	0.309585	0.999999	0.995308	0.999993	

TABLE 3. - TUKEY HSD TEST OF THE "TOTAL-LYING-DOWN" VARIABLE

GROUP	{1}	{2}	{3}	{4}	{5}	{6}
	M=1324.8	M=1312.4	M=1348.4	M=1344.2	M=1355.2	M=1319.6
G_1:1 {1}		0.949158	0.567205	0.745160	0.300083	0.999065
G_2:2 {2}	0.949158		0.152781	0.256391	0.058747	0.995435
G_3:3 {3}	0.567205	0.152781		0.999673	0.996507	0.355534
G_4:4 {4}	0.745160	0.256391	0.999673		0.969151	0.524044
G_5:5 {5}	0.300083	0.058747	0.996507	0.969151		0.160930
G_6:6 {6}	0.999065	0.995435	0.355534	0.524044	0.160930	

TABLE 4. - TUKEY HSD TEST OF THE "SITTING" VARIABLE

GROUP	{1}	{2}	{3}	{4}	{5}	{6}
	M=6.8000	M=10.800	M=4.2000	M=2.8000	M=2.4000	M=4.0000
G_1:1 {1}		0.697294	0.931163	0.697294	0.609288	0.908319
G_2:2 {2}	0.697294		0.198351	0.074939	0.055296	0.174348
G_3:3 {3}	0.931163	0.198351		0.995433	0.985493	1.000000
G_4:4 {4}	0.697294	0.074939	0.995433		0.999990	0.997823
G_5:5 {5}	0.609288	0.055296	0.985493	0.999990		0.991492
G_6:6 {6}	0.908319	0.174348	1.000000	0.997823	0.991492	

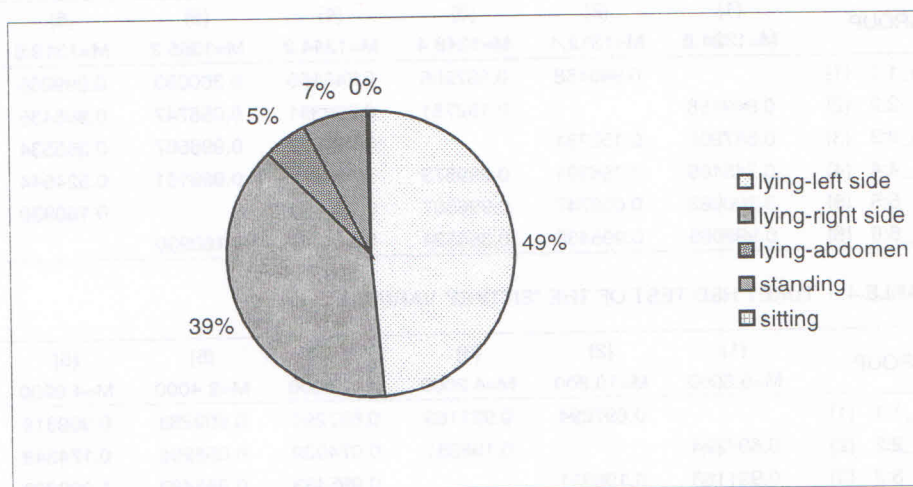
TABLE 5. - COMPARISON OF THE DURATION OF POSITIONS FOR ALL OBSERVED SOWS 24 HOURS AFTER FARROWING

Positions	$\bar{x} \pm Se$	Basic statistic			Analysis of variance	
		sd	x_{min}	x_{max}	F	p
lying-left side	702±15.14	82.93	480	856		
lying-right side	561±13.11	71.81	425	717		
lying-abdomen	71±11.58	63.42	20	302	908.0271	0.00
standing	104±4.94	27.04	59	167		
sitting	5±0.90	4.93	0	20		

TABLE 6. - TUKEY HSD TEST OF THE "POSITIONS" VARIABLE

POSITIONS	{1}	{2}	{3}	{4}	{5}
	M=702.20	M=560.93	M=70.967	M=103.73	M=5.1667
G_1:1 {1}		0.000017	0.000017	0.000017	0.000017
G_2:2 {2}	0.000017		0.000017	0.000017	0.000017
G_3:3 {3}	0.000017	0.000017		0.183967	0.000122
G_4:4 {4}	0.000017	0.000017	0.183967		0.000017
G_5:5 {5}	0.000017	0.000017	0.000122	0.000017	

GRAPH. 1. - THE PERCENTAGE OF ALL SOWS' POSITIONS PERFORMED 24 HOURS AFTER FARROWING



From the data in Table 5 it is clearly visible that all observed sows spend most of their time (expressed in minutes) lying on their left side (702 ± 15.14), right side (561 ± 13.11), abdomen (71 ± 11.58), then standing (104 ± 4.94) and, least of all sitting (5 ± 0.90). In our research the sows were lying down 93% of the time (thereof 49% on the left side, 39% on the right side and 5% on the abdomen), standing 7% and sitting 0% (Graph. 1). Thus it is to be assumed that the percentage values may reflect the small motivation of the sows for moving as it is known that the sows, in the semi-natural environment, spend the day after farrowing with their piglets, lying down on their side and that they rarely change their position (Gundlach, 1968). Accordingly, one may conclude that this behaviour reflects inadequate environment, considering that the animal behaviour is an active response to the conditions in the environment

(Krsnik and Yammine, 1992), because the farrowing crates have been built in such a way that they minimize the standing up and lying down dynamic, by making the space unsatisfactory for these activities (Baxter and Schwaller, 1983). The way in which the sow is lying down endangers the piglets (Wechsler and Hegglin, 1997) and, accordingly, their welfare. The risk is the least when sows express considerable pre-lying behaviour (rooting around and pawing at the ground, looking at and making contacts with piglets), then lying down quickly (Marchant et al., 1996). In our research the sows, after vocalizing their intention to lie down, punished the disobedient piglets by pushing their heads against the fence or the feed or water trough vocalizing these activities by quick short grunts following in quick succession.

We have registered a small number of sows' activities during our research (they eat, drink, urinate, bite, root, scratch). With their first morning meal the sows get slowly up, without any visible excitement and do not stay long at the feeding trough. When given out their afternoon meal, some of the sows do not get up at all, they eat less and stand up for a shorter period of time. During the evening and during the night the sows keep quiet and their activities are reduced. Defecation during the night has not been observed and urinating is rare, sows rarely eat, but they drink more often. Their shifting during night hours is also rare and usually accomplished without getting up. In the 24-hours-time-period after farrowing, the sows, after getting up, scratch intensively those parts of their bodies they were lying down on. Lou and Hurnik (1998) state an even smaller number of activities: nursing, eating, drinking, rooting, oral-nasal activities and "stasis" - the time between the above mentioned meaningful activities. Such a poor behavioural repertoire is the sign of an impoverished environment for, otherwise, the repertoire of pigs held in a semi-natural environment consists of 103 behavioural elements (Stolba and Wood-Gush, 1989). The sows, positioned in crates, are considered to be in a "frustrating" situation as they are unable to satisfy their motivation for motion, search for food and demonstration of other types of behaviour (Broom et al., 1995). Taking into consideration the fact that the environment stimulates the maternal behaviour, as it develops during at least two farrowings (Thodberg et al., 2002) the sows should, in our opinion, be given such type of environment where they could demonstrate at least some of their species-specific nest behaviour as given by Gundlach (1968).

According to the above results one may come to the conclusion that the sows, 24 hours after farrowing, mostly lie on their side (more on the left than on the right side) and that they perform a small number of short-time activities. This conclusion was confirmed by other authors as well. In the animal welfare context, a shortened time in the crates before farrowing and the time until

weaning would, in our opinion, greatly help not only the demonstration of their maternal behaviour, but other types of behaviour as well. The dimensions of the crates, taken the sows' constitution into consideration, should be reconsidered as well.

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VLADANJE KRMAČA 24 SATA NAKON PRASENJA

Sažetak

Veliki je broj aktivnosti u krmača vezan uz razdoblje reprodukcije, pa razumijevanje njihovog ispoljenog vladanja daje odgovore za bolji postupak, a u svrhu dobiti i kvalitetnije proizvodnje. Promatrano je 30 krmača 24 sata nakon prasenja u boksovima s uklještenjem s obzirom na 5 položaja i 6 aktivnosti. Krmače su tijekom istraživanja najviše ležale, rijetko sjedile, a sve aktivnosti su obavljale kratkotrajno. Takav siromašan repertoar s malim brojem aktivnosti i rijetkom promjenom položaja karakteristični su za tu fazu reprodukcije, ali mogu biti i posljedica siromašnog okoliša, te narušene dobiti. Skraćene boravke u uklještenju prije prasenja i ono do odbića pomoglo bi dobiti krmača i omogućilo ispoljavanje većeg broja oblika materinskog vladanja, kao i ostalih oblika vladanja koje onemogućuje uklještenje.

Ključne riječi: vladanje, krmače, dobit.

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