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Influence of electronically controlled individual feeding on behaviour and reproductive performance of pregnant sows*

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ABSTRACT

The behaviour of 31 to 43 pregnant sows housed in one pen was observed during 5 diurnal periods (the number of sows depending on the timing of parturition). On the basis of these behavioural observations the sows were distributed into 5 social ranks: dominants, subdominants, subordinated, selfpossessed and marginals. The reproductive traits studied were: number of live-born piglets, number of piglets alive at 21 days, and litter weight at 21 days. Reproductive performance evaluated in this way did not show any distinct differences according to the social ranks of sows. The average number of piglets born alive varied from 10.8 in selfpossessed to 12.7 in the two extreme ranks: dominants and marginals. The number of piglets alive at 21 days varied from 10.5 in self-possessed to 12.3 in marginals. Litter weight at 21 days varied from 58.0 kg in subdominants to 59.7 kg in marginals. It is suggested that the electronic feeding system is advantageous for the housing of pregnant sows. This feeding system enables maintenance of pregnant sows in one group and permits undisturbed and individual feed consumption irrespective of sows social rank.

KEY WORDS: sows, behaviour, feeding system, litter productivity

INTRODUCTION

One of the modern systems for management of dry sows is combination which comprises group housing and individual feeding. Such a system permits maintai-

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ning satisfactory sow well-being, undisturbed feed consumption and enables sow rations to be individually programmed (Lambert et al., 1985; Brooks and Eddison, 1994; Nowachowicz et al., 1995).

In connection with the increasingly frequent installation of computerized feeder equipment in piggeries, there is a need for ethological observations of behavioural activity of group-housed sows and a feeding and study of their performance level.

The aim of the study was to compare the litter productivity of group-housed sows in relation to their social ranks.

MATERIAL AND METHODS

The experiment was performed at the Agro-Wronie breeding farm which was equipped with the Electronic Sow Feeder Porcode system manufactured by Holland Nedap Poiesz. Each sow was identified by computer on the basis of individually numbered transponder ear tags, and received the programmed complete ration. The sows were able to consume the daily ration at once or at the next visit to the feeder station. The feed station was illuminated during the night.

In one pen (150 m^2) fitted with a running field (65 m^2) there were 31 to 43 sows. The lying area (50 m^2) was divided into eight straw-bedded boxes (6.5 m^2) lacking one wall. The dunging area was about 37 m^2. Water was continuously available from three nipple drinkers. The sows were together in the same pen from mating until about 2 weeks prior to parturition. The new entrant sows learned to use the automatic feeder equipment during 7 days and next they were gradually integrated into the group.

Twenty-four h behavioural studies were conducted 5 times in 14-day intervals. Details of sow behaviour were noted at 15 min intervals. Behavioural patterns and sow distribution into social ranks were described according to Jezierski and Juda (1976).

The studied material comprised sows of Polish Landrace in which about 20 percent were primiparous and others were in the second reproductive cycle. Sow litter performance was assessed on the basis of the number of piglets born alive, the number of piglets alive at 21 days, and litter weight at 21 days.

The results pertinent to sow productivity were statistically analyzed according to the Ruszczyc (1978).

RESULTS AND DISCUSSION

The five series of behavioural observations, each lasting 24 h, indicated that sows spent, on average, the majority of the observation period in the lying position, about 81.4%. Next, moving 11.6, standing 4.7, eating 1.7, other actions 0.6%

TABLE 1

Proportions of sows haematocrital activities, %

Haematocrital activity	Observation period, h				Average
	$4^{01} - 10^{00}$	$10^{01} - 16^{00}$	$16^{01} - 22^{00}$	$22^{01} - 4^{00}$	$\overline{X}$
Lying	74.4	69.3	87.6	94.3	81.4
in pen	70.0	63.1	81.5	94.2	77.2
in running field	4.4	6.2	6.1	0.1	4.2
Moving	16.9	18.6	6.9	4.2	11.6
in pen	14.7	16.1	6.5	4.1	10.4
in running field	2.2	2.5	0.4	0.1	1.3
Standing	5.4	8.9	3.5	0.9	4.7
Eating	2.7	2.3	1.5	0.2	1.7
Another actions	0.6	0.9	0.5	0.4	0.6

(Table 1). The results are similar to ones obtained by Carter and English (1983), Lambert et al. (1983a, b) and Spoolder et al. (1997).

The sows consumed their daily ration, as a rule, at once in about 20 min and some of them tried to get feed again. The region of the feeder station was the area where antagonistic encounters were the most numerous. Hunter et al. (1988) reported that in groups of sows there exists a high correlation between position in dominance hierarchy and position in feeding order. The number of interactions between pen mate sows, on average, was 1.73 per sow daily (Table 2). The intensity of antagonistic encounters was higher when the hierarchial arrangement in the pen was disrupted by removal of sows in advanced pregnancy or by introducing new ones. The new entrant sows were integrated gradually into the group and never initiated an attack on the older pen mate sows, and initially resided in their own vicinity.

TABLE 2

Sows number in pen during particular observation and number of agonistic encounters

Observation	Sows number	Number of agonistic encounters	
		total	per one sow
I	31	53	1.71
II	37	67	1.81
III	33	77	2.33
IV	43	74	1.72
V	37	43	1.16
Average	36.2	62.8	1.73

The different forms of behavioural activity were used to divide the pen mates sows into five social ranks (Table 3). The number of dominant sows in the pen was very stable throughout the study (3 to 4). The number of marginal sows in the pen, on the other hand, was very unstable (3 to 11) probably because of the six new

TABLE 3

Sows number in particular social ranks

Sow social rank	Observation					Average
	I	II	III	IV	V	$\bar{X}$
Dominant	3	3	3	4	4	3.3
Subdominant	6	7	4	4	6	5.4
Subordinated	11	9	12	18	14	12.8
Selfpossessed	7	7	11	14	10	9.8
Marginal	4	11	3	3	3	4.8

entrant sows that were present in the pen during the II series of behavioural observation. Most sows were ranked as subordinated (9 to 18).

Results of sow reproductive performance traits are listed in Table 4. Litter size was not significantly influenced by social ranks of the sows, similarly as litter size at 21 days and litter weight at 21 days. The same performance level in dominant and marginal sows would suggest that feed allowance and undisturbed feed consumption may be decisive for ensuring a high performance level of group-housed pregnant sows.

TABLE 4

Sow reproductive performance traits, mean values (x) and standard deviations (s)

Sow social rank	Number of piglets				Litter weight at 21 day	
	born alive		at 21 day			
	$\bar{X}$	s	$\bar{X}$	s	$\bar{X}$	S
Dominant	12.66	2.30	11.66	1.93	58.33	13.45
Subdominant	12.00	1.87	11.57	1.82	58.00	10.55
Subordinated	10.50	2.06	10.31	2.02	58.31	11.86
Selfpossessed	10.83	2.15	10.50	1.75	59.50	12.14
Marginal	12.66	2.49	12.33	2.58	59.66	14.12

CONCLUSIONS

The adopted electronic sow feeding system may be accepted as advantageous for group management of pregnant sows. There were no negative behavioural events, moreover, the sows had high litter productivity. A further study should be continued on more numerous material.

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STRESZCZENIE

Wpływ elektronicznie regulowanego indywidualnego żywienia na zachowanie i użytkowość rozpłodową loch prośnych

Przeprowadzono pięć całodobowych obserwacji zachowania się 31-43 loch prośnych (liczba loch zmieniała się na skutek różnego terminu porodu). Na podstawie zachowania lochy podzielono na 5 grup socjalnych: dominanty, subdominanty, podporządkowane, opanowane i marginesowe.

Użytkowość rozpłodową loch oceniano na podstawie liczby prosiąt żywo urodzonych w miocie, liczby prosiąt w 21 dniu oraz masy miotu w wieku 21 dni. W zakresie tych cech nie stwierdzono żadnych wyraźnych różnic pomiędzy poszczególnymi grupami socjalnymi loch. Średnia liczba prosiąt żywo urodzonych w miocie wahała się od 10,8 w grupie osobników opanowanych do 12,7 w dwóch skrajnych grupach: dominantów i marginesowych. Liczba prosiąt w miocie w 21 dniu wahała się od 10,5 w grupie opanowanych do 12,3 w grupie loch marginesowych. Masa miotu w 21 dniu wahała się od 58,0 w grupie subdominantów do 59,7 kg w grupie loch marginesowych. Należy stwierdzić, że elektroniczny system indywidualnego żywienia loch jest korzystny, gdyż pozwala utrzymywać lochy prośne grupowo, zapewniając indywidualne żywienie niezależnie od zajmowanej pozycji hierarchicznej przez poszczególne lochy.