

## THE BEHAVIOURAL REACTION OF WEANERS TO HANGING TOYS: WOODEN BALL AND AROMATIZED WOODEN BALL – WAY TO REDUCE AGGRESSION AFTER MIXING REAKCJA BEHAWIORALNA WARCHLAKÓW NA DODATKOWE, PODWIESZANE ELEMENTY: DREWNIANĄ PIŁKĘ I AROMATYZOWANĄ DREWNIANĄ PIŁKĘ - MOŻLIWOŚCI OGRANICZENIA AGRESJI PO POŁĄCZENIU MIOTÓW

Jacek NOWICKI, Marcin KOPYRA, Czesław KLOCEK

Department of Pig Breeding, University of Agriculture in Krakow, Al. Mickiewicza 24/28, 30-059 Kraków, Poland  
Corresponding author: Jacek Nowicki, PhD, phone: +48 12 662 40 70, e-mail: jnowicki@ar.krakow.pl

### ABSTRACT

The behaviour of weaners after mixing housed in pens equipped with hanging wooden ball, aromatized with vanilla fluid hanging wooden ball and without enrichment was evaluated. It was found that both enrichments reduced aggression, however the most interesting for weaners was the aromatized wooden ball.

**Keywords:** behaviour, weaners, aggression, environmental enrichment

### STRESZCZENIE

Przeprowadzono obserwacje zachowania warchlaków utrzymywanych po odsadzeniu w kojcach wyposażonych w podwieszoną drewnianą piłkę, aromatyzowaną aromatem waniliowym podwieszoną drewnianą piłkę oraz bez elementów dodatkowych. Stwierdzono, że dodatkowe wzbogacenie środowiska chowu w postaci aromatyzowanej drewnianej piłki spowodowało statystycznie istotne ( $P < 0,05$ ) obniżenie poziomu agresji w porównaniu do grupy bez elementów dodatkowych, jednak obecność nie aromatyzowanej drewnianej piłki również spowodowała skrócenie czasu spędzanego na walkach i obniżenie ich częstotliwości występowania, jakkolwiek nie zostało to potwierdzone statystycznie.

**Słowa kluczowe:** zachowanie, warchlaki, agresja, wzbogacenie środowiska

### DETAILED ABSTRACT (in Polish)

Regulacje prawne Unii Europejskiej zwracają uwagę na konieczność wzbogacenia środowiska chowu świń. Problem stanowi jednak określenie jakimi cechami powinny się charakteryzować elementy dodatkowe, by zaspokoić potrzeby behawioralne świń. W przeprowadzonym doświadczeniu dokonano 24-godzinnych obserwacji zachowania 144 warchlaków w okresie 2 dni po odsadzeniu i ponownie przez 24 godziny po 3 tygodniach od odsadzenia. Warchlaki pochodzące z dwóch miotów łączono ze sobą w każdym z 8 powtórzeń i następnie dzielono na 3 grupy: grupa I – kontrolna (6 warchlaków w powtórzeniu) utrzymywana w kojcu zaścielonym słomą o wymiarach 1.5 x 2,2 m, grupa II – doświadczalna (6 warchlaków w powtórzeniu) utrzymywana w identycznym kojcu wyposażonym w zabawkę – drewnianą piłkę, podwieszoną u sufitu, grupa III – doświadczalna (6 warchlaków w powtórzeniu), utrzymywana w identycznym kojcu z podwieszoną aromatyzowaną aromatem waniliowym drewnianą piłką. Nie stwierdzono statystycznie istotnych różnic w całkowitej aktywności pomiędzy grupami. Jednak w grupie utrzymywanej w kojcu z aromatyzowaną drewnianą piłką w pierwszych dwóch dobach po odsadzeniu i połączeniu miotów odnotowano statystycznie istotnie krótszy ( $P < 0,05$ ) czas trwania zachowań agonistycznych, jak również istotnie niższą częstotliwość ich występowania. Obecność w kojcu nie aromatyzowanej drewnianej piłki również spowodowała skrócenie czasu spędzanego na walkach i obniżenie ich częstotliwości występowania, jakkolwiek nie zostało to potwierdzone statystycznie.

### INTRODUCTION

In commercial conditions pigs of similar ages and weights are usually mixed with unfamiliar animals, resulting in considerable aggressive behaviour [5]. It is especially visible after weaning, which is a very stressful event often associated with vigorous fighting, growth check and digestive disorders [13]. It is a critical period for the piglets with respect to both nutrition, change from milk to solid food, and social behaviour, separation from the sow and mixing with piglets from other litters. At this time, the piglet is very susceptible to disease because of its immature digestive and immune functions. Modern production systems therefore seek to meet the needs of the weaned piglet by providing a high quality diet, an appropriate thermal environment and a high standard of hygiene [1]. Moreover, weaning is often connected with entering novel environment what may cause fear [7]. Social mixing is perceived by pigs as a stressful event, because the increased salivary cortisol level was found

[10]. The most intensive aggression occurs during the first 1-2 h after which it steadily decreases to a very low level by 24-48 h post grouping and within a given group size the amount of fighting increases with the number of unfamiliar pigs within the pen [8]. Environmental enrichment introduced into and underlined by EU law regulations (Commission Directive 2001/93/EC) [4] may improve the barren conditions and may appease behavioural needs [11]. Commission Directive 2001/93/EC states that pigs kept in groups must be taken to prevent fighting and when signs of severe fighting appear the causes shall be immediately investigated and appropriate measures taken such as providing plentiful straw to the animals, if possible, or other materials for investigation is necessary. Polish law regulations (Rozp. MR i RW (Dz. U. Nr 167, p. 1629) [15] state that stockpersons should minimize aggression among pigs and prevent fights. Similar dispositions rule also in other EU countries i.e. British Code of Recommendations for the Welfare of Livestock – Pigs [3] underlines, in the part describing the welfare of weaners and rearing pigs, that the welfare plan should include a strategy for managing mixing and establishing groups of pigs. Plenty of space, sufficient environmental enrichment can help minimize aggression at mixing. However, the environmental enrichment generally resolves itself into the provision of straw. Also the results concerning the influence of environmental enrichment are not univocal.

The problem is to recognize properly the features of the enriching objects which would satisfy pigs' behavioural needs. In opinion of Lewis et al. [9] the properties of a substrate determine whether or not it will be successful as a source of environmental enrichment. However the destructibility and flexibility are widely accepted as material characteristics which are relevant to pig toys [9]. The characteristics of objects, which were found to be attractive for pigs and maintain their attention are: ingestible, destructible, deformable, chewable and odorous [16]. The sense of smell is very well developed in swine and it reflects itself in fact that pigs are attracted to odourants associated with familiar food [7]

The choice of enrichment for pigs in indoor system is often arbitrary, and do not take into account the requirements of the animals themselves. A consequence of such approach is that animals rapidly lose interest in additional objects [6]. In opinion of these authors the effectiveness and success of any type of environmental enrichment relies upon its ability to reinforce a motivated behaviour, e.g. exploratory or feeding motivation. The toys which are not destructible are not very useful because pigs quickly habituate to their presence and soon ignore them. However, non-destructible but odorous toys

**THE BEHAVIOURAL REACTION OF WEANERS TO HANGING TOYS: WOODEN BALL AND AROMATIZED WOODEN BALL – WAY TO REDUCE AGGRESSION AFTER MIXING**

Table 1. Behavioural profile of weaners housed in pen with hanging aromatized wooden ball, hanging wooden ball and without a toy (24 h = 100%)

Tabela 1. Zachowanie warchlaków utrzymywanych w kojcu z aromatyzowaną drewnianą piłką, podwieszoną drewnianą piłką i bez elementu dodatkowego (24 h = 100%)

Behaviour Zachowanie	Subsequent days of observation (1 = day of weaning) Kolejne dni obserwacji (1= dzień odsadzenia)	Housing System utrzymania		
		Pen equipped with a hanging aromatized with vanilla fluid wooden ball Kojec wyposażony w aromatyzowaną waniliowym drewnianą piłkę	Pen equipped with a hanging wooden ball Kojec wyposażony w podwieszoną drewnianą piłkę	Pen without a toy Kojec bez elementu dodatkowego
Eating (%)	1	4.28b	3.06b	3.43
	2	4.16	2.63	4.30
Czas jedzenia (%)	21	4.98	3.85	6.88
Duration of fighting (%)	1	0.12a	0.15	0.20a
	2	0.11e	0.25	0.26e
Czas trwania walk (%)	21	0.07	0.09	0.07
Fighting frequency	1	5.40c	7.12	7.35c
	2	4.23d	5.85	8.13d
Częstotliwość walk	21	1.07	1.20	1.18
Interest in toy (%)	1	0.53	0.31	-
	2	0.31	0.41	-
Zainteresowanie zabawką (%)	21	0.38	0.32	-
Total activity (%)	1	34.23	32.05	32.53
	2	24.28	22.80	22.75
Całkowita aktywność (%)	21	22.26	19.35	21.23
Total resting (%)	1	65.77	67.95	67.47
	2	75.72	77.20	77.25
Odpoczynek (%)	21	77.74	80.65	78.77

Means in rows signed the same letters differ statistically significantly (P<0.05)

probably have the chance to be more attractive for pigs. Previous preliminary observations [12] showed that also non destructible objects (wooden ball) may reduce the duration and frequency of aggressive behaviour of newly mixed weaners. Taking all above information into account it was decided to determine whether the non-destructible and chewable but odourized wooden ball can affect the behaviour of weaners after mixing and decrease the time and frequency of agonistic behaviour.

#### MATERIAL AND METHODS

24 hour behavioural observations of 144 Polish Landrace

x Polish Large White crossbred weaners during 48 hours after weaning at 35 days after farrowing (first observation period) and again 24 hours after three weeks from weaning (second observation period) were carried out. Animals were housed in mechanically ventilated building with the electronic steering and temperature regulation. Moreover, to avoid the microclimate differences the observations were carried out in the early autumn and during spring. The experiment was made in 8 repeats. In each repeat the weaners were mixed from 2 litters and divided into 3 groups:

Group I (6 weaners) housed in a standard pen, 1.5 m (width) x 2,2 m (length) covered with plenty of straw

Group II (6 weaners) housed in the similar pen covered with plenty of straw with the hanging wooden ball, fixed to the ceiling

Group III (6 weaners) housed in the similar pen covered with plenty of straw with the hanging wooden ball, fixed to the ceiling and previously aromatized with vanilla fluid. Aromatization was repeated in 3 days intervals during the whole observation period.

All pigs were fed ad libitum.

Each pig was individually marked using waterproof chalk, what enabled the identification of initiator and recipient of subsequent behaviour. The 24 hour behavioural profile of all groups was evaluated including the activity phase: agonistic behaviour (fighting and biting), fighting frequency, eating duration and eating frequency, interest in enriching object duration as well as the resting phase including lying on the side, lying on the belly and sitting. 24 hour behavioral observations were carried out continuously using video camera (Burle) and two time-lapse video recorders (Samsung SVR-24 JP and Panasonic AG 6124). During night the illuminance did not exceed 40 lx in the pen area, because the backlights were used, so there were no artificial light effect on the behaviour of weaners. The obtained behavioural data was marked on the previously prepared ethogram and statistically analyzed using Kruskal-Wallis test.

## RESULTS

The day of mixing was characterized by the highest activity of all observed weaners (table 1). The pigs housed in pen with aromatized wooden ball were slightly more active in comparison to other groups, however it was not statistically confirmed.

The fighting frequency as well as the duration of fights in weaners housed in pen equipped with the aromatized wooden ball were statistically significantly lower ( $P < 0.05$ ) in comparison to the group housed without additional enriching object. The eating time achieved the significantly higher ( $P < 0.05$ ) values in pigs which were housed in pen with the aromatized wooden ball than in weaners housed with a wooden ball without aromatization. The time spent on interest in aromatized toy was also longer than time spent at non-aromatized toy, however it was not confirmed statistically.

During the second observation day (day after mixing) the decrease of total activity in all observed groups was found, however, it was still the highest in the group housed with hanging vanilla aromatized wooden ball. The fighting frequency and its duration in this group achieved also the lowest values and they were statistically significantly lower than in group housed without additional enriching

object.

After three weeks the further decrease of total activity was observed in all groups. The duration of fights was also the shortest in case of aromatized toy however the differences were small and statistically not significant.

## DISCUSSION

Weaning often combines several stressful events such as sudden change of diet, a move to a new housing environment, the mother-young link disruption and mixing with unfamiliar piglets [10]. Mixing with other animals induce the aggressive behaviour what is necessary for the establishment of social hierarchy. The most intense aggression occurs during the first 1 – 2 days after it steadily decreases to a very low level by 24-48 h post-grouping [8]. Merlot et al. [10] report that the high cortisol level in newly mixed piglets decreased within 8 hours what can evidence that during first few hours the stress level connected with fights is the highest.

In own experiment the presence of enriching objects influenced the behaviour of weaners after mixing. It is especially visible in case of aggression measured as the average fighting frequency and duration of fighting behaviour. The decrease of aggression level was found starting from the evening hours on weaning day and on the second day in groups housed with wooden ball and aromatized wooden ball, but not in pen without them. It can suggest that the social hierarchy was established more quickly in pens with toys and the additional objects made the adaptation to the new environment easier. These our observations are in agreement with findings of Blackshaw et al. [2] where both fixed and free toys influenced on the decrease of aggression level. However mentioned authors suggest that free toys were less attractive than fixed toys because free toys can lay on the pen floor where they could be soiled by faecal material and pigs which have well developed smell can loose interest in them. In opinion of Van de Weerd et al. [16] the toy for pigs should be odorous. It was also visible in our results because the interest in the hanging aromatized wooden ball increased in first day while the interest in non aromatized wooden ball at the same time was relatively small. Probably the presence of aromatized wooden ball shortened the duration of aggressive attacks, because the aggression was redirected to the ball. Low frequency of biting tails and ears in enriched environment was also observed by Van de Weerd et al. [17], however, these authors suggest that the presence of straw per se is an efficient way of reducing aggression.

The results of the researches carried out by Pearce and Paterson [14] showed that toys (chains,

bars, cloth straps, tyres) used for pigs reared in the crowded treatments significantly increased the amount of exploratory behaviour, however it did not influence the total activity level. In own observations also the total activity level was rather not affected by the housing system, however, the eating time seem to be dependent on the presence of enriching objects, because in pen with aromatized wooden ball highest eating time was found what can suggest that the vanilla fluid may increase the appetite.

In conclusion it should be stated that the presence of additional objects which are not easily destructible also can affect the behaviour of newly-mixed weaners and reduce aggression. Moreover, it is well known that the sense of smell is the best developed in pigs. Therefore, it is very important to find the most attractive odourant for weaners. The reduce of fighting frequency and aggressive behaviour connected with redirection of activity into the toy may improve the productive results, however, further investigation is necessary.

## REFERENCES

- [1] Annex to the European Food Safety Authority Journal (2005) "The welfare of weaners and rearing pigs: effects of different space allowances and floor types". Scientific Report EFSA-Q-2004-077.
- [2] Blackshaw J.K., Thomas F.J., Lee J.A. (1997) The effect of fixed or free toy on the growth rate and aggressive behaviour of weaned pigs and the influence of hierarchy on initial investigation of the toys. *Appl. Anim. Beh. Sci.*, 53: 203-212.
- [3] Code of Recommendations for the Welfare of Livestock – Pigs, Defra Publications, London 2003, p. 28
- [4] Commission Directive 2001/93/EC of 9 November 2001 amending Directive 91/630 EEC laying down minimum standards for the protection of pigs, (2001), Official Journal of the European Community, 1.12.2001.
- [5] D'Eath R.B. (2002) Individual aggressiveness measured in a resident-intruder test predicts the persistence of aggressive behaviour and weight gain of young pigs after mixing. *Appl. Anim. Beh. Sci.*, 77: 267-283.
- [6] Day J.E.L., Spooler H.A.M., Burfoot A., Chamberlain H.L., Edwards S.A. (2002) The separate and interactive effects of handling and environmental enrichment on the behaviour and welfare of growing pigs. *Appl. Anim. Beh. Sci.*, 75: 177-192.
- [7] Jones J.B., Wathes C.M., White R.P., Jones R.B. (2000) Do pigs find a familiar odourant attractive in novel surroundings? *Appl. Anim. Beh. Sci.*, 70: 115-126
- [8] Keeling L.J., Gonyou H.W. (2001) Social Behaviour in Farm Animals. CAB International, ISBN: 0-85199-397-4.
- [9] Lewis E., Boyle L.A., O'Doherty J.V., Lynch P.B., Brophy P. (2006) The effect of providing shredded paper or ropes to piglets in farrowing crates on their behaviour and health and the behaviour and health of their dams. *Appl. Anim. Beh. Sci.*, 96: 1-17.
- [10] Merlot E., Meunier-Salaün M.C., Prunier A. (2004) Behavioural, endocrine and immune consequences of mixing in weaned piglets. *Appl. Anim. Beh. Sci.*, 85: 247-257.
- [11] Newberry R.C. (1995) Environmental enrichment: Increasing the biological relevance of captive environments. *Appl. Anim. Beh. Sci.*, 44: 229-243.
- [12] Nowicki J., Kopyra M. (2006) Preliminary investigations of the influence of free wooden ball in pen on the behaviour and growth rate of newly mixed weaners. *Ann. Anim. Sci. Suppl.*, 2/1, 95-100.
- [13] Paratt C.A., Chapman K.J., Turner C., Jones P.H., Mendl M.T., Miller B.G. (2006) The fighting behaviour of piglets mixed before and after weaning in the presence or absence of a sow. *Appl. Anim. Beh. Sci.*, 101: 54-67.
- [14] Pearce G. P., Paterson A. M. (1993) The effect of space restriction and provision of toys during rearing on the behaviour, productivity and physiology of male pigs. *Appl. Anim. Beh. Sci.*, 36: 11-28.
- [15] Rozporządzenie Ministra Rolnictwa i Rozwoju Wsi z dnia 2 września 2003 r. w sprawie minimalnych warunków utrzymania poszczególnych gatunków zwierząt gospodarskich. (Dz. U. Nr 167, poz.1629).
- [16] Van de Weerd H.A., Docking C.M., Day J.E.L., Avery P.J., Edwards S.A. (2003) A systematic approach towards developing environmental enrichment for pigs. *Appl. Anim. Beh. Sci.*, 84: 101-118.
- [17] Van de Weerd H.A., Docking C.M., Day J.E.L., Breuer K., Edwards S.A. (2006) Effects of species-relevant environmental enrichment on the behaviour and productivity of finishing pigs. *Appl. Anim. Beh. Sci.*, 99: 230-247.

