

Colour preferences in pigs*

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The aim of the study was to determine the behavioural response of weaners to feeders of different colours. Eighteen weaners, crosses of Polish Landrace x Polish Large White, were observed. The pigs received compound feed in blue, red or yellow feeders, *ad libitum*. The behaviour of the pigs was observed using an industrial surveillance camera and recorded in a time-lapse system. The number of visits to each feeder, the time spent at the feeder and the amount of feed eaten were noted. The piglets spent the most time at the blue feeder (on average 41 minutes per day) and the least time at the yellow feeder (28 minutes). These preferences were similar in individuals of both sexes.

KEY WORDS: pigs / coloured feeders / colour preferences / vision

The sense of sight plays an important role in the lives of both free-living and domesticated animals. According to Prince [18] and Adamczyk et al. [1], the angle of view of adult pigs is 310° [1, 18]. This allows them to continuously observe their surroundings, but may reduce their capacity to determine the distance of objects [7]. Tanida et al. [20] estimated the angle of view of pigs at 250°. The anatomical structure of the pig's eye, as well as test results obtained by some authors, indicates that they may be able to distinguish colours [5, 21]. The presence of rods and cones in the eye suggests that pigs have the ability to identify different wavelengths of light, and thus can recognize colours. The size of the eyeball and area of the retina is similar in pigs and humans, which may suggest an ability to concentrate light similar to that of humans [6]. Zonderland et al. [22] found that when pigs recognize objects the level of lighting is less important than the size of the objects. The ability of livestock animals to distinguish colours and their preferences for certain colours may play an important role in pig production. Pen accessories (feeders, troughs, drinking bowls, and barriers) made of materials of a specific colour would be easier for animals to locate and might also encourage them to use them. This would fa-

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cilitate their functioning in the rearing environment and make their handlers' everyday work easier.

Tanida et al. [21] suggest that pigs may not be able to distinguish red from green, but they are able to distinguish blue from green. Results obtained by Deligeorgis et al. [3] show that piglets have some preferences for specific colours. They found that water intake by piglets was higher from red and blue drinkers than from green ones. The duration of use of green drinkers was also shorter than in the case of blue ones. The results of a study by Poznański et al. [17] suggest that the colour preferences of piglets change with age. In their experiment piglets preferred blue and green bottles during the first period of life, but later preferred mainly yellow bottles.

The results of existing research do not provide a conclusive answer regarding colour preferences in pigs. This would be important information, because placing equipment (e.g. feeders, troughs, and barriers) with animal-friendly colours in pens could make them easier to locate, encourage animals to use them, and improve their welfare, which may improve production efficiency and the quality of animal products. For this reason a study was undertaken to determine the behavioural response of weaners to feeders with different colours.

Material and methods

The experimental material was 18 Polish Landrace x Polish Large White crossbred piglets (gilts and barrows) with an average body weight of about 17 kg. Piglets were housed in pens with dimensions of 250 cm × 325 cm. Six weaned piglets (three gilts and three barrows) were kept in each pen. The animals were fed *ad libitum* from three box feeders divided into two parts. Permanent access to water was provided by nipple drinkers. Three feeders, yellow, red and blue, were placed in each pen. The location of the feeders was changed every four days to prevent the piglets from becoming accustomed to a particular location.

The piglets' feed intake from each feeder was monitored. Initially each feeder was filled with 7 kg of feed. Feed was added as it was used up, and each time a record was made of the amount of feed added and the amount remaining before the position of the feeder was changed. When the location was changed the remaining feed was weighed and new feed was added to reach 7 kg.

Observations of behaviour were performed in three series lasting three days each. All piglets were marked on their backs with individual symbols allowing them to be identified. Round-the-clock behavioural observations of the piglets were carried out using surveillance cameras (CCD) and recorded with a time-lapse digital recorder. After the observation period the video was analysed.

The observations included the following:

- time spent by weaners at feeders
- eating frequency (frequency of approaches to the feeder)
- individual preferences (according to sex)

All data were statistically analysed by calculating the arithmetic means and standard deviations (SD) for each type of behaviour. Normal distribution of data was confirmed by

the Shapiro-Wilk test. Differences in behavioural data concerning preferences for the three colours were determined by analysis of variance and Duncan's test, using Statistica 10 PL software.

Results and discussion

In our experiment, weaners preferred eating from the blue and red feeder and approached them more frequently than the yellow one. The average frequency of feeder visits was 12.09 in case of the blue feeder, 11.38 for the red feeder and 9.18 for the yellow feeder (Tab. 1). The average time spent at the feeders per day per animal was 33.94 minutes (Tab. 2). Differences were observed in the time spent at feeders of different colours; the pigs spent more time near the blue feeder (on average 40.42 minutes per day) than near the yellow one (28.22 minutes). An intermediate value (33.19 minutes) was noted in the case of the red feeder.

Table 1
Mean (\pm SD) number of visits to feeders

Feeder colour	Average \pm SD
Red	11.38 ^a \pm 7.7
Blue	12.09 ^a \pm 6.3
Yellow	9.18 ^b \pm 7.1
Mean	10.89 \pm 7.1

a, b – means in columns marked with different letters differ statistically significantly ($P < 0.05$)

Table 2
Mean (\pm SD) time spent near feeder per day (min)

Feeder colour	Average \pm SD
Red	33.19 ^{ab} \pm 25.83
Blue	40.42 ^a \pm 30.88
Yellow	28.22 ^b \pm 30.02
Mean	33.94 \pm 29.28

a, b – means in columns marked with different letters differ statistically significantly ($P < 0.05$)

Females visited the feeders more frequently and stayed there longer than did males (Tab. 3 and 4). However, both barrows and gilts spent the most time at the blue feeder (34.5 and 43.4 minutes, respectively). The animals spent the least time at the yellow feeder (Tab. 4). Similar results were obtained for the frequency of approaches to the coloured feeders (Tab. 3), i.e. the lowest frequency was noted in the case of the yellow feeder.

Table 3
Mean frequency (\pm SD) of feeder visits by gilts and barrows

Feeder colour	Sex	
	barrows	gilts
Red	11.20 ^a ±6.00	11.50 ±8.41
Blue	12.50 ^a ±6.50	11.90 ±6.15
Yellow	7.90 ^b ±6.06	10.00 ±7.45
Mean	10.50 ±6.21	11.10 ±7.39

a, b – means in columns marked with different letters differ statistically significantly ($P < 0.05$)

Table 4
Mean (\pm SD) time spent by barrows and gilts near coloured feeders (min)

Feeder colour	Sex	
	barrows	gilts
Red	30.60 ^{ab} ±23.43	34.50 ^{ab} ±27.16
Blue	34.50 ^a ±27.48	43.40 ^a ±32.31
Yellow	21.70 ^b ±23.76	31.50 ^b ±32.43
Mean	28.90 ±24.98	36.50 ±30.64

a, b – means in columns marked with different letters differ statistically significantly ($P < 0.05$)

The average daily feed consumption was 1.22 kg. The highest feed intake was from the blue feeder (1.53 kg on average) and the lowest from the yellow feeder (on average 0.92 kg per day).

Eyesight in pigs is thought to play a less important role in their natural environment than other senses [8, 9, 12, 19]. Pigs do not base their assessment of the environment primarily on sight [12]; while searching for food they rely mainly on information gathered by the senses of touch and smell [2, 14, 16]. This may be due to the fact that pigs use vision mainly in relation to objects that are near and at eye level [11]. The results of research by Eguchi et al. [5], Deligeorgis et al. [3], and Mayhew [13] show that pigs are able to distinguish blue from other colours.

In a study by Morgan et al. [15] the frequency of visits to the feeder by a single individual ranged from 9.22 to 13.11 per day, depending on the housing system (straw bedding or slatted floor). Similar results were obtained in our study (9.18-11.38). Dyrzcz [4] found that during the initial period of fattening the frequency of feed intake and interest in the trough was 18.0 times in finishing pigs fed three times per day, 19.8 in those fed twice a day, and 21.2 in pigs fed once per day.

The time spent at a feeder of a particular colour may indicate animals' colour preferences. In our previous research [10], younger piglets (approx. 10 kg body weight) fed *ad libitum* spent on average about 204 minutes at the trough per day (14.2% of the day).

Dyrzcz [4] found that the eating time of one individual (duration of stay at the feeder) was 1.54 h in the initial period of fattening. In an experiment by Morgan et al. [15], the average time at the feeder ranged from 53.6 to 53.9 min per animal per day, while in the present study it was lower (33.94 on the average) and varied according to the colour of the feeder.

Similar colour preferences of pigs were observed by Deligeorgis et al. [3], who found that blue drinkers were used by piglets for the longest time. Different results were obtained in our own previous study of the colour preferences of pigs for coloured balls [10]. The pigs showed the greatest interest in red balls and the least in blue ones.

Human colour preferences are known to depend on sex. Similar relationships can be shown in animals. Deligeorgis et al. [3] showed that female piglets preferred blue drinkers while males more often used red ones. In our study barrows most preferred the blue feeders, as measured by the frequency of approaches to the feeder, but there were no statistically significant differences for this parameter in gilts. Nevertheless, both barrows and gilts spent the most time at the blue feeder.

A clear indicator of the colour preferences of animals may be the amount of feed eaten from a feeder of a particular colour, when simultaneous access to the feed is provided to all animals. In a study by Morgan et al. [15], feed intake by pigs ranged from 1.76 kg to 1.85 kg, while in our own study it varied from 0.92 (yellow feeder) to 1.53 (blue feeder). Deligeorgis et al. [3] noted the highest water intake by piglets from blue and red drinkers.

Summing up, the weaners observed preferred blue feeders. This is indicated by the number of visits to the feeders, the time spent at them, and feed intake from them. It can be predicted with high probability that the use of blue feeders should provide better

results than yellow and red ones. The use of blue automatic feeders for fatteners can be expected to contribute to higher feed intake and thus may increase weight gain in fattening pigs. However, as there has been very little research in this area, further in-depth observations should be conducted and their results implemented in practice.

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