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Testing different methods to evaluate pig welfare on farm

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Abstract

Feasibility and validity of protocols used to assess welfare were evaluated in two fattening rooms in twenty farms, chosen according to the group size, pen shape, floor and space per animal. The two rooms contained animals at the beginning or at the end of the fattening period, respectively. Behaviour was recorded either through direct observations of the pens (3 times per minute, at 5 min intervals), 15 minutes after entering the room (B_1) or after the removal of an object given at the end of the visit (B_3). The third protocol consisted of a 2 minute observation inside the pen (B_2). To evaluate the human-animal interaction, the time to adapt to the presence of the operator in the corridor (HA_1) was measured, as well as the reaction of the group when the operator entered the pen (HA_2) or walked slowly through the pen (HA_3), the time taken by the first five pigs to approach the operator (HA_4) and the reaction of the animals when the operator tried to catch an ear (HA_5). Lesion scoring was carried out inside the pen on a sample of 60 individual fatteners or at pen level on most of the pigs from the corridor. The occurrence of the main active behaviours is assessed similarly over time by B_1 and B_3. Behavioural observations are then possible in an on-farm welfare assessment. Lesion scoring from the corridor tends to under estimate the number of lesions (scratches, tail wounds). The HA_3 test appears to be the best one to evaluate the relationship towards humans but has to be validated.

Keywords: *animal welfare, behaviour, human-animal relationship, lesion score, on-farm assessment, pig*

Introduction

Animal-related parameters are used for on-farm welfare assessment to take into account the effects on the animals of their environment and the farmer skills (Main *et al* 2003). Simple protocols have to be designed to develop a welfare assessment tool that can be used by technicians to advise or control farmers or by farmers themselves to improve their management. The cost of the overall system will depend mainly on the time needed to perform all the required measurements. Rapidity is therefore a quality among others that has to be taken into account. The objectives of this study were to define simple procedures to assess behaviour of fattening pigs and to score lesions, and to test their feasibility and validity. Another aim was to propose ways in which to evaluate the human-animal relationship on a farm.

Materials and methods

A survey was conducted on 20 pig farms. On 15 of them, pigs were kept in pens with concrete floors (fully slatted: 14 farms; partially slatted: one farm), in groups of seven to forty-two pigs, with an area per pig ranging from 0.67 to 0.97 m^2. On four other farms, pigs were kept on straw in groups of 15 to 30 animals, and the space area ranged from 1.15 to 2.58 m^2 per animal. In one farm pigs were kept outdoors. All pens of two different rooms were used for the evaluation on each farm. The first room was used at the beginning of the growing period, a minimum of 15 days after animals had been regrouped (room 1). The number of pigs in the room ranged from 70 to 220 (mean = 120) and the number of pens from one to 12 (median = 8). The second room was used at the end of the finishing period, prior to the first departure to the slaughterhouse (room 2). The number of pigs in these rooms ranged from 40 to 150 (mean = 88) in one to 12 pens (median = 7). The pens in each room were divided between two observers. Each observer carried out all the observations on their own allocation of pens. The whole protocol was carried out first in room 2 and then procedures for measuring behaviour and some tests evaluating human-animal interaction were done in room 1. Three trained observers carried out the study. Farms were visited in pairs and visits began in the morning, after pigs had been fed.

Behaviour of animals (rooms 1 and 2)

Some behaviours are of particular interest in welfare assessment, because they are indicators of reduced welfare (agonistic social behaviour, abnormal oral behaviour) or of good welfare (play behaviour, positive social behaviour). Within these behaviours, some are long-lasting and others very brief. Therefore each pen was observed three times for

Table 1 Spearman correlation coefficients between behaviour measures resulting from three different protocols (B_1, B_2, B_3) applied in the growing period (room 1) and at the end of fattening period (room 2).

Stage (number of farms)	Room 1 (19 farms)			Room 2 (20 farms)		
Behaviours	**B_1/B_2**	**B_1/B_3**	**B_2/B_3**	**B_1/B_2**	**B_1/B_3**	**B_2/B_3**
Toy/straw related behaviour	0.94***	0.89***	0.91***	0.90***	0.93***	0.84***
Investigations of the environment	0.68**	0.80***	0.68**	0.84***	0.78***	0.87***
Social negative behaviour	-0.07	0.66**	0.24*	0.36	0.46*	0.30
Social positive behaviour	0.09	0.43	0.18	0.34	0.74***	0.41
Feeding/drinking	0.82***	0.75***	0.79***	0.80***	0.89***	0.94***
Other oral activities	0.43	0.62**	0.61**	0.40	0.59**	0.26

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Table 2 Spearman correlation coefficients between tests evaluating human-animal interaction carried out at the end of the fattening period (20 farms).

	HA_1, 2mn	**HA_1, 10mn**	**HA_2**	**HA_3**	**HA_4, 2 pigs**
HA_1, 10mn	0.47*				
HA_2	0.00	-0.21			
HA_3	-0.14	-0.26	0.53*		
HA_4, 2 pigs	0.15	-0.03	0.37	0.40	
HA_5	0.51*	0.22	-0.35	-0.15	-0.10

* $P < 0.05$

Table 3 Use of different classifications to compare lesion-scoring methods, from the corridor or inside the pen (percentage of animals per class).

Method	Choice of classes to classify individual scores			CMH[a]
From the corridor(1,188 pigs)	< 5 scratches (72.7)	5-10 scratches (22.4)	> 10 scratches (4.9)	
Inside the pen (1,160 pigs)	< 5 scratches (60.6)	5-10 scratches (31.2)	> 10 scratches (8.2)	***
	< 6 scratches (69.0)	6-11 scratches (24.4)	> 11 scratches (6.6)	**
	< 7 scratches (75.2)	7-12 scratches (19.8)	> 12 scratches (5.0)	ns

** $P < 0.01$, *** $P < 0.001$, ns = not significant, [a] Mantel Haenszel chi-square ie Mantel Haenszel chi-square between each classification concerning pigs scored inside the pen and the classification concerning scores from the corridor.

one minute at a time with a five minute interval between two successive observations. All behaviours adopted by each animal were recorded. This procedure was performed twice; first at least one hour after the morning feed and 15 minutes after entering the room (B_1) and again three to four hours later, after removal of an object which had been left for 15 minutes in the pen, in order to reactivate the animals (B_3). A third protocol consisted of a two minute observation of the animals, the observer being inside the pen (B_2). Recorded behaviours were positive and negative social behaviours, feeding and drinking behaviour, investigation of the environment, investigation and manipulation of toys or straw, non-feeding oral activities and resting.

Human-animal interaction (rooms 1 and 2)

Five protocols were defined to characterise the behaviour of animals towards humans. When the operators entered the room, they made all the pigs stand up by making noise from the corridor. They then counted the number of pigs still sitting or standing after 2 and 10 minutes (HA_1). The reaction of most of the group was scored when the operator entered the pen (escape, ie general movement of the pigs to the back of the pen, or not; HA_2) and while he was walking slowly through the pen (panic, ie animals running away or gathering at the back of the pen, or avoidance, ie animals moving aside quietly; HA_3). The test described by Miura *et al* (1996) was adapted and used to record the time necessary for the first five pigs to approach to within 30 cm

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of the motionless observer standing at the side of the pen (HA_4). Lastly, the reaction of a sample of 60 pigs per room when the operator tried to catch their ear was scored (possible or not; HA_5). This latter test was only performed in room 2.

Skin lesions and injuries (room 2)

According to previous experiments on fattening pigs (Courboulay *et al* 2003), sampling a third to half of the animals present in a room is enough to describe the importance of lesions in a population. Lesion scoring was therefore carried out inside the pens from a sample of sixty fattening pigs spread over the whole room to serve as a reference (method 1). Three centimetre long scratches and bites were taken into account if they were red or dark coloured or presented sufficiently continuous scabs. Smaller lesions were also counted if they were more than 3 mm wide. The lesions were counted on both sides of each pig. Ears and tail were scored as intact, red, wounded, presenting scabs or torn.

A simpler, second method, consisted of scoring most animals in the pen from the corridor. The observation stopped when it was not possible to determine if the pig had already been scored or not. The lesions were observed on one side of the pigs. Scratches were scored according to three classes: less than five lesions, from five to ten lesions and more than ten lesions. Ear and tail problems were scored from the corridor according the same scale as inside the pen.

Statistical analyses

For each method, behaviours were expressed as the number of times the event was observed in the room within the whole number of active behaviours observed in the room. Spearman correlation coefficients were calculated for comparison of behaviours between the three methods and between rooms of each farm. The effect of the method on the total number of observed active behaviours in the room was analysed for each room according to an analysis of variance, after a log-transformation.

Human-animal interaction variables were calculated within each room and consisted of the proportion of pigs in the room still standing at two or ten minutes (respectively, HA_1; 2 min and HA_1; 10 min), the proportion of pens where the main reaction is escape (HA_2) or panic (HA_3), the mean aggregate of the times for two pigs to approach the observer (HA_4) and the proportion of animals accepting the contact (HA_5). Spearman correlation coefficients were calculated between these tests and between rooms for each test, as well as between the tests and the area per animal. Number of ear and tail lesions were analysed between methods using a Mantel Haenszel chi-square. Individual lesion scores were first transformed according to the scale used in method 2 (under five lesions, from five to ten lesions and over ten lesions) to be compared to scores obtained from the corridor and were submitted to chi-square analysis. Then we changed the thresholds between classes and used two different scales. Scale one and two consisted of three classes with thresholds at six and 11 lesions (scale one) and seven and 12 lesions (scale two). Mantel Haenszel chi square tests were calculated to evaluate the effect of the method. All data were analysed using SAS 8.01.

Results and discussion

Behaviour of animals

The amount of active behaviours observed differed significantly between the three methods at the end of the fattening period (213, 107, 158 active behaviours for B_1, B_2 and B_3 respectively; $P < 0.001$) but the difference between B_1 and B_3 was not significant in room 1 (281 and 218 active behaviours for B1 and B3 respectively; $P > 0.1$). Pigs were more active at the beginning of the visit and even if the object re-activated them consistently, the activity went down, as they got older. Strong significant correlations existed between B_1 and B_3 for all behaviours in room 2 (see Table 1) and for most behaviours in room 1. This result indicated persistency in the expression of the different behaviours over time. Correlations between the beginning and the end of the fattening period were significant ($P < 0.05$) for all parameters when they were observed from the corridor. They ranged from 0.46 (social positive behaviour) to 0.88 (toy/straw investigation). It seems therefore unnecessary to perform observations at each stage of the growing-fattening period in order to have a good description of the behaviours of the animals.

Human-animal interaction

Very few significant correlations existed between the five tests used in room 2 (Table 2). The HA_1 test concerned the adaptation of pigs to a human being who was not in close contact with them. HA_1 (2 min) test is significantly correlated to the number of pigs per pen ($r = -0.66$, $P < 0.05$) and to the area per pig ($r = -0.53$, $P < 0.05$). Thus the presence of the observer affected mainly animals located near the corridor and did not give any information about the whole group. This was no longer the case after ten minutes (HA_1; 10 min) but this measure was not correlated to any other ones, underlining its poor validity. The HA_4 test was sometimes difficult to perform because of the aggressiveness of some animals. It should therefore be limited to the observation of the first two pigs, but would not therefore reflect the whole group. The best correlation was found between HA_2 and HA_3 tests ($r = 0.53$, $P < 0.05$). Pigs escaped when the operator entered the pen in 78 of the 136 studied pens in room 2 whereas panic was scored only in 29 pens. The HA_3 test seems a better one because it was more selective and easier to standardise. On some farms it was impossible to open the doors of the pens and therefore the noise or disturbance caused by the observer jumping into the pen may have altered the reaction of the animals. The HA_5 test is correlated to the area per pig ($r = -0.68$, $P < 0.05$). Furthermore in some cases, animals accepted the contact although they were frightened, since they had no way to escape.

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Skin lesions and injuries

Number of scratches ranged from zero to 69 for the pigs scored individually. There was no statistical difference in the amount of scratches scored on the right and the left sides of the pigs. When scoring was performed on only one side of the animal and data classified in three classes, there was a significant effect of the method on the distribution of animals per class (Table 3). Observations made from the corridor tended to under-evaluate the number of lesions. This might be explained by the fact that animals recorded were not the same. Moreover, we took into account thin, red scratches difficult to see from the corridor. When the definition of classes was changed, there were no more differences between methods. This fast and simple procedure allows a good characterisation of the animals in a farm.

Tail problems, such as wounds and redness, were under-evaluated too when animals were checked from the corridor compared to the sample of pigs ($P < 0.001$), but important lesions like lacerations and scabs on the tails did not differ ($P > 0.3$). There was no difference between methods in evaluation of ear problems, except for red ears ($P = 0.03$). In a welfare assessment tool, it could be necessary to combine observations inside the pen (tail, leg weakness) and from the corridor.

Conclusions

Rapid methods can be used to score lesions and behaviour of pigs on farm. Nevertheless, lesion scoring systems can be simplified in order to take into account only meaningful lesions. Behaviour can be recorded through repeated scans in order to get the same amount of data between observers. These adjustments can facilitate repeatability of these criteria but data on short-lasting behaviours remain difficult to collect. Human-animal relationship is more difficult to evaluate. Some tests seem interesting but their validation is necessary before using them on a farm.

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