Pig welfare

Quantifying pigs' welfare using behavioural parameters

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Introduction

The most common means of transport for (slaughter) pigs is the lorry even though, in welfare terms, it is generally found that lorry transport is worse for pigs than rail, sea or air transport. Pigs are likely to suffer motion sickness during road transport, which may result in vomiting after eating 4 hours before transport (Bradshaw *et al.*, 1995). For this reason, pigs require careful preparation before transport and comprehensive plans for the journey should be made. The transport conditions are usually worse for slaughter pigs than for breeding animals.

Transport and associated handling always have some adverse effects on the welfare of pigs (v. Putten and Lambooij, 1982). Adverse effects are related to psychological, physical, environmental, metabolic and treatment factors (Figure 1). Indicators of poor welfare include behavioural responses indicative of coping ability. Where control systems are overtaxed the term stress is used (Broom and Johson, 1993); a well known disease related to transport is the Porcine Stress Syndrome (Tarrant, 1989).

Nowadays, transport distances of pigs by road between farms or to the slaughterhouse are increasing because of the economic consequences of greater opportunities for long distance trade. Within the European Union (EU), free movement of animals from one member state to another has resulted in more long distance transportation to slaughter.

Regulations on the protection of animals during transport are laid down in the Council Directive of 19 November 1991. Article 3b states "Member States shall ensure that no animal shall be transported unless it is fit for the intended journey and unless suitable provisions have been made for its care during the journey and on arrival at the place of destination. Animals that are ill or injured shall not be considered fit for transport". Pending implementations of these provisions, Member States may, subject to the general provisions of the Treaty, apply relevant national additional rules. The conditions during transport and duration of transport and the welfare of transported animals are more and more the subject of discussion.

Coping style

Pigs are kept for several months under specific housing conditions which vary according to the particular production

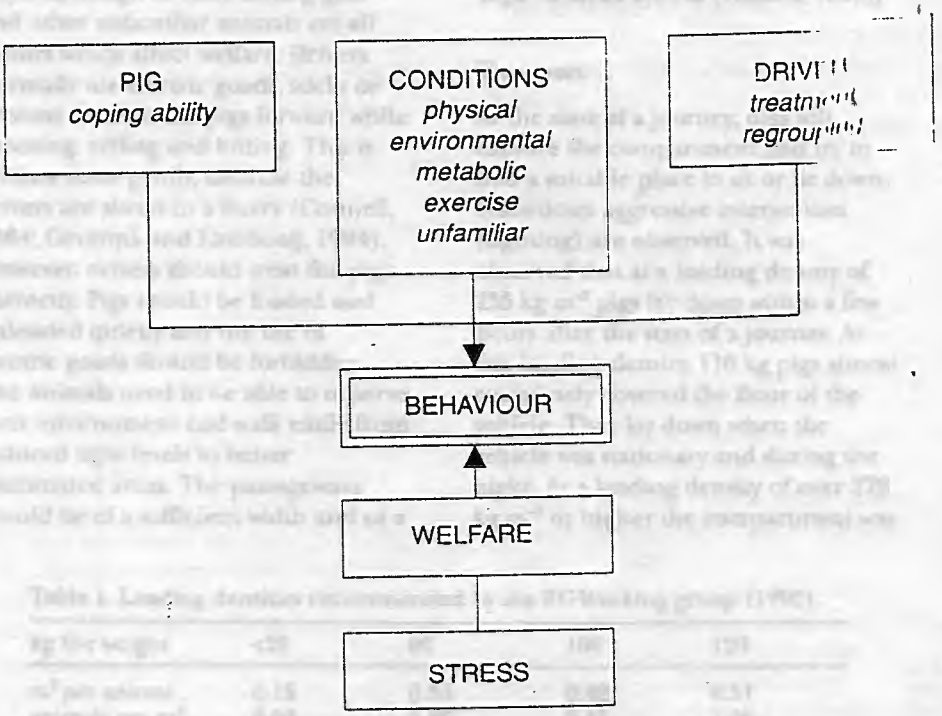

Figure 1. Factors that affect behaviour during transport and associated handling.

The following paper was presented at a meeting related to an EC–AIR project on the heading, transport and lairage of slaughter pigs. The full proceedings of this meeting are now available for sale (see page 442 for information).

system. After this period they have to be transported either to another farm or to a slaughterhouse. Individual pigs respond in different ways to stressors. The response is dependent on the genotype, coping style, treatment and experience of the animal. On the basis of their responses, pigs can be divided into groups in which different behavioural and physiological characteristics may be noted. Pigs may be divided into active and passive individuals based on behaviour tests. The normal cortisol value in blood is higher in passive animals compared with active ones. However, after an ACTH challenge, the value is equal in both groups. When piglets are placed on their backs ("back" test), the active animals show a higher increase in heart beats than passive animals (Hessing, 1994). However, it should be noted that behavioural characteristics vary in a population (Jensen *et al.*, 1995). Based on agonistic interactions, pregnant sows may be divided in three groups – high, low and no success at winning. The normal cortisol value is highest in animals having low success, while these animals respond most to the ACTH challenge test (Mendl *et al.*, 1992).

Coping style may correlate with the response to transport and associated conditions. Transport conditions involve exposure to social stress (e.g. mixing with unfamiliar pigs) and non-social stress (rough handling). Individual differences in behaviour in home pen conditions and during mild challenge tests may be related to subsequent reactions during transport, driving and mixing (Geverink *et al.*, 1995). During fattening, when the pigs are aged between 14 and 20 weeks old, the piglets can be tested for social status by scoring the agonistic interactions or by using a "food competition" test. In the first test, social ranking of individuals may be determined by allowing a total of four hours of agonistic interactions (bite, head knock, threat, displace, avoid). In the second test, the pigs have no access to food for twenty hours prior to the test. At the start of the test a fixed amount of food is placed in the trough. For fifteen minutes, interactions (bite, head knock, threat, displace, avoid) and frequency and duration of eating are scored. Finally, an "open door" test may be used to test for individual activity and exploration. In this test, the door of a pen is opened and the reaction of pigs is recorded on video. The passageway next to the pen is blocked resulting in an area of about 6 x 1 m the pigs can enter. After ten minutes, the pigs are gently returned to the home pen. Parameters scored afterwards from video recordings are latency to leave the pen, frequency of crossing particular areas, exploration and social interactions.

Loading and unloading

Procedures of loading and unloading, physical design of (un)loading gear and other unfamiliar animals are all factors which affect welfare. Drivers normally use electric goads, sticks or brooms to move the pigs forward while shouting, yelling and hitting. This is seldom done gently, because the drivers are always in a hurry (Connell, 1984; Geverink and Lambooij, 1994). However, drivers should treat the pigs correctly. Pigs should be loaded and unloaded quietly and the use of electric goads should be forbidden. The animals need to be able to observe their environment and walk easily from reduced light levels to better illuminated areas. The passageways should be of a sufficient width and of a solid structure. Steel projections and channels in the walls are not acceptable. Climbing a loading ramp is difficult for pigs, as the situation is often psychologically disturbing. The animals may simply refuse to try, and even turn their sides towards the ramps. As a result, the heart rate may increase to a level where the heart starts to lose synchronisation (v. Putten and Elshof, 1978). The angle of the loading ramp should not be greater than 15–20° (v. Putten and Elshof, 1978; Fraser and Broom, 1990). Descending a loading ramp steeper than 20° is difficult and should be avoided (Grandin, 1981).

Parameters to be recorded during driving consist of the order the individual pigs proceed along the passageway, and the frequency individual pigs are pushed by the driver. During mixing, the frequency and duration of agonistic interactions as well as the identity of the initiator or receiver may be recorded. Data can be analysed with The Observer / Video Tape Analysis System (Noldus, 1991).

Transport

At the start of a journey, pigs will explore the compartment and try to find a suitable place to sit or lie down. Sometimes aggressive interactions (fighting) are observed. It was observed that at a loading density of 235 kg m^{-2} pigs lay down within a few hours after the start of a journey. At this loading density, 110 kg pigs almost completely covered the floor of the vehicle. They lay down when the vehicle was stationary and during the night. At a loading density of over 278 kg m^{-2} or higher the compartment was

Table 1. Loading densities recommended by the EC-Working group (1992).

kg live weight	<25	60	100	120
m^2 per animal	0.15	0.35	0.42	0.51
animals per m^2	6.60	2.80	2.35	1.96

clearly overcrowded. The consequence was a continual changing of positions, and the pigs were not able to rest (Lambooij, 1988; Lambooij and Engel, 1991). A loading density for slaughter pigs of 235 kg m^{-2} is suggested as a compromise between animal welfare, meat quality and the economics of transport.

Other aspects that affect the activities are the effects of rough or smooth journeys, duration of transport and the micro-climate. During short journeys, pigs are mostly standing and sitting, while during a rough journey a higher number of pigs remain standing compared with a smooth journey (Bradshaw *et al.*, 1995). Pigs lie down after two to four hours following the start of transit, thus during longer journeys the main activity is lying down. When pigs are artificially ventilated or well ventilated they are more quiet (Lambooij, 1988; Barton-Gade and Vorup, 1991).

As mentioned above, the main activity of pigs during transport is lying down. Video observation during transport may be related to the number of pigs and the duration of pigs standing, sitting or lying down. When possible, walking during transit and stops may also be noted.

Lairage

After arrival at the slaughterhouse, pigs need to be unloaded carefully and as soon as possible, because ventilation in stationary vehicles is often very poor. The passageways need to be solid, while projections and channels should be avoided. The floors should not be be slippery. Different colours and shadows may frighten the animals; they walk easily from a dark to a lighter place. Electric goads are in common use in lairages, but, they cause stress to the pigs and should be banned (Grandin, 1990; Geverink and Lambooij, 1994; Geverink *et al.*, submitted).

The width of a passageway is sufficient when four to five animals can walk side by side. Groups of about ten to fifteen pigs should be driven. Pigs may be discouraged from returning by using gates (Grandin, 1990). In Denmark, a fully automated system which is controlled by a computer has now been developed (Barton-Gade *et al.*, 1992).

In front of the restrainer, pigs are brought to a single or double file using a step by step design or via a curved crowed pen with an entrance restrictor to prevent jamming (Grandin, 1990). In this area electric goads are particularly frequently used in order to maintain the line speed (Geverink *et al.*, 1995).

Despite these developments and recommendations on welfare, handling in the lairage is still a major cause of distress to slaughter pigs. To examine the behaviour of pigs, special attention should be given to design and handling techniques. Parameters that can be measured are the distance from the unloading platform to the holding pen and further on from the holding pen to the restrainer, the design of passageways, the size of the holding pens and density in pig per m^2. Attention may be given to the use of tools (electric goads, sticks, brooms) and whether the driver uses these tools from the front or the back of the group. Lairage time and duration and frequency of showering may also be recorded, along with the treatment of pigs that are unable to walk due to physical damage or exhaustion.

Behaviour of groups in lairage can be recorded on video tape after the introduction of the pigs into the holding pen. A GR-M3 camcorder may be mounted above the pen, providing a viewing area which encompasses at least 90% of the area of the pen. Tapes may be subsequently viewed and analysed with The Observer (Noldus, 1991). Frequency and duration of all aggressive interactions as well as the identity of the initiator and receiver may be recorded. In addition, behaviour can be sampled live for five 10-minute bouts. All aggressive interactions may be recorded with The Observer 2.0 on a Psion Organiser LZ 64 hand-held computer. Duration of the interactions observed may then be calculated and, at the start and the end of each bout, the number of animals sitting or lying may be recorded.

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