



Do umbilical outpouchings affect the behaviour or clinical condition of pigs during 6 h housing in a pre-transport pick-up facility?



Sarah-Lina Aa. Schild^a, Tine Rousing^a, Henrik E. Jensen^b, Kristiane Barington^b, Mette S. Herskin^{a,*}

^a Department of Animal Science, Aarhus University, Blichers Allé 20, DK-8830 Tjele, Denmark

^b Department of Veterinary Disease Biology, University of Copenhagen, Copenhagen, Denmark

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ABSTRACT

This study focused on behavioural and clinical effects of umbilical outpouchings (UOs) in pigs. Matched pairs of pigs with UOs (diameter 12 cm; range 4–20; diagnosed *p.m.* as hernia or non-hernia) and controls (N = 28) were compared during a 6-h stay in a pick-up facility. Overall, skin lesion scores were increased after the 6-h stay. Behaviour of the UO-pigs differed from the controls (a shorter latency to lie down ($P < 0.05$) and decreased aggression ($P < 0.05$)). Pigs with umbilical hernia showed e.g. increased sitting ($P < 0.05$) and decreased lying ($P < 0.05$) compared to pigs with non-hernia UOs. No effects of the size of the OUs were found. These results are among the first to establish knowledge about UO-pigs and suggest that a stay in a pick-up facility can be challenging for pig welfare. The behavioural findings suggest that UO-pigs, and especially pigs with hernia, may be less fit for mixing and housing in barren environments.

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1. Introduction

Umbilical hernia and comparable conditions presenting as outpouchings on the ventral aspect of the abdominal wall are relatively common pathological conditions in modern pig production (Searcy-Bernal et al., 1994; Petersen et al., 2008).

Typically, the day of slaughter involves potential stressors for pigs e.g. fasting (Gispert et al., 2000), mixing with unknown conspecifics (Barton Gade, 2008) and high stocking density (Warriss et al., 1998), which all may compromise animal welfare (Lambooy, 2007). However, effects of typical pre-slaughter stressors on pigs with umbilical outpouchings (OUs) have not been examined. Specific regulations for the fitness of pigs for transport have been laid out by the EU (Anonymous, 2005). However, the fitness for transport of pigs with UOs is not specified, in the European legislation, whereas Danish national guidelines specify that, irrespective of the underlying pathology, the diameter of the outpouching should be used as criteria for fitness for transport. Hence, in Denmark, pigs with UOs greater than 15 cm in diameter require special conditions (e.g. the pigs fitness for transport must be evaluated prior to transport and UO-pigs must

be separated from non UO-pigs in the pick-up facility and on the lorry) in order to be transported (Anonymous, 2008).

In order to maintain maximum infection control in the herd and to achieve a rational and quick pick-up from farms, Danish slaughter pigs are often kept in on-farm pick-up facilities before being transported to the abattoir (Jensen, 2012). Thus, a pick-up facility consists of pens without feed or rooting materials, where the pigs are typically mixed with unfamiliar animals and kept at a high stocking density for several hours before transport. However, the impact of the use of pre-transport pick-up facilities on pigs with UOs is unknown.

The aim of the present study was to examine behavioural and clinical consequences of a 6-h stay in an experimental pick-up facility in clinically healthy pigs with UOs versus control pigs without UOs. Based on the Danish guidelines involving the diameter of the umbilical outpouchings as well as recent findings of different pathological conditions within porcine umbilical outpouchings at slaughter (Andersen et al., 2014), special attention was paid to these measures.

It was hypothesised that UO-pigs, and especially those with UOs greater than 15 cm in diameter, would differ behaviourally from control animals during the stay in the pick-up facility. Specifically, since umbilical hernia (UH) is reported to be painful in humans (Velasco et al., 1999; Rodriguez and Hinder, 2004), we expected a lowered aggression threshold and thus increased aggression in UO-pigs. Furthermore, due to the reported pain from human UHs, we expected a reduction in lying behaviour in UO-pigs and an increased

* Corresponding author. Tel.: +45 8715 7945; fax: +45 8715 6076.
E-mail address: mettes.herskin@anis.au.dk (M.S. Herskin).

sitting behaviour. These effects were expected to be evident in pigs with larger UOs.

2. Materials and methods

2.1. Animals and housing

This study was conducted at Aarhus University, AU-Foulum, Denmark from August to September 2013 and utilised a total of 56 Danish crossbred Landrace × Yorkshire × Duroc slaughter pigs. The pigs were purchased from a commercial farm at a minimum of 60 kg of body weight and were delivered in two batches. After arrival, the animals were distributed to identical home pens measuring 13.6 m², each containing 12 animals of which a maximum of 50% had UOs and the rest were healthy controls as well as non-experimental pigs. Enrichment material consisted of straw (5–7 kg uncut wheat straw per pen allocated daily) and a plastic ball provided to the pigs a minimum of five days prior to the experiment. The flooring consisted of 27% slatted floor, 37% partially slatted floor and 36% solid floor. Animals were fed a commercially available complete dry feed mix for *ad libitum* intake (topped up three times daily) (Svin Enh Bas Helse U, DLG, Copenhagen, Denmark) and had free access to two drinking bowls per pen. Temperature in the home pen (on the day of testing) was 17.5 ± 1 °C (mean ± SE) measured approximately 1 m above the floor. All animals were inspected by a veterinarian no later than a week prior to the initiation of data collection. The study was approved by the Danish Animal Experiments Inspectorate.

2.2. Experimental design

The experiment was designed as a case–control study (Ersbøll et al., 2004) comparing selected behavioural and clinical measures of pigs with an umbilical outpouching versus matched controls during a 6-h stay in an experimental pick-up facility. In the facility, no feed or rooting materials were available, and the animals were mixed with unfamiliar pigs at entry. The experiment was carried out over four weeks and consisted of four consecutive blocks of 12 (blocks one and two) or 16 (blocks three and four) pigs, respectively. Pigs for the first two blocks were recruited from the same batch of animals, and similarly for pigs from blocks three and four.

After an acclimatisation period, where pigs were housed in the home pens for at least seven days after arrival to AU-Foulum, the pigs were relocated into one of two experimental pick-up pens, each containing three to four pairs of experimental pigs (from at least three different home pens) as well as non-experimental pigs. The non-experimental pigs were animals without UOs or any other clinical signs. These animals were added to the pick-up pen in order to achieve a stocking density of 0.65 m² per pig and maintain a number of animals per pen resembling commercial conditions.

Within each block, the UO-pigs were identified in the home pen on the day prior to the experiment (day –1) and included in the experiment based on the presence of an UO up to 20 cm in diameter, no open skin lesions on the UO and no other clinical signs of disease. The following visually examined criteria were used for the inclusion of control animals: clinically healthy and matched as closely as possible the UO-pig in terms of: resident pen, sex (UO-pigs: 18 females/10 castrates, controls: 11 females/17 castrates) and shoulder height (UO-pigs: mean 66 cm (range 61 to 73), controls: 68 cm (range 64 to 73)) and body condition score (UO-pigs: median 3 (range 2 to 4), controls 3 (range 2 to 4)) listed in a weighted order. On the day of the experiment, humane endpoints were: Fresh blood present on the UO, sudden changes in the size, shape or colouring of the UO, evidently lowered locomotor function, large skin lesions or lack of general responsiveness.

Because of the outpouchings on the ventral aspect of the abdomen and the marking used for identification, the observers could not be blinded for the treatment (UO-pig vs. control).

2.3. Experimental procedures

2.3.1. Experimental pick-up facility and relocation of animals

The pick-up facility was located in a section of the building located 20 to 30 m from the home pens and contained eight identical pens, of which two were used as experimental pick-up pens. Each pick-up pen contained 13 animals and measured 8.5 m². The pigs had access to two drinking bowls per pen. Artificial light was provided during the 6-h stay in order to facilitate the behavioural recordings. The temperature in the pens was 18.1 ± 1 °C (mean ± SE) (measured once per block at the initiation of the 6-h stay at a height of approximately 1 m). Neither enrichment nor food was available during the 6-h stay. The pen flooring consisted of approximately 40% slatted floor and 60% partially slatted flooring.

On the day of the experiment, all pigs were subjected to a clinical baseline examination. In order to be able to collect the clinical data, the animals were restrained by nose sling. Two trained technicians were involved in the clinical examinations; one restraining the animal and the other person—always the same—collecting the clinical data. After the clinical examination, the experimental pigs were numbered on the back using different colouring for UO-pigs and controls and then walked to the pick-up facility, where they were mixed at entry. Within each block, the pigs were introduced to the pick-up facility at 06:00 h. After a 6-h stay in the pick-up pens, the pigs were relocated, and the UO-pigs were held at a low density (3 to 5 m² per pig) in straw-bedded pens and provided their normal feed for *ad libitum* intake during the night. All animals were weighed upon departure from the pick-up facility (UO-pigs mean: 101 kg (74 to 123 kg), controls: 105 kg (89 to 120 kg)). The following day, the UO-pigs were stunned using a captive bolt pistol (Cash Magnum CAL 25, CASH Pistol, Ulfborg Kirkeby, Denmark) and euthanized.

2.4. Data collection

2.4.1. Clinical recordings

The clinical examinations conducted before and after the 6-h stay in the experimental pick-up facility consisted of determination of: 1) sex (female or castrate); 2) height of the standing animal at shoulder level (cm) (Fig. 1); 3) reducibility of the outpouching: “reducible”, “irreducible” or “unclassified”; 4) body condition score based on a scale of 1 to 4, where “1” referred to pigs where ribs, spine and hip bones were conspicuous; “2” characterised pigs where ribs, spine and hip bones were palpable when applying a light pressure; “3” characterised pigs where ribs, spine and hip bones were palpable when applying a firm pressure;

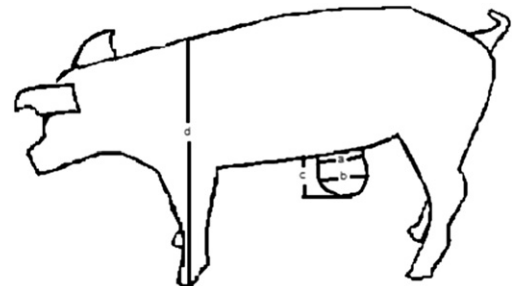


Fig. 1. Schematic drawing of the clinical baseline registrations from the body and umbilical outpouching (UO) of UO-pigs and healthy control animals: a) diameter of UO at the ventral side of the abdomen; b) diameter at centre of the UO; c) longitudinal diameter of UO (measured at expiration); and d) shoulder height. All distances were quantified in cm and the measurements took place while the pig was kept in a nose-sling in the home pen on the day before slaughter.

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