ASSESSMENT AND INCIDENCE OF SKIN DAMAGE IN SLAUGHTER PIGS

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Abstract – Documentation of animal welfare in the entire production chain is an increasing demand from authorities and the market. The aim of this study was to establish a scale by which skin damage in living pigs as well as in carcasses can be evaluated and to investigate when the skin damage arises. The study included 240 pigs from six commercial herds. It is possible to establish a scale for assessing skin damage on the live pig that expresses the corresponding skin damage assessed on the carcass. Furthermore, the results indicate that skin damage is primarily caused by aggression. A four point scale was used, but it can be argued that a three point scale would be more operational.

Key Words – Animal welfare, Documentation, Skin damage, Slaughter pigs

• INTRODUCTION

Documentation of animal welfare in the entire production chain is an increasing demand from authorities and the market. Skin damage indicates reduced animal welfare, and therefore assessment of the damage could be one relevant measurement to use when documenting animal welfare. New investigations have indicated that the temperature immediately after sticking and the concentration of lactate, glucose and albumin in the blood combined with skin damage assessed on the carcass might be relevant measurements for documenting animal welfare on the day of slaughter [1]. It is well known that aggression gives rise to an increased incidence of skin damage [2]. When fighting, pigs tend to target the head, neck and ear, and usually skin damage in the hind region is fewer than skin damage in the front and middle regions [3]. Skin damage can be caused by facility design and less proper handling by operators.

For many years, DMRI has used a four point scale developed by an EU working group: from 1 = none to 4 = extreme (the DMRI-scale) [4]. Another scale is the five point scale (from 1 = none to 5 = severe) provided by the Meat and Livestock Commission [5]. By the latter scale, the carcass is evaluated as a whole, while the DMRI scale can be used to score different parts (e.g. front, middle and hind quarters) of the carcass. Guàrdia et al. used the five point MLC scale in a study including 15695 pigs delivered to five Spanish pig abattoirs [6]. Score 4 and 5 only represented 1.8 % of the total number of recorded carcasses and as a consequence, only a three level scale (1, 2 and 3 including 4 and 5) was used in the data analysis. Lately, a new scale has been introduced in Welfare Quality [7]. The carcass is assessed in five regions separately: the ears, the front, the middle, the hind-quarter and the legs. The scratches are counted, and the assessment is carried out using a three-point scale from 0 (up to 1 lesion), 1 (2 – 10 lesions) to 2 (more than 10 lesions or any wound penetrating the muscle). Unless the wound penetrates the muscle, this scale does not take into account the severity of the damage. Furthermore, the assessments seem to be time consuming. Therefore, it is relevant to investigate the scale and the number of scores used for skin damage assessment.

When assessing the incidence of skin damage it is to some extent possible to recognize the sources (facilities, slaps, bites or claws), but during the assessment of the carcass at the slaughter line, it is not always known whether the damage reflects handling at the slaughterhouse or incidences before arrival. This requires a scale for assessing the degree of

skin damage in the live pig and the carcass as well.

The aim of this study was to establish a scale by which skin damage in living pigs as well as in carcasses can be evaluated, and to investigate when the skin damage arises. The developed scale is documented by photos.

- MATERIALS AND METHODS

A total of 240 pigs from six different commercial herds were included in the study. 40 pigs from each herd were chosen as focal pigs. In the home pen, they were numbered individually on the back using a spray marker. Before loading, the pigs were housed in conventional delivery facilities. At the farm, the pigs were loaded by the lorry driver following normal commercial Danish procedures. The pigs were transported on different commercial 3-deck lorries (Finkl, Bissingen, Germany).

The study was conducted at two commercial Danish abattoirs (slaughtering speed: 820 pigs per hour and CO_2 stunning in groups, slaughter line speed: 410 carcasses per hour) in November 2012 and January 2013. At the slaughterhouse, all pigs from each lorry were unloaded according to the standard procedures and moved by the abattoir staff to the lairage pens, where the focal pigs were distributed into 6 pens of 15 pigs from the same lorry (pen area: 8.6 m^2, height: 1.06 m solid walls, pigs in adjoining pens). Data collection was intentionally carried out under commercial conditions, and therefore no instructions regarding handling of the pigs were provided to the staff.

The pigs were housed in the lairage for 1 hour. After lairage, the pigs were driven out of the lairage pens by the abattoir staff using rattle sticks and into a race with automatic push-hoist gates (Automatic Driveway Systems, Butina A/S, Holbaek, Denmark). The gates moved the pigs towards and into the stunning chamber. The pigs were stunned in groups of 5 - 6 pigs in 90 % CO_2 for 3 minutes (Backloader, Butina A/S, Holbaek, Denmark), shackled and subjected to sticking according to Danish legislation.

Skin damage on live pigs was assessed in four regions separately: the head and ear, the front, the middle and the hind quarters. Assessment on carcasses was performed in three regions separately; the front, the middle and the hind quarters. The reason for not including the ear in the carcass assessment was the challenges in differentiating between damage to the ears arising before and after slaughter. However, as the head and ears are often damaged through fighting, it is reasonable to assess these parts on the live animal.
Skin damage was recorded at four checkpoints: in the home pen, in the delivery facilities, after 1 hour of lairage and at the slaughter line 45 minutes after sticking. Skin damage assessment in live pigs was performed in the pens. Furthermore, a smaller study including assessment of skin damage in the live pigs and at the carcasses 45 minutes after sticking, the day after slaughter was performed. The handling of these pigs was similar to the handling of the 240 pigs in the main study.

One experienced observer performed all examinations. A four-point scale inspired by Barton Gade et al. [4] was used (Table 1). The highest scoring body side of each pig/carcass determined the score.

Table 1 Skin damage scores

0	None or a little superficial damage
1	Some superficial damage, clearly marked or up to three short (2 - 3 cm) and deep
2	Clear deep and/or long damage (> 3cm) including much superficial damage or circular areas
3	Much deep damage

- RESULTS AND DISCUSSION

By marking the pigs individually, it was possible to identify the development in skin damage from the home pen until after slaughter. Depending on the checkpoint up to 12% of the pigs received a lower score at one time point compared to the previous, even though all assessments were carried out by the same observer. The more complicated the scale, the more often this is likely to occur. This underlines the need of an easy to use and well described scale.

In the live animal it is sometimes difficult to see small skin damage, especially if the pigs are dirty or during winter when the burstles are more pronounced. Furthermore, the dehairing process post mortem might erase some of the small skin damage. Figure 1 shows an example of two pigs receiving score 1 and 2, respectively, just before slaughter, and the look of the carcasses 40 min and the day after slaughter.

The damage seen in the live animal could easily be detected on the carcass as well. Furthermore, the damage assessed on the carcass on the day of slaughter was still visible the day after slaughter even though the smallest might not be as clear as the fresh damage. However, it must be concluded that the damage is not erased by the slaughter and chilling process, and the carcass evaluation reflects the incidences on the live pig just before slaughter.

Figure 1. Photo of two pigs with the score 1 (left) and 2 (right) just before slaughter, 40 min after slaughter and the day after slaughter

The assessments of the pigs can be seen in Figure 2 to 5. As can be seen from the figures, the most severe grade has only been used in a very few cases. This is in accordance with the study by Guàrdia et al [6] assessing 15695 pigs on a five point scale, in which only 1.8 % achieved a score of 4 or 5. In practice, the scale is therefore a 3 point scale referring to 0: no or a little superficial damage, 1: detectable damage and 2: extensive damage. It can be discussed if a three point scale is detailed enough for research properties.

Figure 2. Assessment of skin damage on head and ears in home pen (Ho), loading area (Lo) and at the abattoir (Ab). 0 is no or a little damage, 3 is much deep damage.

Figure 3. Assessment of skin damage on the front in home pen (Ho), loading area (Lo), at the abattoir (Ab) and at the carcass (Ca). 0 is no or a little damage, 3 is much deep damage.

Figure 4. Assessment of skin damage on the middle in home pen (Ho), loading area (Lo), at the abattoir (Ab) and at the carcass (Ca). 0 is no or a little damage, 3 is much deep damage.

Figure 5. Assessment of skin damage on the hind in home pen (Ho), loading area (Lo), at the abattoir (Ab) and at the carcass (Ca). 0 is no or a little damage, 3 is much deep damage.

In this study, ear and front are the only parts of the pig with scores above 1, except for a single pig at the abattoir and when assessed at the carcass. These are the areas that the pigs attack when they are fighting, and it indicates that in these 6 herds most of the skin damage is caused by fighting and not by facility design or inappropriate handling. However, to generalize the results, a larger study is needed.

To document the animal welfare on the day of slaughter, it is of interest to investigate when the damage occur. As can be seen in Figures 2 - 5, the incidences of skin damage assessed as 2 or worse are very low in the home pen. The incidences increase in the delivery facility and continue to increase at the abattoir. Fighting occurs mainly when pigs are mixed and this takes place in the delivery facility and in the abattoir and is reflected in the increase in skin damage from the loading and further in the abattoir. All mixing of pigs is therefore recommended to be minimized.

In this study, the four-point scale was chosen. However, the assessment of 3 was seldom used and could not be used to discriminate between the herds. As the incidence is so low, it can be argued that a three point scale still reflects the variation we aim to describe. A three point scale would at the same time be more operational in practice. Translated to an animal welfare assessment this could correspond to 0: good animal welfare, 1: acceptable but not superior

animal welfare, 2: not acceptable animal welfare.

- CONCLUSION

It is possible to establish a scale for assessing skin damage on the live pig that expresses the corresponding skin damage assessed on the carcass. Furthermore, as most skin damage in this study is seen in the front, the results indicate that the skin damage is primarily caused by aggression and appears both in the delivery facility and at the abattoir. A four point scale was used, but it can be argued that a three point scale would be more operational.

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