TREATMENT OF SLAUGHTERPIGS DURING LAIRAGE IN RELATION TO BEHAVIOUR AND SKIN DAMAGE

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W-2.07

SUMMARY

In five Dutch slaughterhouses, the following was studied in the mild winter '93/'94: 1) lairage design and handling, 2) agonistic interactions between pigs and individual differences in agonistic behaviour, and 3) skin damage after slaughter using a 4-point scale. In all slaughterhouses, brooms and/or electric goads were used to move the pigs. In one abattoir, rough handling resulted in severe skin damage. In only one slaughter-house, animals were gently moved. The number of pigs in holding pens ranged from 27 to 90. The density in holding pens varied from 1.0 to 2.7 pigs/m^2. In all slaughterhouses, the pigs were showered continuously during resting time. Resting time varied between none (pigs were slaughtered immediately after arrival) and three hours. In general, a peak in agonistic interactions occurred after half an hour in lairage. Large individual differences in aggression were observed. The percentage of resting animals increased steadily up to 87% and remained fairly constant after one hour. Skin damage was usually higher in the front region (related to agonistic behaviour) than in the middle and hind region (related to handling). Skin damage was positively correlated with resting time and density. Received aggression was positively correlated with skin damage in the front region. It is suggested that to decrease aggression and skin damage, pigs should be slaughtered immediately after arrival.

Introduction

Treatment of slaughterpigs during lairage at the abattoir may cause stress and physical pain, and lead to deterioration in meat quality. Several studies have led to recommendations for improvements of design and handling (van Putten et al., 1983; Lambooy, 1992; Grandin, 1990; Guise and Penny, 1989; Warris et al., 1992; Troeger, 1989). In spite of these recommendations, welfare of slaughterpigs has not improved. Conditions in slaughterhouses have changed during the last few years: speed of slaughter lines has increased considerably. However, slaughterhouse management takes more interest in the welfare of pigs in order to process carcasses without bruises and produce better meat quality.

In addition to design and handling, individual reactions of pigs may play a role with regard to their wellbeing. Recent studies show different behavioural and physiological strategies which are consistent within individual pigs (Hessing et al, 1992; Lawrence et al, 1991). These individual differences can have consequences for the adaptability of pigs in stressful situations and for the effects of stress in terms of meat quality.

The objectives of this survey of slaughterhouses were to 1) describe lairage design and handling, 2) determine the level of agonistic interactions in the holding pen and possible individual differences in aggressive behaviour, and 3) assess the skin damage after slaughter and its relation to behaviour.

Animals, materials and methods

Five Dutch slaughterhouses (hereafter referred to as A-E) were visited in the mild winter '93/'94. Visits to three of those slaughterhouses (A, B, and C) were repeated twice. Design aspects studied included among others density and number of pigs in the holding pen, and duration and frequency of showering. With regard to handling, attention was given to the use of electric goads and sticks to drive the animals.

In each slaughterhouse, the behaviour of two groups in lairage was recorded on video tape for 1.5 hours after introduction in the pens. Thirty individuals in each group were marked on the back with a standard marker spray for ease of identification. Tapes were subsequently viewed and analysed. All aggressive interactions including aggressor and receiver were recorded. Frequency and duration of interactions were

calculated. Simultaneously, two groups were observed live during five 10-minute bouts. The first bout started when the pigs entered the holding pen, the second started at t = 20 min., the third at t = 40 minutes, the fourth at t = 60 minutes, and the fifth at t = 80 min. All aggressive interactions were recorded and frequency and duration of the interactions were calculated. At the start and the end of each 10-minute period, the number of animals resting (sitting and lying) was recorded.

After slaughter of the observed pigs, skin damage in the front (cranial the caudal point of the shoulder), middle and hind region (caudal the hipbone) was assessed subjectively, using a 4 point scale (Barton-Gade, Danish Meat Research Institute) which takes product utilisation into account: 1 = no skin damage, 2 = slight skin damage, 3 = skin damage affecting quality, 4 = extreme skin damage with possible rejection of tissue.

The Spearman rank correlation coefficient (r_s) was used to determine the level of association between density and skin damage, and resting time and skin damage. With regard to the groups recorded on video in slaughterhouse A, B, and C, the Spearman rank correlation coefficient (r_s) was used to determine the level of association between the amount of received aggression and skin damage. For each slaughterhouse, one of six video recordings was omitted from analysis due to insufficient data. Correlation coefficients were calculated for each of the remaining five groups and pooled.

Results and discussion

Design and handling

Abattoirs A and B slaughtered considerably more pigs per hour than C, D and E, and had larger facilities for penning pigs. Animals transported on the same deck of a truck belonged almost always to the same producer lot, and were put in the same holding pen. No knowledge existed about the number of pens they were kept in during fattening, treatment during transport and existing skin damage on arrival at lairage. As the number of pigs on a deck varied considerably (27-90 pigs), density in the holding pens also varied between 1.0 and 2.7 pig per m^2. Pigs were showered continuously in all abattoirs.

Almost all transport-workers used electric goads to get the pigs out of the trucks. Employees of the slaughterhouses drove the pigs to the holding pens using electric goads, sticks or brooms. Only in slaughterhouse C was this done gently, without yelling or hitting the animals. Pigs were gently tapped with a stick on their back as they were counted. Speed of driving did not seem to be affected by the procedure used in other slaughterhouses.

Resting time in holding pens varied; in the small slaughterhouses, supply could be insufficient during several hours, causing the number of pigs in lairage to be depleted. New pigs arriving at the slaughterhouse would be driven immediately to the stunning point. If the supply of pigs was sufficient, pigs would stay in lairage for up to three hours. Driving from the holding pen to the stunning point was done in a rough way, even in abattoir C where unloading was carried out gently as described before. A large group of pigs were hit with brooms or prodded with electric goads from behind, so that they climbed on top of the pigs before them. In slaughterhouse A and C design often forced the pigs to walk into the race in one direction and then to turn around and walk the other way. As the animals were jammed inside the race and piled on top of each other, turning around was difficult and they often turned over backwards. In all slaughterhouses, electric prods close to the restrainer were powered by electricity, indicating that management allows their usage. However, use of electric goads should be avoided as it increases a pig's heart rate (van Putten and Elshof, 1978), and increases blood-splashing in the meat (Calkins et al., 1980).

Behaviour

Initially the behaviours observed were of an investigatory nature, involving walking through the entire holding pen, nose contact with the walls, and nose contact with other pigs. During the first half hour, the total duration of aggressive interactions increased. After an hour, the total duration of interactions decreased (fig. 1). This contradicts with earlier studies which showed that the majority of aggressive encounters occurred in the first 30 minutes (Moss, 1978). The aggression was by no means evenly distributed amongst individuals. In each group, one to three pigs were the major aggressors. From the beginning, pigs started to lie down along the fences. The number of pigs lying down gradually increased during resting time and remained fairly constant after one hour (fig. 2). The highest percentage of pigs observed resting was 87%, the mean percentage after one hour was 26%.

Skin damage

There was no difference between skin damage values between repeated visits to the same slaughterhouse (front: F=1.09; middle: F=2.06; hind: F=1.58; d.f. = 31). This is somewhat surprising, as large differences in meat quality were found in several studies (Tarrant, 1989; Warris, 1993). Skin damage in the hind region was always lower than skin damage in the front and middle regions. Normally during fighting, bites are targeted mainly at the ears, face and neck (McGlone, 1985). Rough handling will mainly cause skin damage in the middle region. For example, in slaughterhouse D, rubber sticks, which were used to drive the animals, caused considerable skin damage throughout the middle region.

Spearman's Rank Correlation with slaughterhouses treated as blocks resulted in significant correlations between resting time and skin damage, and density and skin damage. As density and resting time also correlated (r_s=0.2957, P=0.027), a partial correlation was used to correlate density and skin damage, corrected for resting time, and to correlate resting time and skin damage, corrected for density. It appears that resting time correlates significantly with skin damage in all parts of the body. Continuing aggressive encounters probably cause increasing skin damage. Density correlates with skin damage in the middle and hind region (table 1). An increased density may hamper a pig being attacked to flee from an aggressor, thus receiving bites in the middle and hind region which it could otherwise avoid. Skin damage in the front region correlates positively with frequency and duration of received aggression in slaughterhouse B, and with duration of received aggression in slaughterhouse A (table 2). This shows that aggressive interactions cause a majority of skin damage in the front region in these slaughterhouses.

Conclusions

Design should avoid pigs being driven in one direction and than having to turn around. High density in the holding pens should be avoided as skin damage in the middle and hind regions increases probably because pigs are unable to flee from their attacker. Driving pigs in a rough way does not seem to increase the speed of moving. Driving pigs with sticks causes more skin damage than driving with electric goads. The fact that aggression increased during the first half hour of lairage as well as the association between resting time and skin damage points out that in the visited slaughterhouses during the winterseason,with regard to welfare, pigs should be slaughtered directly after arrival.

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