EFFECTS OF PRE-SLAUGHTER MANAGEMENT ON CARCASS WEIGHT AND MEAT QUALITY

Marie-Josée Turgeon[1], agr. and Renée Bergeron[2], Ph.D,, agr.
[1]Centre de développement du porc du Québec Inc.
[2]Université Laval

Introduction

Fasting pigs before slaughter has many advantages such as feed saving (2-3 kg/animal), and increased food safety by reducing the risk of viscera rupture and pathogen contamination of carcasses during the evisceration process (Miller et al., 1997). Other potential advantages are an improvement in meat quality (Tarrant, 1989). Indeed, some studies have shown that fasting before slaughter improves meat colour (D'Souza et al., 1998; Eikelenboom et al., 1991) and ultimate pH (Beattie et al., 1999; D'Souza et al., 1998; Eikelenboom et al., 1991; Jones et al., 1985; Warriss et Brown, 1983). However, fasting can reduce live weight and carcass weight (Murray and Jones, 1994; Warriss, 1985; Wittmann et al., 1994). It is therefore important to control fasting duration to take advantage of the improvement in meat safety and quality, without compromising carcass weight. Magras et al. (2000) obtained a fasting efficiency of 95% after 16 hours of food withdrawal, with pigs that had been fed *ad libitum*. Restricted fed pigs required a longer fasting duration. In Quebec, only a small percentage of pork producers (about 10%) fast their pigs before slaughter, and they do so for a maximum of 12 hours before slaughter. The main reasons stated by producers for not fasting the animals are the lack of proper facilities, the increased work load and the fear of reducing pig performance (Viau and Champagne, 1998). The goal of our experiment was therefore to compare four methods of food withdrawal by measuring their effects on live weight, carcass weight, stomach weight and meat quality. These pre-slaughter procedures were tested under two feeding methods and at two slaughter times.

Materials and Methods

Three batches of 256 pigs raised in 16 pens containing an equal proportion of males and females, were randomly allotted to one of 16 treatments (2X2X4 factorial design), 3 weeks before the start of shipping to the abattoir. Shipping took place at a rate of 4 pigs per pen per week. Factors were: feeding method (floor, 3 times daily or trough, *ad libitum*), slaughtering time (10h00 or 22h00), and fasting method (FM) prior to shipping:

FM 1: 4 pigs were fasted in a separate shipping pen, mixed with 4 other pigs;
FM 2: all pigs remained in their home pen and were fasted;
FM 3: 4 pigs were fasted in their home pen by isolating them from others with a barrier;
FM 4 (control): pigs were not fasted.

Total fasting time for FM 1, 2 and 3, including transportation (1 hour) and lairage (3 hours) was 16 hours. Water was continuously available, except during transport.

On the farm, all pigs were weighed 2 days prior to the first shipping to slaughter. For the second, third and fourth shipping weeks, only the pigs ready to be slaughtered (4 per pen) were weighed. For those pigs, it was possible to calculate an average daily gain during the shipping period, to test the effect of fasting treatment on live weight. At slaughter, carcass weight was recorded. Stomachs were harvested during evisceration and weighed with their content. Fasting efficiency was calculated as the percentage of stomachs with a weight smaller than 1.4 kg (Chevillon, 1994). Twenty-four hours after slaughter, pH and surface lightness L^* values were measured in the *longissimus* muscle (between the 11^{th} and 12^{th} rib), after blooming for 30 minutes. Meat colour was also assessed with the Japanese colour scale (Nakai et al., 1975). The number and type of skin blemishes were also recorded on each carcass.

Data were analysed with the GLM procedure of SAS (1996). Fasting treatments were compared with contrasts (FM 1,2,3 vs. FM 4; FM 1, 3 vs. FM 2; FM 1 vs. FM 3).

Results and discussion

Average daily gain during shipping period

Average daily gain between the first and the last shipping was not different between fasting treatments. This suggests that repeated fasting (FM 2) of pigs does not have a detrimental effect on pig performance. However, average daily gain was lower for floor fed pigs (0.68) compared to trough fed pigs (0.73) during the same period.

Carcass weight

Carcass weight was not affected by fasting treatment. However, floor feeding resulted in a significantly lower carcass weight (79.7 kg) compared to trough feeding (82.4 kg). This is likely due to a food restriction imposed on floor fed pigs (Bruum et al., 1989).

Stomach weight

Stomach weight was significantly higher for control pigs (FM 4: 1.99 kg) than fasted pigs (average FM 1, 2, 3: 1.11 kg). There were no differences between FM 1, 2 and 3. In addition, floor fed pigs had significantly higher stomach weight (1.49 kg) at slaughter than trough fed pigs (1.18 kg).

Fasting efficiency was 83.6% on average for FM 1, 2 and 3. Fasting efficiency was significantly lower for floor fed pigs (71.8%) compared to trough fed pigs (95.4%), which could be explained by differences in meal size between the two feeding systems, *ad libitum* fed (trough) pigs likely eating smaller meals. Magras et al. (2000) also observed differences in fasting efficiency according to feeding system, trough fed pigs (*ad libitum*) showing a higher value (95.5%) than liquid fed (restricted) pigs (72.5%).

Meat quality

Mixing pigs in a shipping pen before transport (FM 1) resulted in a total number of skin blemishes of 22.1, whereas values of 15.2, 15.5, 15.0 were obtained for FM 2, 3 and 4, respectively (FM 1 vs. FM 3 and FM 1,3 vs. FM 2 contrasts were significant). This was most likely due to the fighting that takes place following mixing of unfamiliar pigs (Moss, 1978).

Fasting treatments (FM 1, 2, 3) significantly improved ultimate pH (5.53) compared to control treatment (5.49). An increase in ultimate pH was also reported in other studies following fasting, but only with longer durations (24 hours: Beattie et al., 1999; Eikelenboom et al. 1991; 48 hours: Warriss, 1982, Wittmann et al., 1994). Ultimate pH was not affected by feeding method or slaughter time. L^* value, on the other hand, was significantly higher for pigs slaughtered in the evening (51.3) compared to pigs slaughtered in the morning (50.3). The Japanese colour score, lower for pigs slaughtered in the evening, also indicated a paler colour for the *longissimus* muscle. A significantly higher L^* value and a lower Japanese colour score were also found for FM 2 pigs compared to FM 1 and FM 3.

In conclusion, fasting pigs for 16 hours before slaughter reduced stomach weight, improved pH, but did not significantly affect carcass weight or meat colour. None of the fasting treatment tested had a negative effect on ultimate pH or colour of the *longissimus* muscle. However, fasting pigs by mixing in a shipping pen before slaughter increased the number of skin blemishes. Furthermore, adding a barrier to the home pen to isolate and fast pigs ready for slaughter does not appear more advantageous than simply fasting all the pigs in the pens, even if food withdrawal is done repetitively.

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