UENCE OF PREVIOUS EXPERIENCE AND PRE-SLAUGHTER BEHAVIOUR ON PIG MEAT QUALITY

ELDRIDGE, R.D. WARNER, C.I. BALL and E.NANTHAN

ian Institute of Animal Science, Department of Food and Agriculture, Werribee, Victoria, AUSTRALIA, 3030.

MARY

elationship between behavioural responses of pigs to pre-slaughter management within the abattoir and pig meat quality were ied in groups of 20 pigs from 5 different piggeries situated similar distances from the abattoir and slaughtered on 6 occasions at 3 intervals. The pigs were independently selected by farm management on the basis of sex and liveweight specification before h to the abattoir. Behaviour was assessed during lairage (resting in holding pens at the abattoir) and handling at the abattoir and quality was measured post-slaughter. Groups of boars and gilts were assessed on alternate occasions.

mean ultimate pH and lightness (CIE; L*) of surface meat colour of the muscle *longissimus thoracis* 24 hours post-slaughter of each p of pigs was significantly correlated with the number of physical interactions by the pigs with the handler while in lairage (P<0.01), ssing time between stunning and de-hairing (P<0.01) and the level of kicking that occurred after shackling post-stunning and sticking 05). The mean incidence of PSE and DFD carcasses of each group of pigs over the period of the experiment was 23.2 and 4% ectively. Although there were no overall statistically significant differences in the incidence of PSE carcasses between piggeries and s within piggeries, the incidence in PSE carcasses from 3 of the farms was significantly greater (P<0.05) from gilts than the incidence ar carcasses (43.9% cv 15.1% respectively).

as concluded that although pre-slaughter factors and post-slaughter processing may influence meat colour and pHu, a major cause of ation in pig meat quality is the source of slaughter pigs.

RODUCTION

earch suggests that pre-slaughter management and the innate ability of the animal to respond to stress may interact to have a major act on meat quality (Warriss 1985). However, Grandin (1992) suggests that the behavioural responses of pigs to pre-slaughter agement may reflect previous handling experiences and management of pigs on the farm unit. This experiment studied the tionship between behavioural responses to pre-slaughter management within the abattoir and meat quality of pigs from different eries.

THODOLOGY

ups of 20 pigs from 5 pig farms situated similar distances from a pig abattoir were slaughtered on 6 occasions at approximately 3 k intervals. Groups of gilts or boars were selected independently by pig farm management on the basis of sex and liveweight for rnate slaughterings. On each occasion, each group of pigs was loaded and transported in a similar manner to the abattoir where they e placed in similar but separate lairage pens (holding pens at the abattoir) between 19 and 24h prior to slaughter. The piggeries were sified into 2 types. Farms 1 and 2 (Type A farms) produced breeding stock and supplied Hampshire, Duroc or Hampshire-Duroc cross first cross Large White x Landrace pigs respectively for slaughter while farms 3, 4 and 5 (Type B farms) supplied commercial grade pigs that were of predominantly Large White x Landrace. All pigs were approximately 80 kg liveweight at slaughter.

The pigs' responses to humans in lairage (interaction score) were assessed as a handler moved through each lairage pen in a sta[ndard] manner. The interaction score was obtained by an observer counting the number of pigs that physically interacted with a handler [who] entered the pen and stood quietly for 1 minute in 4 pre-determined positions in each lairage pen in the evening before slaughter and at 05.00 h on the morning of slaughter. Total movement time from lairage to stunning (stun time) and movement time through the f[orce] yard (force time) was recorded. Closed circuit TV was used to record the movement time and behaviour of pigs as they moved from [the] force yard into the "V" restrainer.

Post-slaughter variables recorded on the slaughter floor included the amount of kicking post shackling (shackle score), processing [time] from stunning to evisceration and initial pH (pHi). Shackle score was scored as 0 for no movement to 5 for strong kicking over period [of] 2 minutes post shackling. The pHi was measured at a convenient position at the end of the slaughter chain approximately 40 min[utes] post-slaughter. The carcasses were subjected to blast-chilling (-20°C) for 2h after leaving the slaughter floor. A chop was removed [from] the anterior end of the loin approximately 24 hours post-slaughter for the measurement of the ultimate pH (pHu) and surface meat co[lour] of the muscle *longissimus thoracis* between the 11/12th rib. The pH was measured using a Jenco Model 6009 portable pH meter (Je[nco] Electronics Ltd, San Diego, USA) fitted with an Ionode IJ42S spear type electrode (Ionode Pty. Ltd. Brisbane, Australia). Meat co[lour] (CIE, L*a*b* colour space) was measured on the muscle surface after allowing the meat to bloom for 30 minutes using a Chroma[meter] Model CR-200 (Minolta Camera Co. Ltd., Osaka, Japan).

RESULTS.

The mean pHu and lightness (L*) of surface meat colour for each group of pigs (n=20) were significantly correlated to the interac[tion] score (pHu r=-0.70; L* r=0.80; df=28; P<0.01), processing time (pHu r=-0.50; L* r=0.63; df=28; P<0.01) and shackle score (pHu r=0.45; [L*] r=-0.38; df=28; P<0.05). Increasing interaction scores and processing times were associated with paler meat with a low pHu while an increa[sing] shackle score was associated with darker meat with a higher pH.

Due to marked variation in the time in which pHi was able to be taken (35 to 55 minutes post-slaughter due to variations in processing ti[me]) this measurement was not suitable for assessing the incidence of PSE (pale,soft and exudative) meat. Thus PSE meat was defined by [the] the L* value (L* > 48) and pHu (pH < 5.52) of the muscle *longissimus thoracis* 24 hours post-slaughter, as pig meat with these specificat[ions] was shown to have a drip loss of >5% in an earlier study (Warner et al. 1991). DFD (dry, firm and dark) meat was defined as meat w[ith] a pHu > 6.0.

The mean incidence of PSE and DFD carcasses for each group of pigs (n=20) over the 18 week period of the study was 23.2 and 4.0% respectiv[ely]. The incidence of PSE carcasses of pigs from Type B farms was greater (P<0.05) than the incidence of PSE carcasses of pigs from Type [A] farms (29.5% cv 13.8% respectively; least significant difference (LSD)=12.4%) but there was no difference in the incidence of PSE betw[een] farms (P>0.05). There was a significant (P<0.05) interaction between farm type and sex of pig in the incidence of PSE carcasses. The incide[nce] of PSE carcasses from gilts was greater (P<0.05) than from boar carcasses (43.9% cv 15.1% respectively; LSD=15.2%) from Type B far[ms] but there was no differences between gilts and boars from Type A farms (17.4% cv 10.2% respectively). The incidence of DFD carcas[ses] from Type A farms was greater (P<0.05) than from Type B farms (6.7% cv 2.2% respectively; LSD=4.5).

Means and interaction means for incidence of PSE and DFD, movement time through the force yard (Ftime), total handling time to stunning (Stime) and interactive score (Iscore) for gilts and boars from 5 different farms. Type A farms supplied predominantly 1st cross pigs. Type B farms supplied commercial grade crossbred pigs.

Type A		Type B			Mean of farm types		Type x Sex Interactions			
1	2	3	4	5	Type A	Type B	Type A Gilts	Type A Boars	Type B Gilts	Type B Boars
11.8	15.8	29.2	32.7	26.7	13.8^{a}	29.5^{b}	17.4^{a}	10.2^{a}	43.9^{b}	15.1^{a}
7.5	5.8	3.3	0.8	2.5	6.7^{a}	2.2^{b}	3.3	10.0	1.1	3.3
4.6^{a}	2.9^{b}	3.6^{b}	3.2^{b}	3.4^{b}	3.8	3.4	4.0^{a}	3.6^{a}	2.9^{b}	3.9^{a}
11.4^{a}	6.7^{b}	8.3^{b}	7.5^{b}	8.4^{b}	9.0	8.0	10.6^{a}	7.5^{b}	7.2^{b}	9.0^{b}
12.3	17.2	20.2	24.7	24.3	14.8^{a}	23.1^{b}	12.8	16.7	24.4	21.7

Means with different superscripts ^{ab} are significantly different (P<0.05).

were significant differences in the way pigs from the different piggeries responded to handling and interacted with stockpersons in the environment. Pigs from Type A farms were less (P<0.01) physically interactive with the handler than pigs from Type B farms. Although were no differences (P>0.05) in stun time for pigs from the different farms, pigs from farm 1 moved slower (P<0.05) through the force the restrainer (force time) than pigs from farm 2 and markedly slower than pigs from the other 3 farms (Table 1). Although there were differences between pig sources in the amount of jamming or baulking by pigs moving into the restrainer, the stockpersons took longer jammed and baulking pigs from farm 1 than pigs from other farms. There were no differences (P>0.05) in force or stun times between boars. Once the pigs were stunned there were no differences (P>0.05) in processing times for pigs from the different sources.

CUSSION

sults show that although some pre-slaughter factors and processing post-slaughter may influence meat colour and pH, the major influence eat quality appears to be due to the source and sex of the pigs slaughtered.

pigs from Type B farms were significantly more interactive and showed a much greater response to the handler, the pigs from Type were less interactive and often ignored the presence of the handler in the lairage pen. However during intensive handling through force yard and into the restrainer, those pigs that were most interactive with the handler during lairage (Table 1) moved markedly quicker the force yard and into the restrainer than pigs from farm 1. Examination of video records of pigs moving into the restrainer suggested slower force time (P<0.05) for pigs from farm 1 to move through the complex was mainly due to the difficulty of clearing jamming baulking pigs at the entrance of the restrainer.

(1991) found that difficult to handle pigs at the abattoir increased the incidence of meat quality defects and suggested that the difficulty handling was associated with on farm experiences. However, in this study, if the difficulty of handling is associated with movement times,

jamming and baulking of pigs, the incidence of meat quality problems was lowest amongst the group of pigs that were slowest and app
to be the most difficult to handle (baulking or jamming at the restrainer) and highest amongst pigs that moved the fastest and caused the
problems while moving through to slaughter. Our results suggest that the physical interaction of pigs with a handler may indicate inexperi
of pigs to stockpeople and resulting in more rapid movements during periods of intensive handling. Reasons for the differences in the influ
of animal responses on meat quality defects are not evident from this study.

Pig meat in Australia is largely obtained from gilts and entire males, however there is little information available on the influence of se
meat quality defects. Our results suggest that sex of the pig may have a marked influence on the incidence of meat quality problems.
commercial grade gilts from Type B farms tended to be more interactive with the handler in lairage and tended to move more rapidly d
slaughtering procedures. It is suggested that these animals may have been hyper-active and therefore more susceptible to stress. A si
difference in incidence of PSE between sexes was also observed within a group of 400 pigs from a single source at an other abattoir (W
et al 1991).

In summary, it is concluded that although pre-slaughter factors and post-slaughter processing may influence meat colour and pHu, a m
cause of variation in pig meat quality is the source and/or sex of slaughter pigs. This variation may be due to either previous handling
the farm influencing behavioural, physiological and psychological responses of pigs to pre-slaughter handling at the abattoir or some sex and
These factors may either act independently or together to influence the quality of pig meat.

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