

## THE EFFECT OF DIFFERENT PRE SLAUGHTER PROCEDURES ON CARCASS AND MEAT QUALITY IN URUGUAY

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**Abstract – The aim of this study was to evaluate the effect of pre slaughter lairage time on carcass and meat quality of cattle. Thirty Hereford steers were randomly assigned to two treatments according to lairage time in the slaughterhouse: 12 hours (Treatment 1, n = 15) and 3 hours (Treatment 2, n = 15). The pH measurements were taken at 1, 3, 6, 12, 24, 36 and 48 hours *post mortem* at *Longissimus thoracis et lumborum* (LM) muscles. Muscle color was measured on the LM at L\*, a\* and b\* color space, after 2 days of aging and one hour of blooming. Shear force measurement was obtained also on the LM and after 2 aging days using Warner Bratzler. Data was analyzed by the SAS software applying GLM and GLIMMIX procedures. Carcass pH did not differ between treatments in any evaluated time (P>0.05). The pH showed an appropriate decline curve, with values within the acceptable standard, between 5.5 and 5.8. The L \*, a \*, b \* and shear force parameters did not differ between treatments (P>0.05). In summary, no differences in carcass and meat quality were found between the evaluated lairage durations.**

### I. INTRODUCTION

Lairage time in slaughterhouse pens is a challenge for the animals, because they have to find a strategy to deal with a variety of stress factors, whether physical, climatic, social and psychological (1, 2, 3, 4). There is evidence that the longer the lairage, greater is the incidence of dark cutting in beef (2, 5). The aim of this experiment was to evaluate the effect of two contrasting lairage times in slaughterhouse pens (3 and 12 hours) on carcass and meat quality of cattle.

### II. MATERIALS AND METHODS

Thirty Hereford steers were randomly assigned to two treatments according to lairage time in the slaughterhouse: 12 hours (Treatment 1, n = 15) and 3 hours (Treatment 2, n = 15). Animals were slaughtered with 500 kg of live weight, in a commercial abattoir licensed to export meat and following AW standard procedures. The journey lasted 5 hours, with a truck in good condition and a proper driving. Carcass pH was measured between the 11<sup>th</sup> and 13<sup>th</sup> rib at 1, 3, 6, 12, 24, 36 and 48 hours *post mortem* at *Longissimus thoracis et lumborum* (LM) muscles. To record the pH, a pH meter (Orion 210A) with a device gel was used. In this study, the pH measured at 24 hours *post mortem* was regarded as the final pH (fpH). Muscle color was measured on the LM at L\* (luminosity), a\* (red index) and b\* (yellow index) color space (6), after 2 days of aging and one hour of blooming using a Minolta ® (Model 400 C) colorimeter. The values were recorded in three different regions of each sample to obtain a representative average value of the color of the meat sample. Shear force measurement was obtained also on the LM and after 2 aging days using Warner Bratzler. Six pieces of 1.27 cm diameter were taken of each sample following the direction of the muscle fibers, using a biopsy forceps. From six measurements of each meat sample, the mean value was calculated. The method used for the analysis of shear force (SF) was based on the work of Purchas et al. (7). Data was analyzed by the SAS software applying GLM and GLIMMIX procedures using mixed models adjusted for repeated measures.

### III. RESULTS AND DISCUSSION

The pH values varied between the different evaluated hours (1, 3, 6, 12 hours) within each treatment ( $P < 0.05$ ). However, the pH stabilized in both treatments by 24 hours *post mortem* (24, 36 and 48 hours). Carcass pH did not differ between Treatments in any evaluated time (Table 1).

**Table 1** pH values (mean  $\pm$  SE) from *Longissimus thoracis et lumborum* muscle at different evaluation times *post mortem*, for two lairage time in slaughterhouse pens, 12 and 3 hours

pH	Lairage Time		P value
	12 h	3 h	
1h	6.56 $\pm$ 0.05	6.52 $\pm$ 0.05	0.51
3h	6.24 $\pm$ 0.05	6.22 $\pm$ 0.05	0.82
6h	6.10 $\pm$ 0.05	6.10 $\pm$ 0.05	0.98
12h	5.89 $\pm$ 0.05	5.77 $\pm$ 0.05	0.10
24h	5.57 $\pm$ 0.05	5.60 $\pm$ 0.05	0.67
36h	5.63 $\pm$ 0.05	5.49 $\pm$ 0.05	0.06
48h	5.54 $\pm$ 0.05	5.51 $\pm$ 0.05	0.73

The pH declining curve was appropriate, not compromising the quality of the final product. Furthermore, the fpH found in both evaluated lairage time, was within the accepted standard, which is characterized by values between 5.5 and 5.8 and any carcass evaluated in this study showed a fpH above 5.8. Under this experiment conditions, the evaluated lairage times did not affect the muscle process of acidification. For Mounier et al. (3) a long lairage time gives a lower meat pH values. The same was observed by Brown et al. (8) who reported that animals slaughtered on the arrival day at the slaughterhouse, had a higher incidence of high pH when compared to animals that remained overnight. No differences were found in meat color nor shear force values between Treatments ( $P > 0.05$ ). As shown in Table 2, no differences were observed in meat colour (“L”, “a” and “b” values) between treatments. del Campo et al. (9) obtained higher a\* and b\* values in the group that

remained in pens for 15 hours, probably related to the lower pH values registered by those authors in the 15 hours Treatment. In the present experiment, SF values did not differ) between treatments (3.71 $\pm$ 0.29 in T1 and 3.95 $\pm$ 0.29 in T2,  $P > 0.05$ ).

**Table 2** Meat colour values (mean  $\pm$  SE) for two lairage time in slaughterhouse pens, 12 and 3 hours

Treat	L*	a*	b*
12h	29.5 $\pm$ 0.3	13.1 $\pm$ 0.27	5.4 $\pm$ 0.16
3 h	29.3 $\pm$ 0.3	12.9 $\pm$ 0.27	4.9 $\pm$ 0.16
P value	0.64	0.48	0.06

Likewise, Ferguson et al. (10) compared 3 and 18 hours in lairage in confined cattle and observed no effect on shear force. However, this result is different to those reported by del Campo et al. (9), who noted that the short lairage time (3 hours) had a negative effect on SF when compared to 15 hours.

### IV. CONCLUSION

No differences were found in carcass and meat quality of steers, according to the evaluated lairage times.

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