MEAT QUALITY OF DIFFERENT BEEF CUTS FROM CARCASSES STORED AT A GIVEN COOLING TEMPERATURE

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Abstract – Although customers and producers demand a quick carcass delivery from slaughterhouse, the conversion of muscle into meat must be adequate in order to avoid meat technological defects. The aim of the present study was to establish the most appropriate meat cut to measure carcasses pH and temperature drops at the slaughterhouse and to determine the most appropriate slicing way for each one. For this purpose, measurements of pH and temperature were carried out in three different locations, topside, top rump and silverside, of carcasses maintained for 24 hours in a cooling chamber at 0-3ºC. Then, carcasses were cut up according to routine proceeding. Topside, top rump and silverside was selected for meat quality measurements, obtained from the carcass and sliced into three directions of cut, lengthwise, cross and sidewise to the muscular fiber. Results showed that silverside could be the election muscle to control the cooling of carcasses, and that each beef cut need a different direction cut to optimize meat quality in terms of juiciness and tenderness.

Key Words – Beef cuts, chilling, cold shortening, texture, water holding capacity.

I. INTRODUCTION

The time to process and commercialize beef cattle at slaughterhouses has to be optimized to the maximum. Although customers and producers demand a quick carcass delivery from slaughterhouse, in order to avoid meat technological defects. The cooling chamber temperature to carry out the carcasses chilling determines the decrease rate of post-mortem pH (Bate-Smith and Bendall, 1949; Marsh, 1954 and Charpentier, 1969), both the time required to reach the pH at which rigor mortis begins, and the time until the final pH is reached, with increasing time as the temperature decreases (Honikel et al., 1981). However, within a few hours after slaughter, pH value drop at temperatures between 0-4 °C is faster than at higher temperatures (Honikel and Hamm, 1978; Winger et al., 1979), as a consequence of the cold shortening. For this reason, the muscle must be cool below 10°C after the rigor mortis is established (Warris, 2003). The final pH varies according to the temperature at which the muscle is maintained during rigor. The high final pH in muscles maintained at 0-1 ºC has been observed in cattle (Cassens and Newbold, 1967). On the other hand, the drop in temperature is related to the position and the amount of fat that covers the muscle in the carcass. Then, a superficial muscle cools faster than deep muscles. To ensure the correct pH decrease and to reduce cold shortening probabilities, both the pH and temperature drops in the carcasses, are normally measured at the slaughterhouse. The aim of the present study was to establish the most appropriate meat cut for carcasses pH and temperature drops measures.

On the other hand, different values of final pH could explain the variability in quality found between different beef cuts. In addition, the final quality perceived by the consumer could be influenced by the cut direction (lengthwise, cross and sidewise) applied to the steaks, in terms of juiciness (associated with WHC of meat) and tenderness of meat.

II. MATERIALS AND METHODS

To conduct this experiment a total of 8 male animals the same breed and management conditions were used. These animals were slaughtered following the current regulations of the European Community on animal welfare in a local slaughterhouse. After slaughtering the carcasses were subjected to cooling for 24 hours at 0-3ºC.

Data collection was carried out on three different muscles or meat cuts: topside, top rump and silverside. Temperature and pH were evaluated at initial time, 6 hours, 18 hours and 24 hours using a pH-meter Crison ph25 with penetration electrode.

Afterwards, the carcasses were cut and the meat cuts mentioned above were obtained, which were sliced in three ways: lengthwise, cross and sidewise to the muscular fiber. On the obtained steaks measures of water holding capacity (WHC), pH, instrumental color with a CM-2600d spectrophotometer Minolta and instrumental texture with a TA.XT-2 texture analyser Stable Micro Systems were carried out.

III. RESULTS AND DISCUSSION

Cooling conditions to which the carcasses were maintained prevented the muscle from reaching a temperature below 10°C before the rigor mortis was established. As one would expect, the more superficial muscles cooled faster, so in order to ensure a proper cooling of the carcass those muscles that take longer to cool should be selected, specifically silverside.

Respect to laboratory studies, the cooking losses were greater in the cross sections to the fiber in all of them topside (31.5%), top rump (31.4%) and silverside (31.2%), and smaller in the lengthwise sections to the muscular fiber (26.1%, 26.9% and 27.6% respectively). Mean instrumental tenderness was higher (more tender) in all lengthwise cuts to the muscular fiber. On the other hand, as a consequence of the lower WHC, the average tenderness analyzed with the texturometer was lower (less tender) in the silverside when a cross direction cut to the fiber was done. However, the average tenderness was lower (less tender) in sidewise cuts to fiber in the case of the topside and top rump.

IV. CONCLUSION

Each muscle has a different behavior regarding the decrease in pH and temperature curve, so different qualities in parameters such as WHC and texture can be expected. On the other hand, the quality studies carried out showed the suitability of using a cut direction for each meat piece, and thus the juiciness and tenderness properties perceived by the consumer could be optimized.

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