PE4.79 Blade Tenderization and Injection Effects on Beef Semitendinosus Muscle Tenderness and Technological Yield 275.00

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Abstract—Tenderness is the primary economic factor for beef palatability. It can be improved by different processes such as blade tenderization and injection. This study showed the effects of injection, tenderization and the association of these two processes on the semitendinosus muscle. All of these processes improved meat tenderness. The injection and tenderization association was significantly better than the others. Injection increased cooking losses but not tenderization. The best process for improving tenderness and having a high technological yield is tenderization before injection.

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Index Terms—beef, injection, tenderness, tenderization.

I. INTRODUCTION

Most consumers base their quality judgement and overall acceptability of beef products on tenderness; and this is the primary economic factor for beef palatability [1]. Though numerous post-mortem processes have been recommended for improving the tenderness of beef muscles such as mechanical tenderization and injection; there are still a number of unanswered questions regarding their optimum use. Mechanical tenderization, like blade tenderization, is one of the most effective and efficient technologies currently used to ensure tenderness and reduce the variability of beef cuts [2, 3]. However, tender cuts do not need be tenderized more than once [4]. Another effective approach is a combination of treatments. Injection reduces Warner-Bratzler shear values up to 50% of the non-injected value and reduces the variability between samples [5, 6]. Blade tenderization treatment prior to injection was generally found to be beneficial for textural characteristics [2, 3]. The aim of these works was to study the effect of different processes on tenderness and cooking yield of meat.

II. MATERIALS AND METHODS

A. Material

The study included eighteen post-rigor beef semitendinosus from young Charolais carcasses which were purchased 9-10 days after slaughter and vacuum packed. The average pH of the meat was 5.64 +/- 0.24. Each semitendinosus muscle was cut into six roasts 4x4x10cm equal to 183 +/- 21g. All treatments were applied to each section, with location within the muscle balanced to ensure that all treatments were assigned to all locations.

B. Treatments

The different treatments were i) tenderization (T), the roast was tenderized by one passage through a Tender Star® (Paulus Stuart, Brussels); ii) injection (I), the roast was injected using a multi needle injector (Inject Star®, Austria) to 110% over the raw meat weight with brine formulated to give 0.51% salt, 0.36% sodium lactate, 0.45% lactose and 0.045% sodium ascorbate in the final product and iii)the last treatment was a tenderization and injection combination (T+I).

C. Analysis

After treatment, each roast was cut into samples (1x2x1cm) in the middle of roast. Some of the samples were stored at 4°C to measure the shear force on uncooked meat. The rest were placed individually under vacuum in cooking bags. The samples were then cooked (during 20 min) in a water bath at 70°C for a final internal temperature of 60°C and stored at 4°C.The cooking yield was determined by weight difference before and after cooking. The technological yield corresponds to weight difference between before process and after cooking. The tenderness was evaluated by using a Warner-Bratzler shear test according the method from Honikel, 1998 [7]. All samples were sheared perpendicular to the fibre direction. The maximum peak force recorded during the test was reported as shear force. All the treatments were applied to the three roasts which lead to a triplicate. As an animal effect was showed, a control was performed for each animal and the difference was calculated between the control and the treatment to find the tenderness gain. An ANOVA test at p=0.05 was used to determine differences between treatment methods.

III. RESULTS AND DISCUSSION

The cooking yield was better for the tenderization alone and control than the others processes (figure 1). There were no significant differences between I and T+I. The cooking losses were increased with I and T+I but not with T alone. Some authors found that cooking losses increased with blade tenderization [8]. However, others authors reported no significant differences for cooking losses of non-tenderized (control) and tenderized roasts [9]. The technological yield was better with injection processes (figure 2). This is logical as with injection the roast weight is increased. All the processes improved the tenderness of cooked roasts when the gain in tenderness was compared with the control and this for every animal. The processes association improved tenderness more than a single process. Blade tenderization prior to injection was found to be beneficial for textural characteristics (figure 3) and might improve cooking yield [2, 8]. There was always an animal variability for the tenderness gain but it was reduced with tenderization. For the other parameters, tenderization significantly decreased the animal variability (table1). Some authors reported that the mechanical tenderization on the palatability of bovine muscles can be effectively utilized to reduce the variability [2, 5].

IV. CONCLUSION

Blade tenderization and injection significantly improve meat tenderness. Injection increases cooking losses but not tenderization alone. Nevertheless, as the injection added brine into meat, it results in a better technological yield than tenderization alone or the control. The association of tenderization and injection improves meat tenderness more than the processes alone. There is another process which improves meat tenderness: tumbling. The next studies will concentrate on the tumbling effect and the interaction between tumbling, tenderization and injection.

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