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Abstract

We randomly assigned 112 Angus yearling steers to 14 nutritional groups fed varied ration energy levels and varied lengths of time. Blade tenderized and non-tenderized boneless rib steaks were evaluated by a taste panel and a mechanical (Instron) shearing technique. Blade tenderization significantly improved taste panel sores for both muscle fiber and overall tenderness and decreased the amount of detectable connective tissue, but did not affect juiciness and flavor scores. Peak shear force decreased with blade tenderization; but total cooking loss increased. Blade tenderization narrowed the range of detectable connective tissue scores for ration energy level groups, leading to more uniform palatability.

Keywords

Cattlemen's Day, 1979; Report of progress (Kansas State University. Agricultural Experiment Station); 350; Beef; Blade tenderization; Palatability; Energy

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Mechanical Blade Tenderization of Meat

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Summary

We randomly assigned 112 Angus yearling steers to 14 nutritional groups fed varied ration energy levels and varied lengths of time. Blade tenderized and non-tenderized boneless rib steaks were evaluated by a taste panel and a mechanical (Instron) shearing technique.

Blade tenderizing significantly improved taste panel scores for both muscle fiber and overall tenderness and decreased the amount of detectable connective tissue, but did not affect juiciness and flavor scores. Peak shear force decreased with blade tenderization; but total cooking loss increased. Blade tenderizing narrowed the range of detectable connective tissue scores for ration energy level groups, leading to more uniform palatability.

Introduction

Mechanical blade tenderization is the most widely used mechanical tenderization method. Boneless or bone-in cuts are tenderized by one or more passes through a machine where rows of blades "puncture" the muscle and connective tissue. The process improves tenderness of table grade cuts, equalizes tenderness within a cut containing several muscles, and improves tenderness of lower grade cuts.

Procedure

We randomly assigned 112 Angus yearling steers to one of 14 nutritional groups (8 per group) including controls, submaintenance and low, medium, and high energy rations (34, 45, or 58 megacalories NEp per 100 lbs. ration) fed for 28, 56, 91, 119, 147, or 175 days. Carcass and ration information were given on page 79 of the 1978 Cattlemen's Day Report.

Boneless rib steaks (longissimus muscle) for taste panel and shear evaluations were cut seven days postmortem. Remaining rib eye portions were tenderized by one pass through a Ross mechanical tenderizer (37 punctures/square inch). Additional steaks were cut for taste panel and shearing. Steaks were cooked, evaluated, and sheared by American Meat Science Association guidelines. A six member trained taste panel scored steaks for muscle fiber tenderness, detectable connective tissue, juiciness, flavor, and overall tenderness. Half-inch diameter cores were sheared with an Instron model 1123 equipped with a Warner-Bratzler head.

Results

Taste panel tenderness improved and detectable connective tissue decreased with blade tenderization (Table 21.1), but juiciness and flavor scores were not affected. Peak shear force decreased with blade tenderization, which agreed with taste panel tenderness scores. Although blade tenderization increased cooking loss 2 percent, it did not affect juiciness scores.

Effects of blade tenderization by ration group means on detectable connective tissue are shown in Figure 21.1. Greatest improvement in connective tissue scores was achieved by blade tenderizing the less tender control and submaintenance steaks.

The narrower range of detectable connective tissue scores for blade tenderized control, submaintenance and low, medium, and high ration energy steaks indicates more uniform palatability. The meat industry could use blade tenderization to improve tenderness of lower grade or less tender cuts or muscles and to "assure" tenderness of higher grades-cuts.

Table 21.1. Taste panel and objective scores (means) for nontenderized and blade-tenderized, beef boneless rib steaks.

Criteria	Non-tenderized	Blade tenderized	Significance level
Taste panel traits[a]			
Muscle fiber tenderness	6.8	7.2	.01
Detectable connective tissue	7.0	7.2	.01
Overall tenderness	6.8	7.2	.01
Juiciness	6.1	6.2	.66
Flavor	6.5	6.5	.11
Peak shear force (lb)	4.63	4.08	.01
Total cooking loss (%)	21.05	23.18	.01

[a]Scores based on 8 point scale (1 = abundant connective tissue, extremely tough, dry, or bland flavor; 8 = no connective tissue residue, extremely tender, juicy, or intense flavor) for each factor.

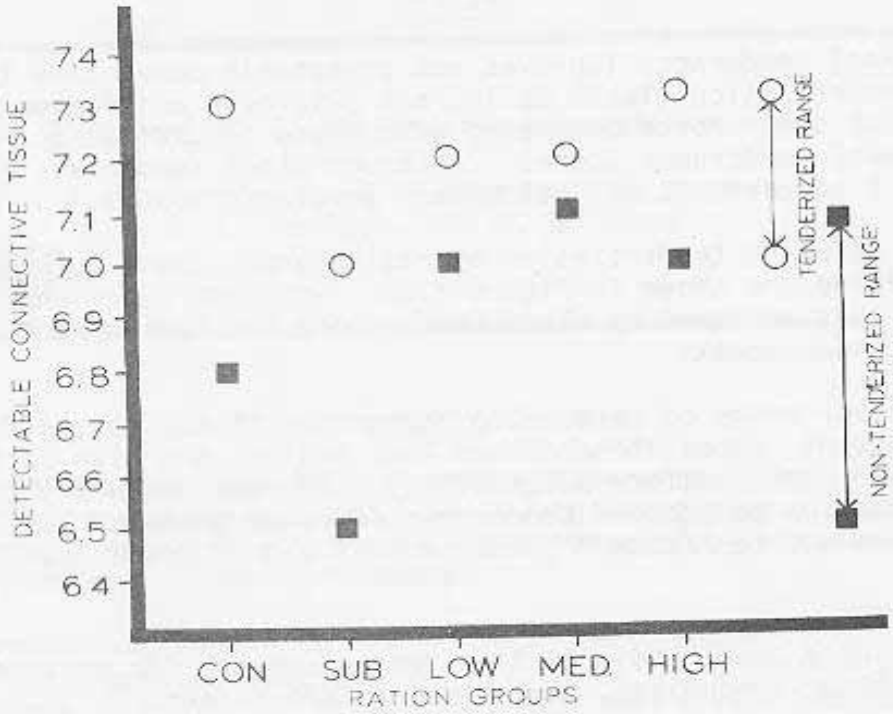
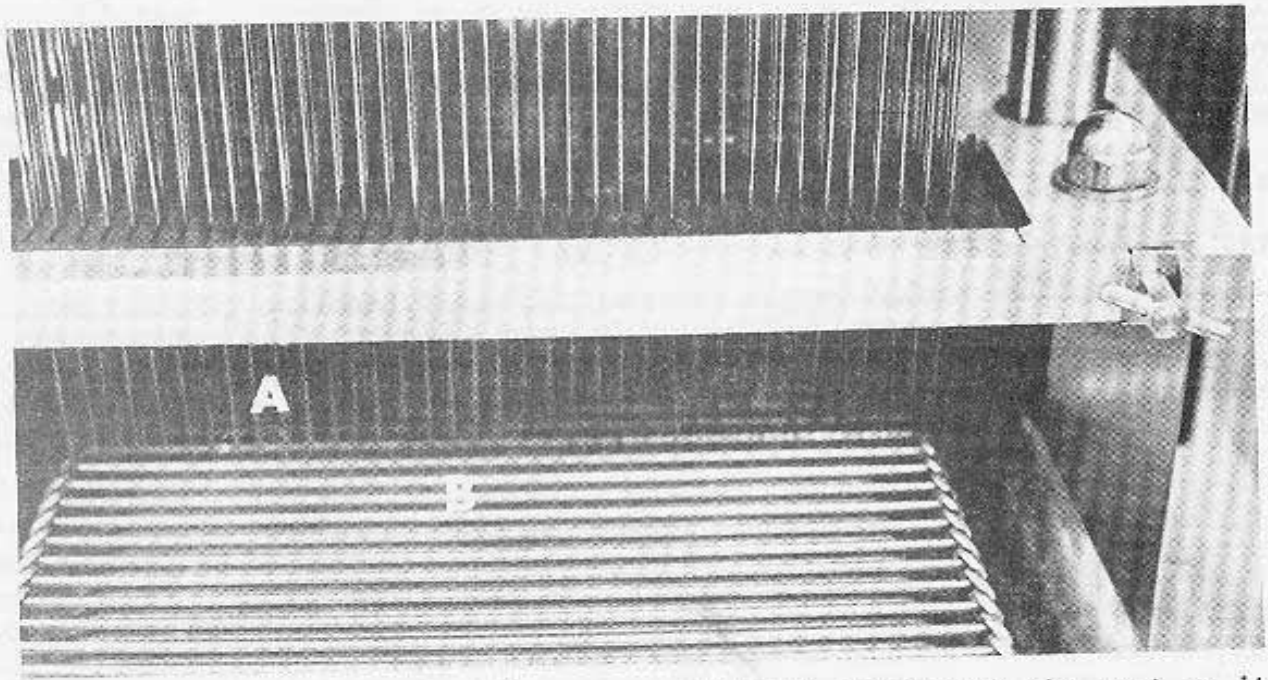


Figure 21.1. Effects of blade tenderizing on detectable connective tissue in ribeye steaks from cattle of control, submaintenance, low, medium, or high energy ration groups. 0 = tenderized; = non-tenderized; 6 = traces of detectable connective tissue; 7 = practically no detectable connective tissue.



Blade Tenderizer. Blades (A) move up and down puncturing the meat as it passes through on the conveyor (B).