Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 1 *Cattleman's Day (1993-2014)*

Article 929

1988

Effects of sugar, internal cooking temperature, and hot-boning on the characteristics of low fat, restructured, value-added beef roasts

S.J. Goll

Melvin C. Hunt

Donald H. Kropf

See next page for additional authors

Recommended Citation

Goll, S.J.; Hunt, Melvin C.; Kropf, Donald H.; and Kastner, Curtis L. (1988) "Effects of sugar, internal cooking temperature, and hot-boning on the characteristics of low fat, restructured, value-added beef roasts," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 1. https://doi.org/10.4148/2378-5977.2332

Effects of sugar, internal cooking temperature, and hot-boning on the characteristics of low fat, restructured, value-added beef roasts

Abstract

Low fat, restructured beef roasts were made from muscles that were conventionally or hot-boned. Differing combinations of salt, phosphate, and glucose were added. Then roasts were cooked to 145 ÌŠF or 200 ÌŠF. Roasts from conventionally boned muscle generally had less warmed-over flavor and higher acceptability scores than those from hot-boned muscle. Adding glucose with salt and phosphate helped suppress warmed-over flavor throughout display and did not reduce flavor acceptability or increase cooking loss. Roasts cooked to 200 ÌŠF had lower warmed-over flavor scores and were more acceptable, but were less cohesive and had higher cooking losses than roasts cooked to 145 ÌŠF. All roasts were acceptable, regardless of boning, ingredient, or temperature treatment.

Keywords

Kansas Agricultural Experiment Station contribution; no. 88-363-S; Cattlemen's Day, 1988; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 539; Beef; Beef roasts; Sugar; Internal cooking temperature; Hot-boning

Authors

S.J. Goll, Melvin C. Hunt, Donald H. Kropf, and Curtis L. Kastner

Effects of Sugar, Internal Cooking Temperature, and Hot-Boning on the Characteristics of Low Fat, Restructured, Value-Added Beef Roasts[1]

S.J. Goll, C.L. Kastner, M.C. Hunt, and D.H. Kropf

Summary

Low fat, restructured beef roasts were made from muscles that were conventionally or hot-boned. Differing combinations of salt, phosphate, and glucose were added. Then roasts were cooked to 145 F or 200 F. Roasts from conventionally boned muscle generally had less warmed-over flavor and higher acceptability scores than those from hot-boned muscle. Adding glucose with salt and phosphate helped suppress warmed-over flavor throughout display and did not reduce flavor acceptability or increase cooking loss. Roasts cooked to 200 F had lower warmed-over flavor scores and were more acceptable, but were less cohesive and had higher cooking losses than roasts cooked to 145 F. All roasts were acceptable, regardless of boning, ingredient, or temperature treatment.

Introduction

When "restructured" meat products are precooked, an undesirable "warmed-over" flavor may become evident and the desirable beef flavor may become less intense. "Warmed-over flavor" is due to rancidity of fats. Salt, which is used in restructuring meat, encourages both rancidity and color deterioration. Adding certain sugars and cooking at high temperatures may help prevent rancidity. The use of hot-boned meat may also help decrease rancidity, as well as increase the cohesiveness of restructured roasts. Consumer acceptability of pre-cooked, restructured, beef roasts can be increased through: 1.) improved flavor, 2.) improved color, 3.) elimination of added salt, 4.) decreased fat levels, and 5.) greater convenience. The objective of our study was to evaluate the effects of: 1.) conventional vs. hot-boning, 2.) added glucose, and 3.) internal cooking temperature on flavor and color characteristics of low fat, restructured, beef roasts.

Experimental Procedures

Meat from six Holstein steers was used to produce low fat, restructured beef roasts. Muscles were removed by either conventional or hot- boning, then were blade tenderized and ground. Meat batches (90% coarse plus 10% fine ground meat) then were subjected to four ingredient additions: 1.) 4% water, 2% NaCl, 0.5% phosphate, 2% glucose; 2.) 4% water, 2% NaCl, 0.5% phosphate; 3.) 4% water, 2% NaCl, 2% glucose; and 4.) 4% water, 0.5% phosphate, 2% glucose. The resulting restructured roasts were cooked to an internal temperature of either 145 or 200 F. Slices of the roasts were displayed (refrigerated, wrapped with plastic film, and placed under lights for 24 hours/day) for 10 days. Meat was evaluated for consumer acceptability and rated for flavor by a trained panel.

[1]Appreciation is expressed to the Cattlemen's Beef Promotion and Research Board for support of this research.

Results and Discussion

Results of the study are shown in Table 24.1. As expected, roasts without added salt and those cooked to 200 F had less moisture, were less cohesive, and had more cooking loss than roasts with added salt and those cooked to 145 F. However, roasts cooked to 200 F received higher consumer acceptability scores, and were perceived to have less warmed-over flavor than those cooked to 145 F (Figure 24.1). Roasts from conventionally boned muscles were more acceptable than those from hot-boned muscles when cooked to a low internal temperature. Roasts with salt, phosphate, and glucose, or salt and phosphate had the highest acceptability scores, whereas roasts with phosphate and glucose had the lowest. All roasts were scored acceptable, regardless of ingredient treatment. Warmed-over flavor, pH values, and cooking yields were higher for hot-boned roasts than conventionally boned roasts when a difference existed. Roasts with salt, phosphate, and glucose maintained the lowest level of warmed-over flavor (Figure 24.1). These data show that adding glucose to a salt and phosphate mix for restructured beef roasts will help maintain low warmed-over flavor scores, without affecting acceptability or yield.

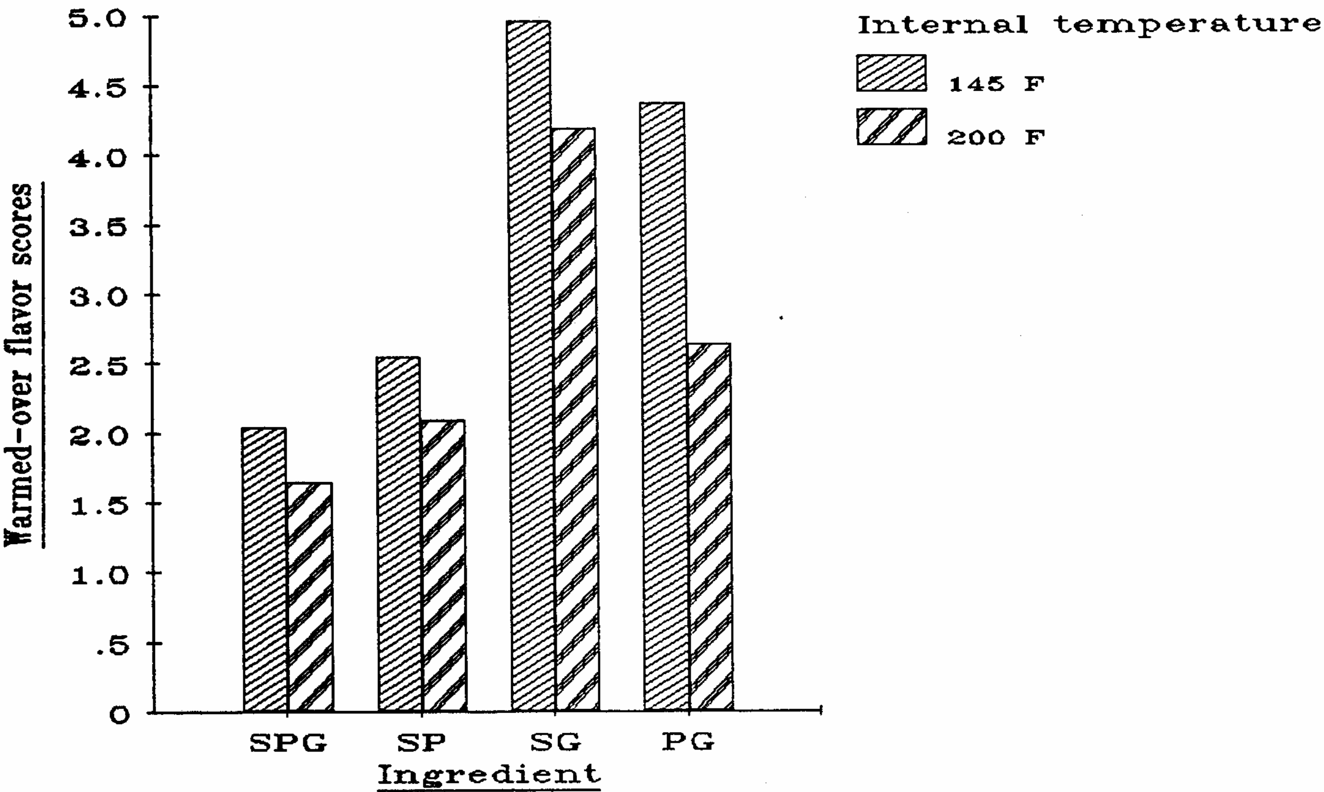
Table 24.1. Mean Values for Consumer Acceptability Scores of Restructured Beef Roasts as Affected by Ingredient and Boning x Temperature Treatments

Ingredient	Acceptability Scores[a]	Internal Temp.	Acceptability Scores[ab] HB	CB
salt, phos. glucose	3.25^{c}	145 F	4.26^{c}	3.92^{c}
salt, phos.	3.25^{c}	200 F	3.33^{d}	3.45^{d}
salt, glucose	3.67^{d}			
phos. glucose	4.78^{e}			

[a]Consumer panel: 1=like extremely, 9=dislike extremely.

[b]HB = Hot-boned, CB = Conventionally boned.

[cde]Mean values in the same column with common superscripts are not different (P>.05).



Six-member trained panel: 1=threshold, 5=moderate −, 10=strong +.

Figure 24.1. Effects of ingredient and internal cooking temperature treatments on "warmed-over flavor" scores of restructured beef roasts. SPG = salt, phosphate and glucose; SP = salt and phosphate; SG = salt and glucose; PG = phosphate and glucose.

* * *

"Restructuring" is a process by which lower value meat raw material, which is generally merchandized in the ground form, is manufactured into "value added" products. The process consists of chopping the meat, mixing it to bring its binding proteins to the surface, blending in desired amounts of fat and added ingredients, and forming the final mixture into appropriate shapes. The product can be raw or precooked, and can be handled and distributed at either chilled or frozen temperatures. The advantage of this process is that it can produce a product that is consistent in quality, composition, size and price; a very desirable advantage for those supplying the needs of the food service industry.

* * *