VALUE-ADDED BEEF PROCESSING: INCREASING THE VALUE OF BEEF SHANKS USING BAADER™ PROCESSING TECHNOLOGY

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Summary

Using a Baader™ desinewing machine on beef shanks can increase the value of a beef carcass by $1 to $5 by improving palatability and texture and reducing fat. By varying belt pressure and drum opening size and passing shanks twice through the desinewer, we obtained commercially acceptable yields. Maximum lean yield was 93% of the shank using 5 mm drum holes for both passes. With 3 mm drum holes, very lean (
produced on the first pass. Using desinewed lean and flaking the sinew with an Urschel Commitrol®, we produced low-fat (10%) ground beef patties. Patties from desinewed lean alone and/or desinewed lean with flaked sinew reincorporated were more acceptable ($P < .05$) and had fewer noticeable connective tissue particles than patties made from unprocessed ground shank.

(Key Words: Beef, Shanks, Sinew, Collagen Low-fat.)

Introduction

Although beef shanks are a major source of lean manufacturing beef, their high connective tissue content prevents use as the sole lean source in many products. Baader desinewing removes the connective tissue and eliminates this problem. The desinewed lean alone has added value and can be used in many products. However, processing the sinew can modify it enough for re-incorporation at natural proportions into the desinewed lean, adding $1 to $3 to the value of a beef carcass.

Another benefit of Baader technology is that it can separate lean and fat. By varying the belt pressure and drum hole size, 50-55% of the shank can be recovered at < 5% fat. The rest of the shank can still be used in a variety of products. This aspect of the process may add $1 to 2 to the value of a beef carcass.

Experimental Procedures

Our eight treatments are listed in Table 1. Beef patties formulated to contain 5, 10, or 20% fat were made from beef shanks or beef round. Each treatment was replicated three times. In three treatments, sinew was reincorporated into the patty mix after flaking frozen sinew through an Urschel Commitrol either once or twice. Yields and compositions of the various manufacturing streams are shown in Table 2.

Results and Discussion

Yields of usable lean were over 92% after two passes through the desinewer. Sinew yield was 6.5 to 7% (Table 2), similar to yields achieved by commercial packers using this technology. The pH of shank meat (6.07) was higher than that of round muscles (5.79). Higher pH improves water-holding capacity in manufacturing meat and may explain the higher juiciness scores of patties made from shank (Table 3).

Baader technology can reduce fat content in first pass lean, while desinewing at the same time. Fat in first pass lean ranged from 4 to 8% depending on drum hole size and belt pressure. Collagen was 27 to 47% less in first pass lean than in whole ground shank (WGS), depending on drum hole size and pressure. Smaller drum holes reduced fat and collagen

more than larger holes, but also reduced first pass lean yields (Table 2).

Patty composition and consumer sensory panel results are shown in Table 3. Patties made from shank meat had higher pH values than those made from ground round. Measured fat was within 1.5% of target levels for each treatment. Collagen content was greater in patties made from whole ground shank (WGS) than in control patties (10C and 20C) made from round muscles.

One purpose of this research was to determine if the recovered sinew could be modified and reincorporated with the desinewed lean as low-fat ground beef. Panelists found fewer detectable connective tissue particles in treatments with (5/5S) and without (5/5NS) flaked sinew compared to WGS and the control treatments (Table 3). Higher juiciness scores for shank-containing patties may be explained by either improved water binding by either collagen or higher pH. As expected, desinewing reduced collagen in those treatments where processed sinew was not reincorporated (5/5NS and 3S). Adding of 7% flaked sinew to the patty mix resulted in collagen levels similar to those of WGS patties (Table 3).

These data need to be confirmed by a larger scale test. However, sinew modification and reincorporation appear promising as ways to improve the value of beef. The potential additional return is $1 to $5 per carcass, depending on how a processor utilizes the technology and how much the sensory quality of beef shanks is improved.

Table 1. Treatments of Desinewed Shanks

Treatment	Lean raw material	Baader used	Drum 1st pass	Drum 2nd pass	Target fat %	Added sinew %
20C	Round	No	N/A	N/A	20	0
10C	Round	No	N/A	N/A	10	0
WGS	Shanks	No	N/A	N/A	10	0
5/5NS	Shanks	Yes	5 mm	5 mm	10	0
5/5 S	Shanks	Yes	5 mm	5 mm	10	7
3/5 S	Shanks	Yes	3 mm	5 mm	10	7
5/5S-F2x (flaked twice)	Shanks	Yes	5 mm	5 mm	10	7
3S	Shanks	Yes	3 mm	N/A	5	7

Table 2. Means for Yields, Composition, and pH of Beef Shank, Knuckle, and Fat Tissues

			Composition, %		
Tissue	Yield, %	pH	Moisture	Fat	Collagen, mg/g
Desinewed shank 5mm drum holes, 2 passes					
1st-pass lean	72.8[a]	5.99	72.1[b]	7.0[de]	10.5[c]
2nd-pass lean	19.6[d]	6.11	67.5[c]	13.6[bc]	13.8[b]
2nd-pass sinew	6.7[e]	5.72	67.1[c]	14.1[bc]	29.5[a]
Desinewed shank 3 mm, then 5 mm drum holes					
1st-pass lean	66.1[b]	6.15	73.1[b]	5.3[e]	7.6[d]
2nd-pass lean	25.1[c]	6.12	63.6[c]	18.8[a]	27.9[a]
2nd-pass sinew	6.8[e]	5.65	68.0[c]	14.3[b]	29.3[a]
Whole shank	---	6.07	69.5[c]	10.3[cd]	14.5[b]
Round muscles	---	5.79	76.5[a]	2.5[f]	5.3[d]
Fat	---	5.57	14.1[d]	82.0[a]	---

[a-f]Means in a column with a different superscript letter are different ($P < .05$).

Table 3. Means for pH, Tissue Composition, and Consumer Panel Scores of Ground Beef Made from Desinewed Shank

		Composition, %			Consumer panel scores[e]		
Treatment[d]	pH	Moisture	Fat	Collagen, mg/g	Particle detection	Juiciness	Overall acceptability
20C	5.80[b]	63.4[c]	19.0[a]	5.2[b]	3.1[bc]	4.2[b]	4.6[b]
10C	5.81[b]	70.8[b]	9.4[b]	5.3[b]	2.7[c]	3.9[b]	4.3[b]
WGS	6.08[a]	69.6[b]	10.4[b]	14.5[a]	4.5[a]	6.1[a]	6.0[a]
5/5NS	6.02[a]	69.4[b]	11.2[b]	6.1[b]	4.0[a]	5.5[a]	6.2[a]
5/5S	6.06[a]	68.4[b]	11.5[b]	14.8[a]	3.9[ab]	5.5[a]	6.3[a]
3/5S	6.12[a]	68.7[b]	11.0[b]	14.3[a]	---	---	---
5/5S-F2x	6.04[a]	68.7[b]	11.3[b]	12.3[a]	---	---	---
3S	6.07[a]	72.0[a]	7.0[c]	9.5[ab]	---	---	---

[abc]Means in a column with a different superscript letter are different ($P < .05$).
[d]20C and 10C = 20 and 10% fat control ground round; WGS = whole ground shank; 3 and 5 = 3 or 5 mm drum holes; NS = no sinew added; S = 7% flaked sinew added to desinewed shank; F2x = sinew flaked twice and added to desinewed shank.
[e]Higher scores indicate more particles or juicier or more acceptable product.