Characterization and Increased Utilization of the Beef Chuck and Round

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Introduction

The beef industry has experienced a steady decline in demand for its product over the last 20 years. This has resulted in a lowering of value in uninflated dollars for cuts produced from the carcass which has put profit pressure on all segments of the industry but most especially the producer segment of the business. This decrease in value has not affected all parts of the beef carcass equally. The value of the round, chuck and trimmings have decreased 20%, 23% and 31%, respectively, in relation to total carcass value whereas the rib and loin cuts have increased (Cattle Fax, 1998). These three carcass compo-nents make up 66 percent of the beef carcass. The marketing potential of the beef chuck and round is thought to be depressed due to much variability in (1) the palatability characteristics of the muscles and (2) composition (Johnson et al., 1988).

The diverse palatability characteristics are further amplified by the traditional way of fabricating the chuck and round. In many instances, muscles are cut without regard to muscle fiber orientation, accentuating tenderness problems. Many researchers (Ramsbottom et al., 1945; Zinn et al., 1970; Prost et al., 1975; McKeith et al., 1985; Paterson and Parrish, 1986; Johnson et al., 1988) have studied several muscles from beef chuck and round, characterizing them according to their palatability attributes. Christensen et al. (1991) and Meade et al. (1992a) have reported on muscle boning the chuck and portions of the forequarter and characterized palatability traits of certain muscles. These and previous studies indicate that many muscles from the chuck and round are very desirable in palatability and tenderness if they are removed intact and cut in the proper muscle fiber orientation.

The National Consumer Retail Beef Studies (Savell et al., 1989; Savell et al., 1991) have suggested factors affecting the purchasing decisions of today's consumer are changing. These studies show that consumers want a convenient product that is very palatable without excess plate waste (fat and bone). Recent Market Basket Studies (Savell et al., 1989; Savell et al., 1991) have also shown that retailers are responding to consumer demands by providing more boneless cuts with little or no external fat. The industry has been successful at meeting fat reduction demands of the consumer on cuts derived from middle meats and the round. Both the outside and seam fat on cuts from these primals can be easily removed. However, removal of seam fat from many of the chuck cuts without cut destruction is impossible under current fabrication techniques. Meade et al. (1992a, 1992b) demonstrated that whole muscle boning (conventionally and using accelerated processing) is a viable option of whole muscle removal, eliminating waste fat and bone but allowing maximum muscle utilization.

Therefore, if muscles from the round and chuck could be better characterized in both palatability, composition and physical attributes, processors might be more willing to remove these muscles intact so that their highest and best use could be fully realized and maximum value recouped for the industry.

Methodology

A study is currently underway at the University of Nebraska and the University of Florida which is funded by the National Cattleman's Beef Association to profile the muscles of the chuck and round to accomplish the above stated objectives.

Carcasses with a minimum of 24 hr chill were evaluated and selected by University personnel from the IBP facility at Dakota City, NE according to the selection matrix in Table 1. The crosscut chuck was removed between the 5th and 6th ribs, cutting through center of the intercostal muscles perpendicular to the dorsal line of the carcass. This allowed the maximum number of chuck muscles to be removed intact so that full muscle dimensions and yields could be determined. The round was also removed for muscle boning. Chucks and rounds from the lower third (⅓) of the Choice grade across all yield grades and weight ranges were selected for intricate dissection. Dissection included whole muscle boning, separation of intermuscular fat, lean trim and bone. Chucks and rounds that had intricate muscle separation were used to quantify yield, at three levels of trim (¾ in., ¼ in. and denuded) physical dimensions and gross characterization.

All muscles from the <700 lb. and >800 lb. weight classification were utilized for proximate composition, color, pigment concentration, connective tissue characterization, bind and fiber type analysis that is being conducted by the University of Nebraska, Lincoln.

Muscles from chucks and rounds from the 700 lb to 800 lb weight range were shipped to the University of Florida, Gainesville, Florida. Muscle portions or steaks were aged for a total of 14 days postmortem then frozen at 0° F for shear force or sensory panel evaluation.

One half of the muscles (i.e. two animals) per weight, yield grade, quality grade cell were cooked utilizing dry heat cookery (i.e. Farber-ware Open-Hearth Grille) to an internal tempera-tures of 160°F. The remaining half of the muscles (i.e. two animals) per cell were braised with mosture in a sealed cooking dish at 275°F oven temperature until 160°F was achieved. After cooking, muscles or steaks were allowed to cool and cores removed for Warner-Bratzler shear force determination according to AMSA (1995) guidelines. Twenty-six muscles from the chuck and 12 muscles from the round were sampled for shear force determinations.

Sensory evaluations are being conducted on all muscles removed from the chuck and round that are over one pound. This included 13 muscles from the chuck and 9 muscles from the round for a total of 22 muscles for sensory evaluation. Sensory panels were conducted according to AMSA (1995) guidelines.

Results

An update on research findings will be presented to participants to further explore the possible alternative uses of underutilized muscles of beef chuck and round.

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Table 1. Table 1. Project design

		Carcass Weight, kg			
	Yield Grade	less than 700	700-800	over 800	Animal #
Upper ⅔ Choice	1	PA-UNBL[a] (4)	SF & TP[b] (4)	PA-UNBL (4)	48
	2	PA-UNBL (4)	SF & TP (4)	PA-UNBL (4)	
	3	PA-UNBL (4)	SF & TP (4)	PA-UNBL (4)	
	4 & 5	PA-UNBL (4)	SF & TP (4)	PA-UNBL (4)	
Lower ⅓ Choice	1	PA-UNBL (4)	SF & TP (4)	PA-UNBL (4)	48
	2	PA-UNBL (4)	SF & TP (4)	PA-UNBL (4)	
	3	PA-UNBL (4)	SF & TP (4)	PA-UNBL (4)	
	4 & 5	PA-UNBL (4)	SF & TP (4)	PA-UNBL (4)	
Select	1	PA-UNBL (4)	SF & TP (4)	PA-UNBL (4)	48
	2	PA-UNBL (4)	SF & TP (4)	PA-UNBL (4)	
	3	PA-UNBL (4)	SF & TP (4)	PA-UNBL (4)	
	4 & 5	PA-UNBL (4)	SF & TP (4)	PA-UNBL (4)	
Total Chucks and Rounds		48	48	48	144

[a]PA-UNBL= proximate analysis and the other procedures conducted at University of Nebraska at Lincoln
[b]SF= Warner-Bratzler shearforce conducted at the University of Florida, TP= Taste Panel analysis conducted at the University of Florida

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