

# Properties of Restructured Beef Rolls As Affected by Incremental Brine/Water Addition



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## INTRODUCTION

Tumbling/massaging technology is now routinely used by the majority of pork processors to enhance yield, tenderness and juiciness of pork meat but it has not been adopted for widespread commercial use by the beef industry. Tumbling can also be an important process which facilitate the restructuring of meat pieces into a value-added final product. Structured lean roast beef products represent a potential growth area for the beef industry due to lower cost, low-fat content and convenience. The utilization of restructured technology could lead to an increase in the utilization of lower price cuts as well as increasing the value-added beef products available at retail. The combination of rate with quantity of brine component addition during the tumbling process may provide a useful means of improving the textural and binding properties of beef.

## OBJECTIVE

To examine the combined effect of timing and quantity of brine component addition on the yield, bind and texture of restructured beef product processed with 25 or 50% pump level.

## MATERIALS and METHODS

### Meat

*Semimembranosus* and *adductor* muscles were trimmed of all visible fat and connective tissue, then ground in a laboratory grinder through a plate with 2.54 cm diameter orifices. The average pH of the meat was  $5.27 \pm 0.04$ , the protein content was  $22.3 \pm 0.92\%$ , the moisture content was  $73.8 \pm 0.15\%$  and the fat content was  $1.8 \pm 0.32\%$ .

The variables investigated:

- Timing and quantity of brine/water addition
- Pump level 125 or 150%

### Beef Roll Preparation

Before processing, the meat was tempered at 4°C for 24 hours. The beef rolls were prepared by vacuum tumbling the ground beef with brine for 4 hours (20 min. on, 10 min. off) at -0.8 atm. pressure. Moisture-proof casings were stuffed and stage cooked in a water bath to 72°C. The rolls were formulated to contain 1.8% NaCl and 0.3% sodium tripoly phosphate. The timing and quantity of incorporation of brine/water during the tumbling process is presented in Table 1.

Table 1. Timing and quantity of brine/water addition.

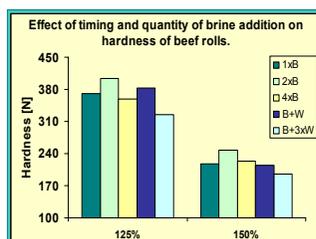
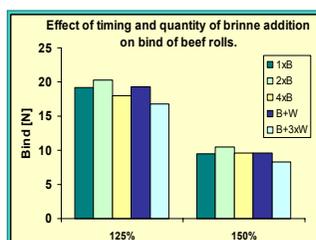
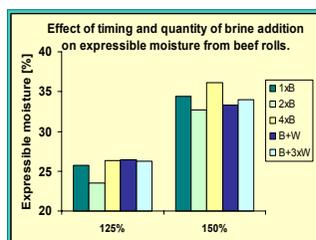
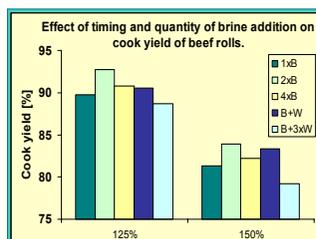
Treatments	Time, h			
	0	1	2	3
1xB	B			
2xB	½B		½B	
4xB	¼B	¼B	¼B	¼B
B+W	½B		½W	
B+3xW	¼B	¼W	¼W	¼W

B=brine; W=water; Total tumbling time=4 hours

### Measurements on Cooked Beef Rolls

- Cooking loss
- Expressible Moisture (EM)
- Purge
- Bind strength
- Texture profile analysis (TPA)

## RESULTS



Brine addition of 50% had detrimental effects on product water binding characteristics. The incremental addition of brine/water during tumbling significantly ( $p < 0.001$ ) affected all parameters characterizing water binding properties of the rolls. Regardless of the pump level, cooking loss and expressible moisture was the lowest when half of brine had been added at the beginning and the second part after 2 hours of the tumbling process. When all salts with a quarter of the water were added at the beginning of tumbling, the resulting rolls had the highest losses during the thermal processing and lowest water holding capacity.

High-added water treatments produced rolls that were less hard, chewy and cohesive, and had poorer binding properties than rolls produced with lower water content. The loss in functionality by higher water addition was not overcome by the tumbling treatments. Addition of brine in two parts increased hardness for both pump levels but was unable to substantially improve bind, cohesiveness or springiness. Late addition of brine/water during tumbling (i.e. during the last hour) adversely affected textural characteristics, which resulted in rolls that were less hard, chewy and elastic, and had poorer binding properties.

## CONCLUSIONS

- The quantity and timing of brine/water addition is critical in ensuring good water binding and textural characteristics of cooked beef rolls.
- Addition of brine in two parts favourably affected hydration properties, thermal stability and texture, yielding lower cooking loss and purge, and increasing WHC and hardness for both 25 and 50% added water rolls.
- Late addition of brine/water during tumbling was detrimental and did not permit the incorporation of the water/brine into the muscle cells so that they were retained both in the raw and cooked state.

## ACKNOWLEDGEMENTS

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