

EFFECT OF COUNTRY, BREED AND STORAGE CONDITION ON THE PROCESSING AND SENSORY CHARACTERISTICS OF BEEF ROASTS

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ABSTRACT

Steer insides from two breeds (*Bos taurus* or *Bos indicus*) was selected from four different plants in each of Australia and the USA. Half the meat was shipped frozen and the other half was shipped chilled to the Iowa State University Meat Laboratory for processing into beef roasts. Before being cooked, the insides were pumped with a salt/phosphate brine typical of commercial practice in the USA. Country of origin and breed had little influence on the processing and sensory characteristics of the beef roasts. Storage condition had the greatest effect on the sensory characteristics of the beef roasts. Beef roasts made from insides that had been stored frozen had higher sensory scores for juiciness, had a more intense beef flavour, had less off-flavours, and a higher overall quality than beef roasts made from insides that had been stored chilled. These attributes made a greater difference to the consumer buyer action than did country of origin or breed.

INTRODUCTION

The Australian meat industry processes various types of beef animals for manufacturing meat. Large quantities of this meat are exported to other countries, including the USA, for further processing. Many studies (Bouton *et al.*, 1978; Koch *et al.*, 1982; Norman, 1982) have shown that animal characteristics (breed, age/gender, feeding regime, etc.) and slaughter and post-slaughter conditions (Chrystall and Devine, 1991; Devine and Chrystall, 1991) can affect the meat quality. Also, many US companies claim that Australian meat doesn't function in the same way as US meat and that there are distinct flavour differences. Therefore, research to determine the effect of country, breed and storage conditions on the processing characteristics of beef roasts is needed so that the optimum handling instructions can be established for Australian beef destined for the USA market. This study investigates the effect of country, breed and storage conditions on the purge (drip), cook yields and sensory properties of beef insides. Before being cooked (i.e., after thawing), the cuts were pumped with a salt/phosphate brine typical of commercial practice in the USA when making beef roasts for retail markets.

The difference in percent purge between frozen and chilled US insides approached significance. Australian insides that had been frozen had a higher percent tumble than that from insides stored chilled, whilst the US chilled insides had a higher percent tumble than insides stored frozen.

Sensory Evaluation

Samples from beef roasts manufactured from Australian meat had higher scores for juiciness and intensity of beef flavour, but had off-flavours and lower overall quality than samples from beef roasts manufactured from US meat (Table 3). Although the differences are significant, they are not large. Beef roast samples from British animals were more juicy, less dry and more tender. More off-flavours were detected and this meat had greater overall quality than samples manufactured from Brahman insides (Table 3). Beef roasts made from insides that had been stored frozen were scored more as being more juicy, with more intense beef flavour and less off-flavours and a greater overall quality (Table 3). The differences observed by the panel were not large enough to alter the buying patterns except when beef roasts had been manufactured from chilled or frozen meat. The data suggest that there are only very small differences in the sensory characteristics of beef roasts made from Australian or US insides.

Table 1. Effect of country, breed and storage conditions on the processing characteristics of beef insides.

	Purge (%)	Cap (%)	Pump (%)	Tumble (%)	Cook (%)	pH
Country						
Australia	3.3	34.1	107.2	107.2	85.8	5.67
USA	2.4	39.2	107.1	106.5	85.4	5.60
LSD (5%)	0.7	5.2	1.7	1.6	3.2	0.08
Breed						
British	2.6	35.8	108.0	107.4	87.2	5.65
Brahman	3.1	38.2	106.4	106.3	84.0	5.63
LSD (5%)	0.7	2.2	1.3	1.0	2.0	0.03
Storage conditions						
Chilled	1.9	36.8	107.3	107.0	8.55	5.40
Frozen	3.8	37.2	107.0	106.7	85.7	5.67
LSD (5%)	0.7	2.2	1.3	1.8	2.1	0.03

Table 2. Interaction of storage condition and country for % purge and % tumble.

	Country	
	Australia	USA
% Purge		
Chilled	1.91	1.85
Frozen	4.73	2.95
LSD (5%)	1.1	
% Tumble		
Chilled	106.5	106.9
Frozen	107.9	106.0
LSD (5%)	1.5	

Table 3. Effect of country, breed and storage conditions on the sensory characteristics of beef roasts cubes made from insides.

	Country		Breed		Storage condition		
	Australia	USA	British	Brahman	Chilled	Frozen	LSD (5%)
Juicy	3.7	3.5	3.8	3.5	3.5	3.7	0.11
Dry	2.8	2.9	2.7	3.0	2.9	2.8	0.14
Tender	3.9	3.9	4.0	3.8	3.9	3.9	0.12
Tough	2.7	2.6	2.6	2.7	2.6	2.6	0.13
Beef flavour intensity	4.0	3.8	3.8	3.8	3.7	4.0	0.10
Off-flavours	2.3	2.1	2.1	2.3	2.3	2.1	0.12
Buy	3.4	3.5	3.5	3.4	3.3	3.7	0.16
Overall quality	3.4	3.6	3.6	3.4	3.3	3.8	0.12

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