

ENHANCING UTILIZATION OF CANADIAN COMMERCIAL BEEF IN GROUND MEAT PRODUCTS

E X E C U T I V E S U M M A R Y



Introduction

Commercial beef is typically produced using mature animals from the breeding herd. This cost effective and versatile source of protein is effectively utilized in a wide variety of products including ground beef. While ground beef has historically been promoted as a commodity item, the emergence of source grinds has presented new opportunities to add value to this category. Source grinds produced from specific portions of the carcass such as the sirloin, round and chuck can provide products with unique characteristics which can add value to the bottom line. The ability to use commercial beef in place of product from youthful cattle can also enhance profitability by reducing costs while maintaining the quality of the finished product.

COMPARING SOURCES FOR GROUND BEEF

Research sponsored by the Beef Information Centre and performed by Alberta Agriculture, Food and Rural Development scientists examined two areas:

Study 1:

How well does Canadian commercial beef compare to beef from youthful cattle, in both trim and source grinds?

Study 2:

How well does Canadian commercial beef compare to Non-NAFTA (offshore) trim for making ground beef?

In both studies, researchers compared both raw and cooked patties based on attributes important to meat quality and consumer appeal. These included instrumental tests of meat texture and water holding capacity, as well as ratings by a consumer sensory panel who evaluated patties based on qualities of appearance, texture, flavour, juiciness, bite and overall acceptability (for details, see Methodology sidebar on next page).

The research was conducted at the Food Processing Development Centre in Leduc, Alberta and the Consumer Product Testing Centre in Edmonton.



Methodology

SAMPLES

All sample patties were unseasoned, prepared in the same manner and had their fat content adjusted to the same level.

ATTRIBUTES TESTED

Sensory Panel Tests:

A panel of consumers who eat frozen pre-formed hamburger patties at home and/or fast food restaurants evaluated the sample patties. The number of panellists ranged between 179 and 210 in Study 1 and 365 in Study 2. Depending on the attribute evaluated, the panellists used either a 9-point or a 5-point scale to rate the patties. The panellists were unaware of the type of the hamburger patty served.

Appearance

Raw patties were evaluated on appearance acceptability, colour and fat colour. Cooked patties were evaluated on their appearance acceptability.

Sensory Analysis

Cooked patties were evaluated on flavour, texture, juiciness, bite and overall acceptability.

Instrumental Tests:

Warner-Bratzler Shear Force

For this measurement of the force needed to drive a blade through a pre-cut piece of meat, higher values generally indicate less tenderness. However, since the product tested was composed of ground meat, the measurements were rather an indication of texture than tenderness.

Water-Holding Capacity

Samples of cooked hamburger patties were spun, and the extracted juices were measured to determine water holding capacity. Although this is an indicator of beef quality, it may not be a good representation of juiciness, which was evaluated by the sensory panel (see "Did you know?" box on page 4). Low water-holding capacity can result in high cooking loss.

Colour and pH

A colourimeter was used to provide an objective measure of meat colour appearance. The pH of raw and cooked patties was also measured as pH is a good indicator of water-holding capacity.

Cooking Loss

Cooking loss was determined by weighing hamburger patties before and after cooking. High cooking loss can lead to lowered juiciness in beef. Cooking loss is also of economic importance to the food service industry.

Source grinds were grouped based on three different cuts: chuck, sirloin and round. For each group, hamburgers made from Grade A beef trim, Cow beef trim and Grade A, D1, D2 and D4 source cuts of meat were compared.

| GROUP 1 CHUCK | GROUP 2 SIRLOIN | GROUP 3 ROUND |
|-------------------|--------------------|-------------------|
| Grade A beef trim | Grade A beef trim | Grade A beef trim |
| Grade A chuck | Grade A sirloin | Grade A chuck |
| Cow beef trim | Cow beef trim | Cow beef trim |
| D1 chuck | D1 sirloin | D1 round |
| D2 chuck | D2 sirloin | D2 round |
| D4 chuck | D4 sirloin | D4 round |

Table 1: Overview of samples tested.

In most cases, sensory and instrumental attributes (see Methodology) were assessed twice for each grind. The patties for each of the two assessments were prepared at a different time. Interestingly, the same grind often received a different evaluation score when assessed the second time, despite the fact the same processing methods and meat supplier were utilized in both assessments. Meaningful comparisons were therefore sometimes difficult to make and further research is required. However, the following findings are notable.



NOTABLE FINDINGS

Chuck Group

Raw patties: Evaluations showed trim and source grinds from mature cattle were equal or better than trim and source grinds from youthful cattle. Some lower scores were observed in the mature categories, such as the fat colour of the cow trim grind being perceived as “too dark”.

Cooked patties: No significant difference was observed between cow trim, D1, D2 and D4 chuck grinds in cooked hamburgers. Trims and source grinds from mature cattle tended to score lower than Grade A chuck and even Grade A trim. Cooked appearance was equal across all categories.

| | GRADE A TRIM | GRADE A CHUCK | COW TRIM | D1 CHUCK | D2 CHUCK | D4 CHUCK |
|-------------------------------------|--------------|---------------|----------|----------|----------|----------|
| OVERALL COOKED ACCEPTABILITY | 5.7 | 6.0 | 5.1 | 4.9 | 5.4 | 5.0 |

Table 2: Overall cooked acceptability of grinds tested. Evaluated on a scale from 1 to 9, where 1 = dislike extremely and 9 = like extremely.

Sirloin Group

Raw patties: D sirloin grinds were all as acceptable as Grade A sirloin grind.

Cow trim and Grade A trim scored somewhat lower on the acceptability scale.

Cooked patties: Although cow trim and D grinds received a larger number of low scores, they were not significantly different from youthful cattle grinds.

| | GRADE A TRIM | GRADE A SIRLOIN | COW TRIM | D1 SIRLOIN | D2 SIRLOIN | D4 SIRLOIN |
|-------------------------------------|--------------|-----------------|----------|------------|------------|------------|
| OVERALL COOKED ACCEPTABILITY | 5.6 | 5.6 | 4.8 | 4.6 | 5.0 | 4.9 |

Table 3: Overall cooked acceptability of grinds tested. Evaluated on a scale from 1 to 9, where 1 = dislike extremely and 9 = like extremely.

Round Group

Raw patties: D round grinds were again as acceptable as Grade A round and tended to be more acceptable than Grade A trim or cow trim.

Cooked patties: Overall acceptability did not differ significantly between the grinds, although D grinds and cow trim grind tended to receive somewhat lower scores than grinds from youthful cattle. Appearance acceptability was not different between the categories.

| | GRADE A TRIM | GRADE A ROUND | COW TRIM | D1 ROUND | D2 ROUND | D4 ROUND |
|-------------------------------------|--------------|---------------|----------|----------|----------|----------|
| OVERALL COOKED ACCEPTABILITY | 5.9 | 5.8 | 5.0 | 4.9 | 5.2 | 4.4 |

Table 4: Overall cooked acceptability of grinds tested. Evaluated on a scale from 1 to 9, where 1 = dislike extremely and 9 = like extremely.



STUDY 2: COMPARING CANADIAN COMMERCIAL BEEF TO IMPORTED PRODUCT

COMMERCIAL BEEF

Researchers further compared the attributes (see Methodology sidebar on page 2) of unseasoned hamburger patties made using ground beef from the following sources:

- 1) Canadian over-thirty-months (OTM) trim
- 2) Canadian under-thirty-months (UTM) trim
- 3) Australian trim (from OTM cattle)
- 4) New Zealand trim (from UTM cattle)
- 5) Uruguayan trim (from UTM cattle)

Notable Findings

Panel evaluation showed frozen Canadian OTM patties are as acceptable as Canadian UTM, New Zealand and Uruguayan patties, and were more acceptable than Australian trim patties. The fat colour of Canadian OTM patties was comparable to that of other grinds, indicating OTM meat did not seem to suffer from fat darkening or discoloration.

| | OTM | UTM | AUS | NZL | URG |
|-----------------------|-----|-----|-----|-----|-----|
| RAW APPEARANCE | 6.4 | 6.2 | 4.9 | 6.1 | 5.9 |

Table 5: Raw appearance of OTM, UTM, Australian (AUS), New Zealand (NZL) and Uruguayan (URG) trim patties. Evaluated on a scale from 1 to 9, where 1 = dislike extremely and 9 = like extremely.

Instrumental measurements on frozen patties showed Australian patties were lighter, less red and more yellow than OTM and UTM patties. This may explain why the consumer panel did not find Australian trim patties as acceptable as the other four trims.

Cooked OTM patties were equal to the UTM patties for overall, flavour, appearance and texture acceptability. When compared to imported grinds, OTM patties were equal or even more preferred in regards to these same attributes.

| | OTM | UTM | AUS | NZL | URG |
|-------------------------------------|-----|-----|-----|-----|-----|
| OVERALL COOKED ACCEPTABILITY | 5.4 | 5.9 | 5.6 | 4.7 | 5.0 |

Table 6: Overall appearance of cooked OTM, UTM, Australian (AUS), New Zealand (NZL) and Uruguayan (URG) trim patties. Evaluated on a scale from 1 to 9, where 1 = dislike extremely and 9 = like extremely.

Instrumental measurements showed Australian trim cooked patties to be lighter in colour than UTM, OTM and New Zealand grinds. Water holding capacity of OTM patties was significantly higher than the water holding capacity of the Australian and New Zealand patties. However, this was not reflected in juiciness scores. This reinforces the fact that juiciness is not only affected by the moisture released by patties but also other factors such as consumer's level of salivation (see "Did you know" box). OTM patties did not suffer from an increased cooking loss compared to other grinds.

Utilizing Canadian Commercial Beef

The results from both studies show there is an opportunity to substitute commercial beef for beef from youthful cattle either as trim or source grind. Although Grade A source and trim grinds tended to have higher overall cooked acceptability scores than source and trim grinds from mature cattle, the differences in these scores were not significant and should not translate into strong consumer resistance. Furthermore, frozen patties from Canadian mature cattle compared favourably to frozen patties from Uruguay, New Zealand and Australia, as well as from Canadian youthful cattle. However, further research will be needed to confirm findings from these two studies.

Did You Know?

"Juiciness" and Water Holding Capacity.

Water is present in meat in two forms: bound and free. If the meat is squeezed or centrifuged (spun at high speed) the free water can be released; this water is called expressible moisture. However, the amount of expressible moisture is not a good measure of "juiciness". "Juiciness" involves not only the free and bound water content of the meat, but also the consumer's level of salivation. Amount of salivation may be a result of many factors including the flavour and fat content of the meat and even factors in the taster's environment.