# CHARACTERIZATION OF INTERMEDIATE VALUE STEAKS FROM THE BEEF CHUCK

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## Story in Brief

Two new retail steaks from the beef chuck (top blade and mock tender) and beef top loin steaks were purchased from a U.S. Choice retailer to contrast cooking, tenderness, and chemical properties. Top blade steaks had the shortest cooking time, lowest shear force (most tender), fewest tough ratings, and cheapest price per pound. Mock tender steaks had the least cooking shrinkage and were similar to top loin steaks for cooking time, shear force, and percentage tough steaks. Furthermore, cooked steaks from the mock tender had the lowest fat and caloric contents as well as the highest protein and moisture levels per three ounce serving. Results indicate that among steaks broiled to a medium degree of doneness, beef top blade and mock tender steaks are at least comparable to top loin steaks in tenderness and nutritional composition.

(Key words: Beef, Steaks, Tenderness, Proximate Analysis.)

## Introduction

Over past years, beef chuck prices increased $8.00/cwt (8%) to add $2.00/cwt and $1.25/cwt to carcass and fed steer values, respectively (NCA, 1990). A portion of this price increase may be attributed to increased utilization of the chuck for ground beef production and perhaps, new merchandising methods for the chuck involving intermediate value whole muscle steaks. Aside from fabrication procedures, very little palatability and nutritional information is available for these new cuts. The recent revision of USDA Handbook No. 8-13 (USDA, 1990) only addresses traditional arm and blade steaks at various levels of trim. Accordingly, the purpose of this study was to characterize top blade and mock tender steaks from the beef chuck for tenderness and proximate composition relative to boneless top loin (strip) steaks.

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## Methods and Materials

Eighty-seven steaks (approximately 1 in. thick) were purchased from a U.S. Choice (USDA, 1989) beef retailer to represent the mock tender (*supra spinatus*), top blade (*infra spinatus*), and top loin (*longissmus dorsi*) boneless cuts. Steaks were purchased on 10 different days, over a four week, period to minimize the risk of repeated sampling from a similar subprimal. Retail package information (number of steaks, price per pound, and package price) was recorded and all steaks were vacuumed packaged and frozen (-22° F).

A random sample of steaks (n = 60; 20 for each muscle type) were thawed (35° F) for 24 hours and subsequently charbroiled on Farberware Open-Hearth broilers to an internal temperature of 158° F (medium degree of doneness). Data were collected to assess cooking time (minutes per 3 oz. serving) and cooking shrinkage (% weight loss). After a two hour cooling period to room temperature, steaks were cored (0.5 in diameter) to determine Warner Bratzler peak shear force using an Instron Model 4500. An average of four cores from each steak was tested to reflect tenderness. The cooked steak (including the cores used for the shear data) was stored at -22° F for subsequent chemical analysis.

The remaining 27 raw steaks and all cooked steaks were individually frozen in liquid nitrogen, powdered in a Waring Blender and analyzed for percent moisture (oven drying), fat (ether extract), and protein (Kjeldal).

Data were analyzed using steak type as the main effect. Duncan's Multiple Range Test was used to partition subclass means.

## Results and Discussion

Cooking properties, tenderness values, and retail prices stratified by steak type are presented in Table 1. Cooking time (minute/100g) was less ($P<.05$) for top blade steaks than for either mock tender or top loin steaks. Cooking shrinkage was similar ($P>.05$) for top blade and top loin steaks, but highest ($P<.05$) for mock tender steaks (28.0, 28.6, and 32.4%, respectively). Furthermore, top blade steaks had the lowest ($P<.05$) shear force values (most tender) while steaks from the mock tender and top loin were similar ($P>.05$). Likewise, top blade steaks had the lowest ($P<.05$) percentage of tough steaks (shear force values of 10 lbs or more) although, all three steak types averaged well within the tender range.

Average price per pound was the lowest ($P<.05$) for top blade steaks, intermediate for steaks from the mock tender and highest ($P<.05$) for top loin steaks. Due to increasing consumer demand for the mock tender during the sampling period, price per pound was the most variable for mock tender steaks

**Table 1. Cooking properties, tenderness, and retail price by steak type.**

| ITEM | TOP LOIN | TOP BLADE | MOCK TENDER |
|---|---|---|---|
| Number of Steaks | 20 | 20 | 20 |
| Raw Weight, oz | 6.9[b] | 5.5[c] | 5.0[c] |
| Cooking Time, min/100 g | 16.8[b] | 12.3[c] | 15.6[b] |
| Cooking Shrink, % | 28.6[c] | 28.0[c] | 32.4[b] |
| Shear Force, lb. | 7.7[b] | 5.9[c] | 8.6[b] |
| Tough Steaks, %[a] | 15.0 | 0 | 15.0 |
| Price, $/lb. | 6.21[b] | 2.37[d] | 2.61[c] |

[a] Shear force values of 10 pounds or higher.
[b,c,d] Means in the same row with a common superscript letter are not different (P>.05).

($1.94 initially vs $3.38 ending). Price variation was minimal among top loin and top blade steaks ($0.30 and $0.10, respectively).

Chemical composition at raw and cooked endpoints stratified by steak type is presented in Table 2. Among raw steaks, intramuscular lipid content was the lowest (P<.05) for the mock tender, intermediate for the top loin and highest (P<.05) for the top blade. Moisture content of raw steaks tended to be inversely related to lipid content. Protein content was similar (P>.05) among top blade and mock tender steaks, but highest (P<.05) for top loins. At the cooked endpoint, no (P>.05) differences were noted among top blade and top loin steaks, however, mock tender steaks were lowest (P<.05) for lipid and highest (P<.05) for protein and moisture retention.

Similar results were observed when chemical constituents of cooked steaks were expressed per 3 ounce serving (Table 3). Mock tender steaks were lowest (P<.05) for lipid and caloric content and highest (P<.05) in protein and moisture. No (P>.05) differences were noted between steaks from the top blade and top loin. (Our values for the top loin coincide directly with values reported by USDA, 1990.)

## Implications

New merchandizing methods for the beef chuck have increased the price of beef (NCA, 1990). Chuck cuts are cheaper than and at least comparable to

**Table 2. Chemical composition of raw and cooked[a] steaks.**

| ITEM | TOP LOIN | TOP BLADE | MOCK TENDER |
|---|---|---|---|
| **RAW[b]** | | | |
| Fat, % | 6.1[e] | 7.7[d] | 3.7[f] |
| Protein, % | 22.7[d] | 20.3[e] | 20.7[e] |
| Moisture, % | 69.2[f] | 71.2[e] | 75.2[d] |
| **COOKED[c]** | | | |
| Fat, % | 11.9[d] | 11.2[d] | 6.3[e] |
| Protein, % | 29.9[e] | 30.4[e] | 32.0[d] |
| Moisture, % | 57.2[e] | 56.3[e] | 60.9[d] |

[a] Broiled to a medium degree of doneness (158° F).
[b] n = 27 ( 5 top loin, 8 top blade, 14 mock tender steaks).
[c] n = 20 for each steak type.
[d,e,f] Means in the same row with a common superscript letter are not different (P>.05).

**Table 3. Chemical composition of cooked steaks expressed per three ounce serving.**

| ITEM | TOP LOIN | TOP BLADE | MOCK TENDER |
|---|---|---|---|
| Fat, g | 10.1[a] | 9.5[a] | 5.4[b] |
| Protein, g | 25.4[b] | 25.8[b] | 27.2[a] |
| Moisture, g | 48.6[b] | 47.9[b] | 51.8[a] |
| Calories, kcal | 199.9[a] | 196.3[a] | 164.7[b] |

[a,b] Means in the same row with a common superscript letter are not different (P>.05).

the top loin in tenderness and chemical composition. The top blade steak has not yet been recognized for its true value. An added quality of mock tender and top blade steaks is their deep orientation within the chuck, which leads to minimal fat trim and a leaner, healthier appearing retail cut, with minimum plate waste.

Also worthy of noting, is the definite need for cookery information at the retail case. If steaks from the chuck are to be utilized effectively, consumers

must be informed of the correct cooking procedures (methods and recommended degree of doneness).

Red meats can provide a wholesome, balanced diet to the health conscious consumer. But this cannot happen without continued efforts from producers and industry leaders.

## Literature Cited

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