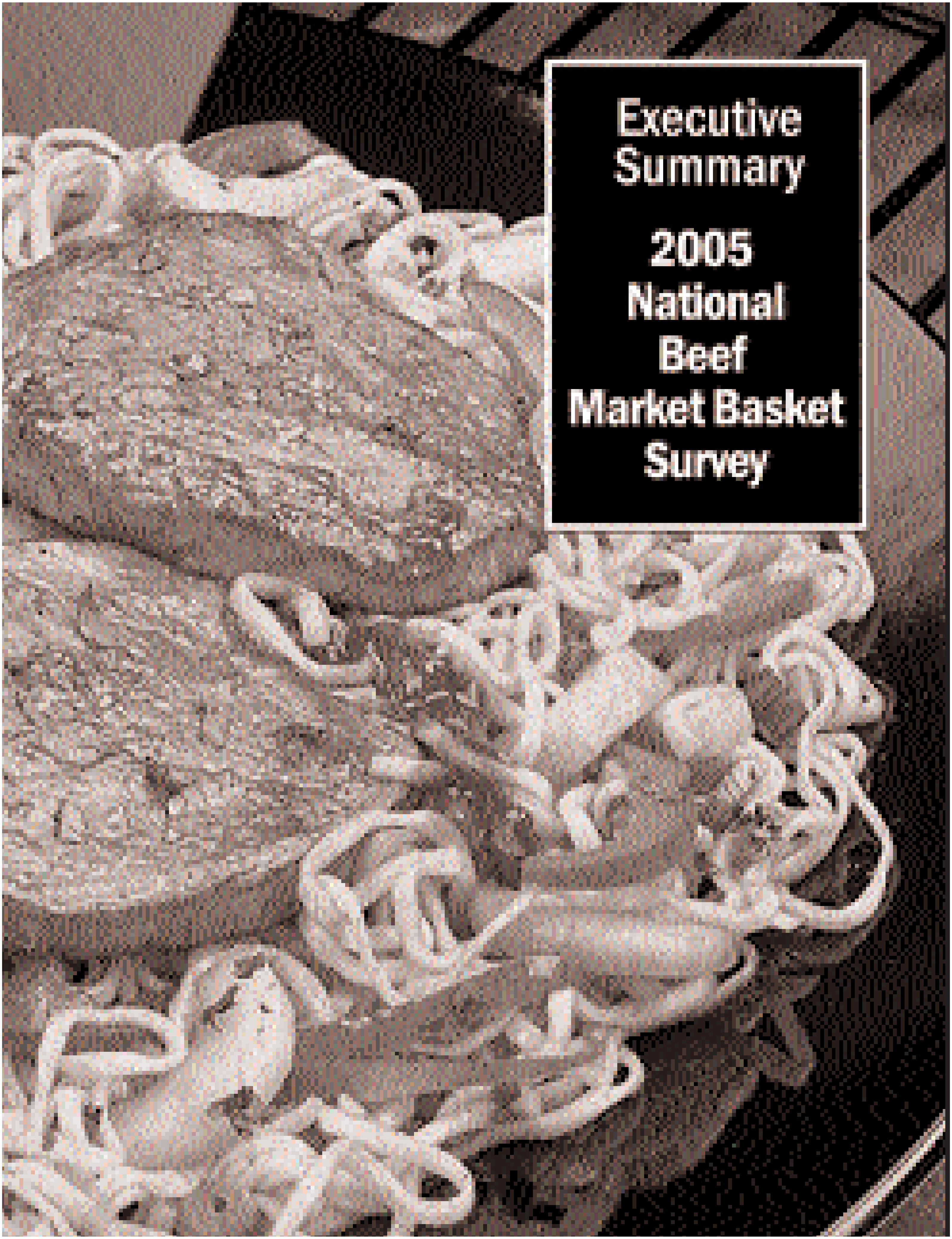
Executive Summary

2005 National Beef Market Basket Survey



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2005 National Beef Market Basket Survey

Funded by The Beef Checkoff

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Objectives

- To gain knowledge of the present state of the composition of raw beef in retail throughout the United States; and
- To compare data acquired through this project with that shown in the National Nutrient Data Bank and Agriculture Handbook 8-13 in order to assess appropriate revisions.

The Need for Updated Nutrition Information

Over the past 30 years, nutritional aspects of beef continually have been associated with the amount of fat it contained. Health professionals have repeatedly characterized beef as having more fat – and sometimes too much fat – when compared to other proteins.

Unfortunately, their recommendations have frequently been based on faulty sources of nutritional information. As a result, nutritionists and consumers have been misled when it comes to beef's role as a source of dietary fat.

Particularly challenging for beef have been studies conducted as far back as the early 1960s that predicted the estimated yields of retail cuts. Researchers for the U.S. Department of Agriculture at the time developed a series of publications on the topic that had a serious flaw: they overestimated the percent fat and total calories for products because there was no adjustment for trimming.

USDA has since updated and revised its nutrient data based on information from universities, agricultural experiment stations, government laboratories and industry. In fact, its most utilized database, Agriculture Handbook No. 8, "Composition of Foods: Beef Products; Raw, Processed Prepared" (commonly known as Agriculture Handbook 8-13), first prepared in 1950, has gone through four revisions. Adds Shalene McNeill, Ph.D., R.D., NCBA's Director of Human Nutrition Research: "When it comes to nutrition, beef has a great story to tell. It is critical that governmental databases reflect the most current beef nutrition information and The Beef Checkoff has established beef nutrient database improvement as a key priority."

Another challenge has been that some of what consumers know about beef and its contribution to fat consumption is derived from the USDA Nationwide Food Consumption Survey and the U. S. Department of Health and Human Services' National Health and Nutrition Examination Survey. The Nationwide Food Consumption Survey is conducted roughly once every 10 years, providing dated information.

Unfortunately, the negative impressions consumers have of beef have been compounded by the ways the data in these surveys are gathered and analyzed. In the years these surveys were conducted, data available from Agriculture Handbook 8-13 were based on retail cuts showing more external fat than the cuts actually found in retail meat cases at the time.

As recently as 1986, data published in the Handbook was based on the same fat trim levels – 1.27 cm (0.5 in) or less – as were used in the 1963 version of the Handbook.

The National Consumer Retail Beef Study in 1986 (Cross et al., 1986) made data presented in Agriculture Handbook 8-13 of 1986 obsolete. Thanks to the checkoff-funded 1991 National Beef Market Basket Survey (Savell et al., 1991), which demonstrated that cuts were even leaner than expected, Agriculture Handbook 8-13 was updated (Jones, 1988) with data on beef retail cuts revised to 0.63 cm (0.2 in) of external fat.

In addition, regression equations developed in this research were able to predict the composition of beef retail cuts trimmed to 0.0 cm and 0.6 cm (0.2 in)external fat, regardless of changes expected in the U.S. beef carcass population.

The findings from these studies helped lead retailers to reduce fat trim specifications to no more than 0.64 cm (0.3 in) to meet consumer demands. They also prompted the need for additional research that would better define beef cuts at retail and determine to what extent retailers were trimming their cuts.

In fact, data from the survey, along with data from Agriculture Handbook 8-13, were used in another study that would allow for determination of nutritive values for raw and cooked beef retail cuts trimmed to 0.3 cm (0.1 in). Results from this study, which showed chemical fat content for most beef cuts lower than what was reported by USDA, were used to supplement data reported in the National Nutrient Data Bank.

It has become evident that continual work must be done to more accurately represent the composition of beef sold at retail. Because this information impacts nutritional recommendations and national nutrition policies, it must be the most accurate and current data available.

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Methodology

Eleven cities, selected to allow for comparison to the previous Market Basket Survey, provided the samples:

- New York, NY
- Atlanta, GA
- Kansas City, MO
- Denver, CO
- San Francisco, CA
- Tampa, FL
- Philadelphia, PA
- Chicago, IL
- Houston, TX
- Los Angeles, CA
- Seattle, WA

Sampling occurred in 82 retail stores from January to March, 2006.

The **first phase** of the survey occurred at the store level, where retail cuts were noted, counted and measured for external fat thickness using a ruler at three different locations on each cut. These measurements were used to calculate an average external fat thickness measurement for each steak and roast. Other package information, such as package weight, price per kilogram, total package price and declared fat/lean ratio were also recorded.

The **second phase** consisted of detailed composition analysis of retail cuts. An assortment of 94 cuts, representing various locations across the carcass, were purchased from each store and shipped to Texas A&M University for analysis. Cuts from the following primals or sections were selected for the dissection studies:

- Chuck arm section
- Rib
- Round
- Miscellaneous (stew meat, stir-fry or skirt steak)
- Chuck blade section
- Loin
- Ground beef

Cuts were dissected into separable lean, external fat, seam fat, bone and heavy connective tissue between muscles (waste). Initial weight and post-dissection weights of all components were taken to determine the percentages of each dissected component for that cut.

Separable lean then was powdered to make a homogenous sample for chemical fat analysis. If the cut or ground beef had no visible external or seam fat, it was weighed and powdered immediately, skipping the dissection process. Chemical fat of the separable lean from each package (including ground beef) then was measured, with means, standard deviations and percentage values computed using data analysis functions found in Microsoft Excel.

Conversion Table
(1 cm = 0.39 inches or 1 inch = 2.54 cm)

Centimeters	Inches*
0.1	0.04
0.2	0.08
0.3	0.12
0.4	0.16
0.5	0.20
0.6	0.23
0.7	0.27
0.8	0.31
0.9	0.35
1.0	0.39

*Formulas: cm x 0.39 = in; in ÷ 2.54 = cm

Results

Phase I

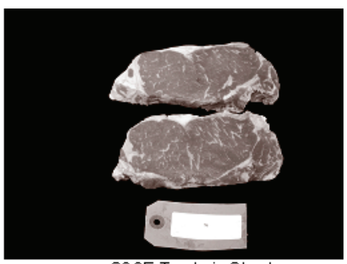
Overall fat thickness for the cuts in the individual store packages was 0.24 cm (0.09 in; Table 1), which was slightly lower than reported in the previous Market Basket Survey (0.31 cm; 0.11 in). More than 10,000 cuts were part of this analysis. Of the 10,110 cuts evaluated, greater than 72% had fat trim levels below 0.125 cm, or one-eighth of an inch. "The most common nutrition misperception about beef is related to its fat content. This survey shows us that the beef in our marketplace is leaner than ever before," says Dr. McNeill.

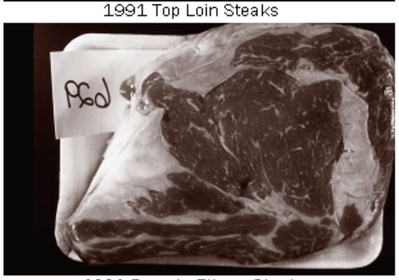
Table 1
Fat thickness of retail cuts according to primal or section of origin

Primal or Section	Number of cuts	Fat thickness, cm
Chuck	2,017	0.17
Rib	1,508	0.36
Loin	2,630	0.36
Round	2,325	0.15
Miscellaneous	1,630	0.12
Total	**10,110**	**0.24 (0.1 in)**

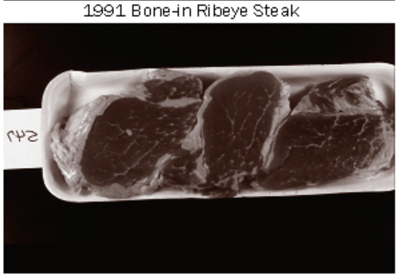
* 1 inch = 2.54 cm

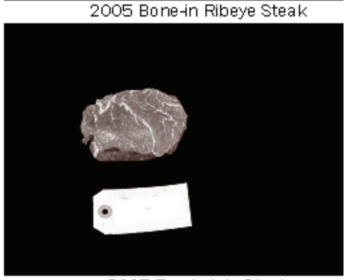

1991 Top Loin Steaks


2005 Top Loin Steaks


1991 Bone-in Ribeye Steak


2005 Bone-in Ribeye Steak


1991 Tenderloin Steaks


2005 Tenderloin Steak

Researchers also measured the amount of retail case-space dedicated to beef in self-service and full-service. This was calculated as square feet of beef/total square feet in the case x 100. Self-service retail space devoted to beef in this survey was calculated at 53.2% and full-service was calculated at 40.8%.

Phase II

Cuts from the round had less external fat than cuts from the rib and loin, with an overall average external fat thickness of 0.10 cm (0 in). Cuts from the rib and loin had the most external fat (0.26 cm; 0.1 in and 0.27 cm; 0.1 in, respectively), with retailers leaving more external fat on these cuts because of the value difference between fat left on the steak and fat that is trimmed off.

Many of the beef cuts at retail had fat thickness measurements between 0.3 cm (0.1 in) and 0.0 cm (Table 2). For most of the retail cuts represented in the National Database, nutrient information is available for cuts with external fat thickness of 1.27 cm (0.5 in), 0.6 cm (0.2 in), 0.3 cm (0.1 in) and 0.0 cm. Therefore, nutritional information for these products cannot be accurately derived from data in the National Database.

Table 2
Means for external fat thickness, package weight, price per kilogram and total package price for retail cuts from the chuck, rib, loin and round primals, other miscellaneous beef cuts and ground beef

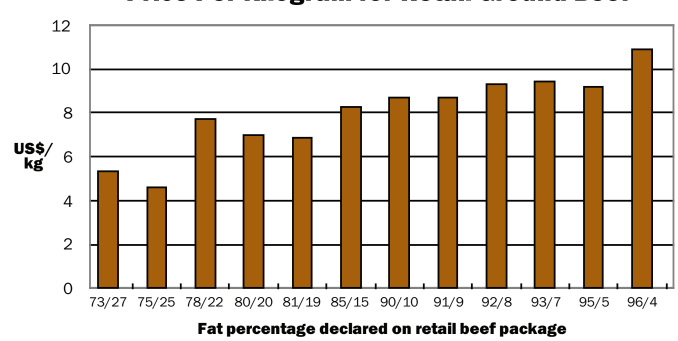
Primal or section	n	External fat thickness cm	Package weight, kg	US$/ kg	Total package price, US$
Chuck average	328	0.13	0.74	8.93	14.10
Rib average	197	0.26	0.57	18.99	21.23
Loin average	268	0.27	0.48	19.02	19.14
Round average	281	0.10	0.69	10.12	14.71
Miscellaneous average	242	0.07	0.64	10.17	13.40
Ground beef average	235	n/a	0.54	8.40	9.85

*1 inch = 2.54 cm; 1 lb = 0.45 kg

When it came to package weights, cuts from the chuck and round were heavier (Table 2). This could be explained by the influx of "family packages" or "value packages" at retail. Also, the high number of roast cuts sampled from these two primals and presence of bone-in chuck cuts would greatly influence the means for package weights.

Highest price per kilogram and highest total package price were found in the middle meats (rib and loin), which is not surprising, given their high quality and popularity with consumers (Table 2). Retail cuts from these primals represent about 13% of the saleable product from the beef carcass, but constitute approximately 35% of the value. Ground beef package value is dependent on the lean to fat ratio of the product, with higher lean content commanding a higher price per kilogram (Figure 1).

Figure 1. Declared Fat Percentage and Price Per Kilogram for Retail Ground Beef



When it came to separable lean, cuts from the round had the highest percentage, while cuts from the rib had the lowest (Table 3). This means that round cuts also had the lowest percentage of separable fat, and also the lowest numeric percentage of external and seam fat. This is partially because most round cuts are single muscle cuts, which diminishes the amount of seam fat present.

Results from the study support statements by Savell et al. (1991) that cuts from the rib and chuck have higher percentages of seam fat than cuts from other primals because many of them are multiple muscle cuts. This study found that the rib and chuck cuts have the highest percentages of seam fat (Table 3).

Table 3

Percentage separable components of retail cuts from the chuck, rib, loin and round primals and other miscellaneous beef cuts

Percentage	Chuck	Rib	Loin	Round	Misc.
Lean	86.81	69.34	84.53	96.63	86.18
External fat	2.92	7.35	6.07	2.27	3.82
Seam fat	4.67	10.52	2.97	0.68	1.18
Total	7.56	17.87	9.04	2.96	5.00
Perinephric fat	0.00	0.00	0.26	0.00	0.00
Bone & connective tissue	5.59	12.79	6.59	0.42	8.47

In the two decades since the National Consumer Retail Beef Study (Cross et al., 1986), retailers have made tremendous efforts to decrease the amount of external fat on cuts (seam fat is not as easy to remove). Innovative fabrication styles can account for some of the decrease in fat trim at retail, while retailer product specifications may also be a contributor.

The research found that boneless, closely-trimmed cuts tended to produce a higher percentage of separable lean, and steaks produced a higher percentage of separable lean than roast counterparts, due to increased trimming during fabrication. These cuts have a higher edible portion and are more appealing to today's diet- and health-conscious consumer.

Data on extractable fat and moisture followed the same trend, with cuts from the round having the lowest numeric percentage of extractable fat and rib cuts having the highest (Table 4).

Table 4

Percentage extractable fat and moisture of retail cuts from the chuck, rib, loin and round primals and other miscellaneous beef cuts

Percentage	Chuck	Rib	Loin	Round	Misc.
Extractable fat	6.90	8.61	5.60	3.71	4.99
Extractable moisture	72.36	70.00	72.06	73.59	73.36

Mean extractable fat percentages for nine of the twelve ground beef classifications in this study were lower than what was declared on the package label for fat percentage (Table 5). As the mean percentages for extractable fat increased, mean percentage of extractable moisture tended to decrease. Seventy-eight of the 82 retail stores audited offered ground beef with 90% or greater lean content. Adds J.O. 'Bo' Reagan, Ph.D., Vice President of Research & Knowledge Management at NCBA, "This study provides strong evidence that the beef industry has again responded to the desires of the consumer for significantly leaner, nutritionally enhanced beef products in the retail case."

Table 5

Percentage extractable fat and moisture for ground beef

Declared lean/Fat percentage	n	Extractable fat, %	Extractable moisture, %
73/27	10	22.67	60.34
75/25	3	23.94	59.37
78/22	4	17.83	63.65
80/20	49	17.02	64.54
81/19	3	22.32	60.10
85/15	50	13.38	67.22
90/10	35	8.88	71.29
91/9	2	8.75	71.57
92/8	4	7.69	71.88
93/7	40	8.11	71.76
95/5	7	4.34	74.63
96/4	28	6.04	72.66
Total/averages	**235**	**13.41**	**67.42**

A key study objective was to compare data obtained with that reported in the National Database (Table 6). The information in the National Database that does not accurately represent the retail beef cuts in the United States is outdated and should be reassessed.

Table 6

Comparison of USDA National Database information with information from current study for separable and external fat components

	2005 Survey	USDA, National Database		2005` Survey	USDA, National Database	
	Separable fat, %	Separable fat, %	Difference, %	Extractable fat, %	Extractable fat, %	Difference, %
Primal	Mean	Mean		Mean	Mean	
Chuck	2.20	2.00	+10.00	4.97	4.74	+4.85
Rib	17.32	20.00	-13.40	7.58	5.04	+50.39
Loin	9.69	13.75	-29.53	5.15	5.48	+4.60
Round	2.70	8.17	-66.95	3.85	3.80	+1.32
Total	**6.43**	**9.59**	**-34.68**	**4.96**	**4.78**	**+4.60**

Overall fat thickness for the cuts in the individual store packages was 0.24 cm (0.1 in).

Comparisons to the National Database

A difference in the origination of values for fat, moisture and separable components should be noted as the results of this comprehensive research are reviewed. The values that are reported in this study are all actual means. The values for these components in the National Database are derived from both regression equations reported in Jones (1988) and actual means reported from Warhmund (1999).

This is significant based on the findings of this study and the broad usage of the National Database for the purposes of determining consumption and its effects on human nutrition.

The mean percent separable fat for a ribeye steak, lip on, bone-in, was 13.4% lower than that shown in the National Database. The mean separable fat percentage was 29.53% lower for four cuts from the loin, and 66.95% lower for three cuts from the round, than the values found in the National Database (Table 6).

Put together, 11 cuts from the chuck, rib, loin and round averaged 34.68% less separable fat on a percentage basis than is reported in the National Database. These 11 cuts account for more than 26% of all fresh beef items (lbs) sold at retail through the year ending September 30, 2006. "The retail case is filled with products that are nutritionally superior to those of the past. This is a result of genetic, management, marketing and merchandising efforts by the entire beef chain. Unfortunately, the national databases have not kept up with this progression," says Jeff Savell, Ph.D., Texas A&M University.

Extractable fat percentages from this study were comparable to those in the National Database. However, data for many of the cuts sampled in the study could not be compared because they were not available in the National Database.

"Because of how and what these databases are used for, national dietary guidelines for example, it is vital that we as a beef industry make the necessary investment in research and dissemination of accurate information on the nutritional composition of our product," says Greg Hilgeman, chairman of NCBA's Joint Human Nutrition Research Committee.

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 PRINTED IN U.S.A. 11-2006 3,000 ITEM #12821