



Nutrient values of beef: A study of changes in fat composition of raw and cooked ground beef



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Reasoning/Methodology

BACKGROUND

- New labeling guidelines for fresh meat products, ground beef fat content must be within 20% of label statement
- Ground beef nutrition labels are based on raw product
- May misrepresent nutritional profile of cooked product
- 50% of beef at retail and 75% at foodservice is of a ground variety (NCBA, 2002)
- Fat 2.25 times the calories of protein, differences could have large impact on total caloric intake
- Few studies have examined the accuracy of raw ground beef labels to the consumed cooked product

OBJECTIVE

- Determine the accuracy of stated ground beef fat content to analytically measured content for 20% variance compliance
- Estimate the difference in caloric content between a 113.4g raw serving and 85.1 g cooked serving for various grind levels of ground beef

METHODS AND MATERIALS

- Ground beef samples weighing 454g were collected from four retail stores and separated in equal halves for raw and cooked sampling
- Samples were purchased in duplicate for 5 fat classifications (diet lean (DL) <10%; extra lean (EL) 10-13%; lean (L) 14-17%; regular (R) 18-23% and high fat (HF) 24-30%) from two suppliers per store
- Samples weighing 113.4g were cooked as hamburger patties to 71°C
- Duplicate lipid extraction was done on all samples using the 2:1 Chloroform: Methanol procedure
- Caloric content was based on recommended serving size of 113.4g raw and 85.1g cooked product
- Data was analyzed using Proc Mixed SAS
 - Supplier within store was considered the random variable

RESULTS

Table 1. Comparison of label declaration and actual value of fat content

Fat Class	Diet Lean (<10% fat)		Extra Lean (10-13% fat)		Lean (14-17% fat)		Regular (18-23% fat)		High Fat (24-30% fat)	
	Label Value	Actual Value	Label Value	Actual Value	Label Value	Actual Value	Label Value	Actual Value	Label Value	Actual Value
4	7.85	10	9.18	14	14.29	20	17.10	25	23.10	
4	5.31	10	11.51	15	15.82	20	15.16	25	20.44	
5	4.61	10	10.87	15	13.29	20	19.20	27	23.26	
5	10.18	10	10.77	15	14.78	20	16.54	27	25.88	
7	6.68			15	13.11	20	19.79	27	22.60	
7	9.02			15	13.56	20	20.24	27	26.06	
7	8.34			15	13.48	20	13.44			
7	7.14					20	23.79			

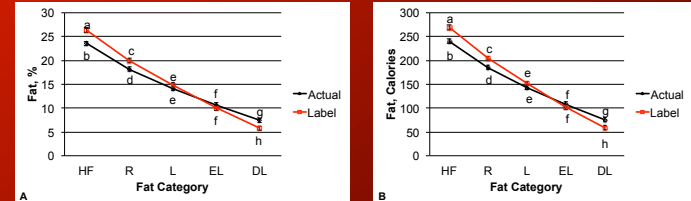
Table 2. Deviation from label declaration by fat content level

Label Fat Content (%)	N	% of N Out of Limit (+/- 20% label)	% of N Exceeding 20% Limit
4	2	100	100
5	2	50	50
7	4	25	25
10	4	0	0
14	1	0	0
15	6	0	0
20	8	25	0
25	2	0	0
27	4	0	0

Table 3. Deviation from label declaration by fat category

Fat Category	N	% of N Out of Limit (+/- 20% label)	% of N Exceeding 20% Limit
Diet Lean	8	50	50
Extra Lean	4	0	0
Lean	7	0	0
Regular	8	25	0
High Fat	6	0	0
ALL	33	18.18	12.12

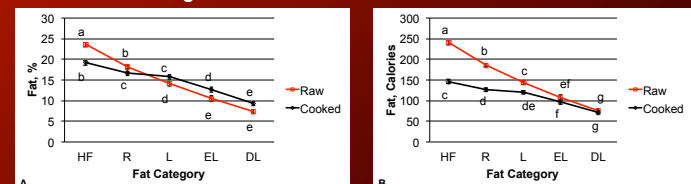
Figure 1. Raw¹ label claim vs raw¹ actual values¹



¹Data based on a 113.4g serving.
²Means with different scripts are different (P<0.05).

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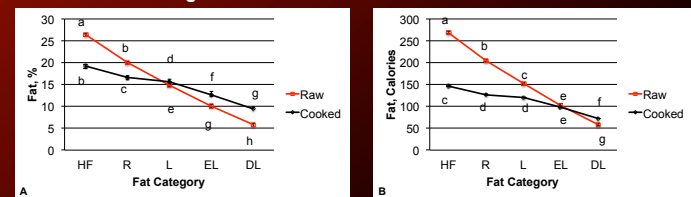
Figure 2. Actual raw¹ to actual cooked¹ values



¹Based on 113.4g raw and 85.1g cooked serving.
²Means with different scripts are different (P<0.05).

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Figure 3. Label raw¹ to actual cooked¹ values



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CONCLUSION

- Deviations greater than 20% of label claim occurred in two of the fat categories (DL and R)
- Label vs. actual fat % and caloric content was different for all categories (P<0.05) except for L and EL
- Calories from cooked patties were lower than raw caloric content for HF, R and L product
- Accurately estimating caloric intake from the raw product may be very difficult and usually results in an overestimation