

BEEF FACTS:

Nutrition

B-Vitamins and Meat

Meat such as beef is an important dietary source of the water-soluble B-complex vitamins. Originally, “vitamin B” was thought to be a single growth substance. Eventually, it proved to be not one, but several different, though functionally related, growth factors and coenzymes. Currently, there are eight B-vitamins - **thiamin, riboflavin, niacin, vitamin B-6, folate, vitamin B-12, pantothenic acid, and biotin**. Dietary Reference Intakes (DRIs) have been established for all of these vitamins (1).

B-vitamins are found in a wide variety of foods. Meat, poultry and fish (MPF), and meat in particular, is a major dietary source of several of these vitamins - thiamin, riboflavin, niacin, vitamin B-6 and vitamin B-12 (Table 1).

Table 1. Meat’s Contribution to B-vitamins in the U.S. Food Supply (2).

B-Vitamin	% of Total ^a from MPF	% of Total ^b from Meat
Thiamin	15.6	13.7
Riboflavin	15.5	11.2
Niacin	33.2	15.6
B-6	33.2	19.9
B-12	73.8	60.6

^a % of Total available contributed by meat, poultry and fish (MPF)

^b % of Total available contributed by meat (beef, pork, lamb, veal)

The actual amounts of the B-vitamins present in any particular cut of meat can depend on factors such as the species, age and degree of fatness. Cooked meats such as beef may contain slightly more of some B-vitamins per unit weight than raw meats because of moisture loss. Although some small losses of other vitamins can occur due to cooking, most B-vitamins are relatively stable to cooking and processing methods (3, Table 2).

Functions of B-Vitamins

In general, B-vitamins aid in the utilization of energy and help regulate many of the chemical reactions necessary to promote growth and maintain health (4).

Table 2. Effect of Cooking on Beef’s B-Vitamins (3).

B-Vitamin	Beef (3 oz)			
	Composite of Trimmed Retail Cuts ^a		Top Sirloin ^a	
	Raw	Cooked	Raw	Cooked
Thiamin, mg	0.09	0.09	0.11	0.11
Riboflavin, mg	0.15	0.20	0.19	0.25
Niacin, mg	3.05	3.51	3.03	3.64
B-6, mg	0.37	0.31	0.37	0.38
B-12, µg	2.76	2.24	2.70	2.42
Folate, µg	5.95	6.80	6.80	8.50

^a Separable lean only, trimmed to 1/4” fat, all grades

For example:

Thiamin (B-1) functions as a coenzyme in the metabolism of carbohydrates and branched chain amino acids, promotes appetite, and contributes to normal nervous system function.

Riboflavin (B-2) functions as a coenzyme in the production of energy within body cells and supports normal vision and healthy skin.

Niacin functions as a coenzyme in fat synthesis, tissue respiration and utilization of carbohydrate; promotes healthy skin, nerves and digestive tract; and fosters normal appetite. “Niacin equivalents” are the measure of actual niacin present, plus the potential niacin from the conversion of the amino acid, tryptophan. Approximately 1 mg of niacin is produced by the body from 60 mg of dietary tryptophan.

Vitamin B-6 (pyridoxine and related compounds) functions as a coenzyme in the metabolism of amino acids and fatty acids. This vitamin helps to convert tryptophan to niacin. Vitamin B-6 influences cognitive development, immune function, and the activity of steroid hormones.

Folate (folic acid or folacin) functions as a coenzyme in the metabolism of nucleic acid and amino acids and is important for the formation of new cells. Adequate folate status prior to and during early pregnancy is important to reduce the risk of neural tube defects which can cause infant mortality.

Vitamin B-12 (cobalamin), found *only* in animal products, is necessary for the synthesis of DNA (deox-

ribonucleic acid), the gene-containing component of cell nuclei. This vitamin also assists in the maintenance of nerve tissues and normal blood formation. Neurological disorders are reported in individuals deficient in vitamin B-12. When children were fed a strict vegetarian diet devoid of meat and other animal products up until the age of 6 years, they exhibited marginal vitamin B-12 deficiency and impaired cognitive functioning in adolescence (5).

Deficiencies of B-vitamins such as folate, vitamin B-6, vitamin B-12, and riboflavin may increase blood levels of homocysteine (6). There is evidence that an elevated homocysteine level is an independent risk factor for cardiovascular disease and stroke (6).

Beef's Contribution

Table 3 presents RDAs for individual B-vitamins and percentages provided by a 3-oz serving of beef (1,3).

Meat such as beef is an important dietary source of B-vitamins. These vitamins act as coenzymes that facilitate cell functions throughout the body, are involved in carbohydrate, fat, and protein metabolism, and help form DNA and new cells (4).

Table 3. Recommended Dietary Allowances (RDAs) for B-Vitamins and Percentages Provided by 3 oz of Beef (1,3).

B-vitamin	Amt. from 3 oz Beef ^a	Child 4-8 y	% RDA	Female 19->70 y	%RDA	Pregnant Female	%RDA	Male 19->70 y	%RDA
Thiamin	0.09 mg	0.6 mg	15	1.1 mg	8.2	1.4 mg	6.4	1.2 mg	7.5
Riboflavin	0.20 mg	0.6 mg	33.3	1.1 mg	18	1.4 mg	14.3	1.3 mg	15.4
Niacin^b	3.51 mg	8 mg	44	14 mg	25.1	18 mg	19.6	16 mg	22
B-6	0.32 mg	0.6 mg	53	1.3;1.5 mg^c	24.6;21.3	1.9 mg	16.8	1.3;1.7 mg^c	24.6;18.8
Folate	6.8 µg	200 µg	3.4	400 µg	1.7	600 µg	1.1	400 µg	1.7
B-12	2.24 µg	1.2 µg	187	2.4 µg	93.3	2.6 µg	86	2.4 µg	93.3

^a Beef, composite of trimmed retail cuts, separable lean only, trimmed to 1/4" fat, all grades, cooked.

^b RDA for Niacin expressed in Niacin Equivalents (NE).

^c 19-50 yr; 51+ yr

References

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For more information, contact:

Nutrition Research
National Cattlemen's Beef Association
P.O. Box 670
Bloomington, IL 60108-0670
(800) 368-3138
www.beefnutrition.org

This project was funded by beef producers through their \$1-per-head checkoff and was produced for the Cattlemen's Beef Board and state beef councils by the National Cattlemen's Beef Association.

