Red Meat (Beef): Analyzing Consumption Limits, Embracing Health Benefits, and Addressing Probable Risks

Sadia Rahaman, *Agriculturist*	***Fahim Ahmed Mondol,*** *Urban Planner*
sadiarahaman79@gmail.com Dept. of Agriculture, NSTU, Noakhali-3814	fahim.urp.ju@gmail.com Dept. of URP, JU, Savar, Dhaka - 1342

ABSTRACT

The purpose of this study is to give an outline of the current state of knowledge in science regarding the place of red meat (beef) in the diet. The nutritional advantages, consumption, and the results of red meat intake on both health and chronic disease outcomes will be covered in this article. According to this study, having a balanced diet is a much more important aspect in keeping one's health. Beef can enhance muscle growth and maintenance when ingested in moderation. Therefore, consuming beef in moderate amount as part of a balanced diet is advised.

***Keywords*:** Red meat, Beef, Consumption, Nutritional advantages, Chronic disease.

1. INTRODUCTION

The meat of cattle (Bos taurus) is known as beef. It is within the category of red meat, which refers to meat from mammals that has a higher iron content than meat from poultry or fish (Wyness et al., 2011). Red meat remains an important component of the human diet, offering an excellent amount of high-quality protein as well as healthy fatty acids and a variety of vitamins for a healthy body. Red meat is frequently perceived to include beef, lamb, and so on (Wyness, 2016). Beef is frequently ground or minced and also served as roasts, ribs, or steaks (Wyness et al., 2011). The quantities of the nutritious elements, however, vary substantially depending on sex, breed, age at slaughter, marbling, and cuts or muscles. (Sexten et al., 2012). Beef of high grade is firm, smooth, fine-grained lean, vivid red in Colour, and well-marbled. The fat is creamy white, soft, and evenly dispersed. Young beef has tender, porous, and crimson bones, but mature beef has strong white bones. Ageing improves the tenderness and quality of beef. When meat preserved by salting, smoking, curing, or the use of chemical preservatives, such as bacon, salami or ham, sausages is considered processed meat (Rogers, 2023)**.**

2. DESCRIPTION

Beef is mostly made up of protein. Animal protein frequently comes of excellent quality, including every one of the nine essential amino acids required for human body's growth and development (Wyness et al., 2011).

2.1 Daily requirement of protein for human

Recommended Dietary Allowance of protein is a moderate 0.8 grams per kilogram of body weight, or 0.36 grams per pound. The RDA is the amount of a nutrient that is required to fulfil the basic nutritional needs of human. In a sense, it's not the recommended daily intake, but rather the bare minimum you need to avoid being sick. These recommendations are not tailored for physical activity level (PAL), but rather are generated as a minimum quantity to maintain nitrogen balance. Individual protein needs vary and depend on a number of variables, including age, health status, and PAL (Lonnie et al., 2018).

2.2 Nutrient contribution of red meat

i. Protein (macronutrient)

The body need dietary protein for development, maintenance, and reconstruction, along with for energy. Chains of hundreds to thousands of amino acids make up the protein found in meals. Essential amino acids must be taken in the diet in order to maintain a healthy state since some amino acids can be synthesised by the body but not all essential (or indispensable) amino acids. Red meat and cattle (and occasionally animal products) are major providers of the eight essential amino acids. When consumed uncooked, red meat provides 20–24 g of protein per 100 g. Red meat that has been cooked contains 27–35 g of protein per 100 g (cooked weight); as the water level of the meat reduces and the nutrients are concentrated, protein content rises (Williamson et al., 2005).

ii. Micronutrient present in beef (Nanjing Agricultural University, China & Li, 2017)

Name of the micronutrient	*Function of the micronutrient*	*Micronutrient amount in beef (per 100g)*
Iron	*Iron is essential for numerous metabolic processes and serves as an oxygen carrier in hemoglobin in blood or myoglobin in muscle. One of the most common causes of anemia is iron deficiency.*	*2.1 mg in lean (10 mg in liver)*
Zinc	*Zinc plays an important role in physiological functions involving growth, cognitive development, sense of taste and reproduction. Zinc deficiency may cause dwarfi sm, dysfunction of vision, loss of appetite, gonadal dysgenesis, loss of memory and other problems.*	*4 mg in lean*
Selenium	*Selenium is a mineral that boosts immunity, slows ageing, and regulates vitamin A, C, and E absorption as well as protein synthesis.*	*7 µg (approximately 150 µg in kidney and 42 µg in liver)*
Vitamin D	*Vitamin D promotes bone calcification and immune system development, as well as protecting against diseases such as TB, diabetes, and coronary heart disease.*	*0.5 µg*
Vitamin B_{12} (Cobalamin)	*It is essential for the creation of red blood cells as well as the development of nervous systems.*	*1 to 3 µg (23 -110 µg in liver and 15-54 µg in kidney)*
Vitamin B6 (Pyridoxine, pyridoxal and pyridoxamine)	*It influences the immune system, the creation of neurotransmitters like serotonin and dopamine, as well as brain development during pregnancy and early childhood.*	*0.3 to 0.5 mg*
Vitamin B5 (Pantothenic acid)	*The synthesis of steroid hormones and the creation of energy both depend on pantothenic acid.*	*0.75 mg*
Vitamin B3 (Niacin)	*The primary role of niacin is in the transformation of fat and carbs into energy.*	*5 mg*
Vitamin B2 (riboflavin)	*Riboflavin helps to maintain healthy skin, eyes, vision, and also helps to prevent cataracts. Riboflavin deficiency may result in urogenital syndrome.*	*0.2 mg*
Vitamin B1 (thiamine)	*It affects how the neurological and appetite system work. Thiamine deficiency can result in polyneuritis, beriberi, inflammation, and peripheral nerve degeneration.*	*0.1 mg*

iii. Fat (macronutrient)

Approximately equal proportions of saturated and monounsaturated fat make up the majority of the fat in beef. Stearic, oleic, and palmitic acids are the principal fatty acids (Wyness et al., 2011). Ruminant trans fats are trans fats found in foods made from ruminant animals like cattle or sheep. Naturally occurring ruminant trans fats are not regarded as being harmful, in contrast to their industrially generated counterparts. Conjugated linoleic acid (CLA), which is most prevalent, can be found in beef, lamb, and dairy products (Schmid et al., 2006). Numerous health advantages, including weight loss, have been associated with CLA. However, high supplemental doses may have detrimental metabolic effects (Benjamin & Spener, 2009). Different fatty acids have varying effects on blood cholesterol and the risk of heart disease, some of which are positive and some of which are negative. Depending on the ratios of lean meat to fat, red meat will have a different fatty acid composition. In comparison to untrimmed meat, lean meat has a higher proportion of polyunsaturated fatty acids (PUFA) and a lower proportion of saturated fatty acids (SFA). Trimming the fat from meat will change the ratios of fatty acids since visible fat has a considerably larger SFA content than other types of fat, with roughly 37 g of SFA per 100 g of meat. The significance of red meat in connection to satiety and weight control is examined, since including lean red meat in a healthy, varied diet may aid weight loss when combined with an energy-reduced diet (Wyness, 2016).

2.3 Risks of Beef/Red meat

Meat has frequently been blamed for an increased risk of heart disease due to its relatively large contribution to fat intakes and alleged high amount of SFAs, despite the presence of a number of elements that may be preventive (such as selenium, n-3 fatty acids, and B vitamins) (Williamson et al., 2005). Numerous studies suggest that consuming well-done meat or different food sources of heterocyclic amines may raise the chance of developing a number of cancer in humans (Zheng & Lee, 2009). Heterocyclic amines are a kind of carcinogen that is produced when animal protein cooked at high temperature, which includes frying, baking, or grilling. They can be found in overcooked and well-done beef, poultry, and seafood. Other substances added to processed meats or generated through curing and smoking have been linked to cancer. (Knize & Felton, 2005) But until now, there hasn't been any conclusive scientific proof to show connection between meat consumption and increased risk of cancer. (Nanjing Agricultural University China & Li, 2017).

3. CONCLUSION

Beef contains high-quality animal protein that is essential for growth and maintenance of the body. The most significant source of protein in our diet can be this red meat. All the essential amino acids as well as a wide range of vitamins and minerals (particularly iron and zinc) can be found in fresh, lean beef. However, consuming a lot of overcooked meat could make you more susceptible to a number of diseases. The most crucial factor in preventing certain cancers and metabolic diseases may be a diet that is well-balanced and also nutritious. When consumed in moderation and in compliance with hygienic guidelines, beef is advantageous for a healthy, particular disease-free person.

REFERENCES

Wyness, L., Weichselbaum, E., O'Connor, A., Williams, E. B., Benelam, B., Riley, H., & Stanner, S. (2011). Red meat in the diet: An update: Red meat update. Nutrition Bulletin, 36(1), 34–77. https://doi.org/10.1111/j.1467-3010.2010.01871.x

Wyness, L. (2016). The role of red meat in the diet: Nutrition and health benefits. Proceedings of the Nutrition Society, 75(3), 227–232. https://doi.org/10.1017/S0029665115004267

Sexten, A. K., Krehbiel, C. R., Dillwith, J. W., Madden, R. D., McMurphy, C. P., Lalman, D. L., & Mateescu, R. G. (2012). Effect of muscle type, sire breed, and time of weaning on fatty acid composition of finishing steers1. Journal of Animal Science, 90(2), 616–625. https://doi.org/10.2527/jas.2011-4218

Rogers, K. (2023, June 30). Bacon. Encyclopedia Britannica. https://www.britannica.com/topic/bacon

Lonnie, M., Hooker, E., Brunstrom, J., Corfe, B., Green, M., Watson, A., Williams, E., Stevenson, E., Penson, S., & Johnstone, A. (2018). Protein for Life: Review of Optimal Protein Intake, Sustainable Dietary Sources and the Effect on Appetite in Ageing Adults. Nutrients, 10(3), 360. https://doi.org/10.3390/nu10030360

Williamson, C. S., Foster, R. K., Stanner, S. A., & Buttriss, J. L. (2005). Red meat in the diet. Nutrition Bulletin, 30(4), 323–355. https://doi.org/10.1111/j.1467-3010.2005.00525.x

Schmid, A., Collomb, M., Sieber, R., & Bee, G. (2006). Conjugated linoleic acid in meat and meat products: A review. Meat Science, 73(1), 29–41. https://doi.org/10.1016/j.meatsci.2005.10.010

Benjamin, S., & Spener, F. (2009). Conjugated linoleic acids as functional food: An insight into their health benefits. Nutrition & Metabolism, 6(1), 36. https://doi.org/10.1186/1743-7075-6-36

Zheng, W., & Lee, S.-A. (2009). Well-Done Meat Intake, Heterocyclic Amine Exposure, and Cancer Risk. Nutrition and Cancer, 61(4), 437–446. https://doi.org/10.1080/01635580802710741

Knize, M. G., & Felton, J. S. (2005). Formation and Human Risk of Carcinogenic Heterocyclic Amines Formed from Natural Precursors in Meat. Nutrition Reviews, 63(5), 158–165. https://doi.org/10.1111/j.1753-4887.2005.tb00133.x

Nanjing Agricultural University, China, & Li, C. (2017). The role of beef in human nutrition and health. In Kansas State University, USA & M. E. Dikeman (Eds.), Burleigh Dodds Series in Agricultural Science (pp. 329–338). Burleigh Dodds Science Publishing. https://doi.org/10.19103/AS.2016.0009.16

Institute of Medicine. Food and Nutrition Board. Dietary Reference Intakes: Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline . Washington, DC: National Academy Press; 1998.