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Effects of Meat Consumption on Human Health: Nutritional Benefits, Associated Risks, and Implications for Dietary Recommendations

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ABSTRACT

Meat has been a significant component of the human diet and has provided the body with high-quality protein, essential amino acids, as well as vitamins and bioavailable minerals that aid in growth, development, and general health. Nevertheless, the increased consumption of meat in the world, especially the intake of red and processed meat, has brought serious concerns regarding the possible adverse effects of meat on the health of consumers. This review assesses the most recent scientific findings on the impact of meat consumption on human health with respect to its nutritional and health risks. The nutritional value and significance of meat are addressed, as well as epidemiological and clinical data that overconsumption of meat is the cause of chronic illnesses, e.g., cardiovascular diseases, obesity, type 2 diabetes, and some cancers. The impacts of meat consumption on the general health of the population, consumer awareness, and dietary principles are also explained. Lastly, the current issues, research gaps, and future research potential are discussed in order to facilitate the promotion of balanced diets that maximize nutritional benefits without facing health risks. This review aims at offering a well-rounded, evidence-based take to the consumers, researchers, and policymakers on the multifaceted association between meat consumption and human health.

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INTRODUCTION

The high-quality protein found in meat is the major source of dietary protein for a large portion of the world's population. The issue of meat consumption is controversial worldwide, as it is believed to affect human health, the environment, and animal welfare. Meat products are a notable source of protein and micronutrients such as iron, zinc, selenium, vitamin D, and vitamin B12. Nonetheless, meat consumption has led to several health issues due to its overuse, including diabetes, cancer, heart disease, and stroke (Almeida et al. 2023). The patterns of meat consumption in the world vary greatly. People can opt out of meat due to moral, religious, or socio-economic issues (Kwasny et al. 2025). To most individuals living in the developed world, meat is readily available and affordable, and it forms a major part of their food consumption. The intake of even relatively small portions of meat and other animal products is estimated to influence the reduction of protein-energy malnutrition (PEM), iron deficiency, anaemia, and vitamin and mineral deficiencies significantly (Font-i-Furnols 2023; Zerfu et al. 2025).

Livestock production has a great influence on the global economy because roughly 40% of the total agricultural gross domestic product (GDP) is through livestock production. In 2021, agriculture contributed more than

4.3% of the global GDP. As of the year 2022, the global cattle business is projected to be USD 1.8 trillion, which is based on the USD 104 trillion projection made by the International Monetary Fund (IMF) on the global economy. About two-thirds of this value comes from the production of meat, with the remaining third coming from the production of dairy and eggs (IMF 2022). Furthermore, the amount spent by consumers worldwide on foods derived from animals, such as fish, reached nearly USD 7.0 trillion in 2018, representing about 12% of total global consumer expenditure (FAO 2022; Ederer et al. 2023). According to the Food and Agriculture Organization (FAO) and the Organization for Economic Cooperation and Development (OECD) projections, the production of animal-based foods, such as meat, dairy, eggs, and fish, is forecast to increase by approximately 14% globally by 2034. Whereas the combined output of meat, dairy, and eggs is predicted to increase by almost 17% (OECD 2025).

This growing trend brings up questions regarding the ecological impacts of the meat industries in terms of emissions related to greenhouse gases and the usage of water, along with the possible health effects of elevated meat production. Among the greenhouse gas emissions generated by the livestock sector, about 80% of them can be traced to ruminant growth. Bovine methane emissions, which are a major concern as well, can also be increased by disease processes that can further increase environmental pollution. Over 32% of the global anthropogenic methane emissions originate solely as a result of bovine-derived gases, highlighting ruminant-derived gases as a major contributor to global climate change (Opio et al. 2013; Zhang et al. 2022).

The demand for animal-sourced foods (ASF) is highly differentiated in terms of regions, countries, and socioeconomic status. The global average daily per-capita consumption rates recorded in 2018 were 51g unprocessed red meat, 17g processed meat, 28g seafood, 21g eggs, 88g milk, 8g cheese, and 20g yogurt, with wide regional differences. Most categories of food were not commonly eaten in high consumption (>1 serving/day) except in 17 countries that reported higher consumption of red meat. The highest total ASF intakes were reported in Russia, Germany, and the United Kingdom, and the lowest was recorded in Tanzania and India. The amount of red meat, seafood, and cheese consumed by adults was higher compared to children, and they were also found to have higher intake of ASF in urban or higher-educated groups (Miller et al. 2022). Since 1990, the world has recorded an upward trend in the consumption of all major ASF categories, especially red meat and eggs, showing that the trend is still in an upward direction, as shown in Figure 1.

The trend mentioned above is alarming, considering the possible negative health consequences of overeating meat, especially fatty meats. This leads to the growing need to conduct research to explore the linkage between the consumption of fatty meat and health consequences, to revise the public health laws and policies, and the nutritional dietary recommendations for the population. The importance of studying the health effects of fatty meat lies in the fact that meat serves as a substantial reservoir of dietary fat, and an overconsumption of fatty meat has been associated with numerous health disorders. The presence of elevated levels of fat, saturated and trans fats, in particular, has been linked to the onset of cardiovascular diseases (CVDs), obesity, type 2 diabetes (T2D), and some forms of cancer (IANIŢCHI et al. 2024).

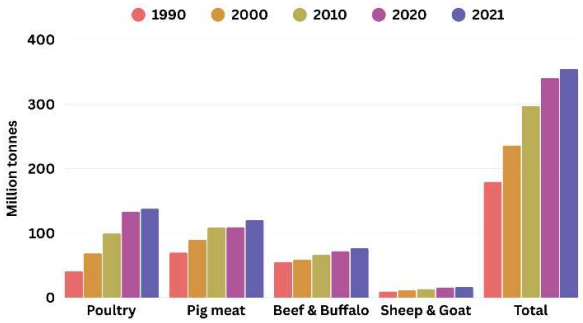

Fig. 1: Meat production in the period between 1990 and 2021 (IANIŢCHI et al. 2024)

Meat still remains an important component of a nutritionally sufficient diet, particularly in cases when alternative sources of protein and micronutrients are scarce. In order to come up with evidence-based dietary recommendations that may assist in maximizing the benefits and reducing the risks, one needs to understand the complex relationship between meat consumption and health (Geiker et al. 2021). This review pinpoints the available research on the nutritional advantages, possible dangers, and health impacts of meat intake to the general population and provides a detailed discussion to educate consumers, health care providers, and policymakers.

Nutritional Profile of Meat and Its Importance in Balanced Diets

Fatty meat is used to refer to meat that is rich in fat. These kinds of meat are usually referred to as having a richer taste and juicier texture, yet they may also cause some adverse health outcomes in case of overconsumption. However, it should be noted that not every fat in meat is bad; monounsaturated and polyunsaturated fats can be beneficial when consumed sparingly (Ponnampalam et al. 2024; Prates 2025). Red meat refers to beef, pork, lamb, and goat meat of domestic animals. This category excludes chicken, wild game, or offal (although the effects of consuming organ meat and wild game on the risk of cancer are unclear) (Nouri-Majd et al. 2022; Kwasny et al. 2025; Zhang et al. 2025). Despite the fact that large quantities of red meat expose a person to the risk of getting bowel cancer, it is also high in nutrients. Ideally, one is advised not to consume over 500 grams of red meat in a week (World Cancer Research Fund International n.d.). Processed meat consumption is also positively related to the risk of developing bowel cancer, even in moderate quantities, and serves no extra nutritional advantage compared to red meat. On this basis, it is advisable to minimize the use of processed meat as much as possible in order to minimize the risk of cancer (WHO 2015; Cancer Research UK 2025).

The nutritional content of meat ranges greatly with regard to species and breed, as well as the geographical location. The chemical makeup of meat also varies among individuals within the same species, influenced by the proportion of various tissues (muscle tissues or adipose tissues), the animal's physiological age, seasonal

variations, nutritional intake, and fattening state. Differences also arise based on the type of meat cut, storage technique, and the culinary style employed (Liu et al. 2023; Yaranoğlu et al. 2023).

Red meat is an excellent source of high biological value protein and other important micronutrients, which are vital in maintaining good health. Meat contains fat; hence, it is responsible for the consumption of saturated fatty acids (SFAs). However, still meat is a source of various fatty acids, the essential ones being omega-6 and omega-3, polyunsaturated fatty acids (PUFAs), such as linoleic and α-linolenic acids (Geletu et al. 2021; Awad and Ali 2023).

The fat and water content of meat vary inversely. On average, 75% of the water is found in raw animal meat, in muscle tissue. This amount of moisture depends on the species and the level of fattening, and is usually about 65 to 75% in the raw, lean cut of meat, and decreases to 55-65% after cooking (USDA 2025).

Meat protein concentration also varies by the type of meat and the proportion of the meat cut. The raw meat has approximately 20 to 25 g of protein per 100 g, and cooked meat has about 28 to 36 g of protein/100 g, since the reduction in water content leads to increased nutritional concentration (Elshebrawy et al. 2023).

The amount of lipid content differs with the state of fattening. The lipid profiles of animal foods differ significantly across species, especially in the proportion of fat classes and ratios of fatty acids. The ratio of omega-6 to omega-3 is between 1:1 and 3:1, as fish are rich in PUFAs (30-50%) and are relatively low in saturated fats (20-30%), which is thought to be nutritionally desirable. Conversely, the proportions of saturated fats (40-55%) of ruminant meat (cattle and sheep) are higher in comparison with PUFAs (5-10%), which result in lower omega- 6: omega-3 ratios of 4:1 to 8:1, but contain beneficial bioactive lipids such as conjugated linoleic acid (CLA). The non-ruminant species, such as pigs and chickens, are typified by very high levels of triglycerides (90 to 95%) and high omega-6/omega-3 ratios (1:1 to 15:1), driven by low omega-3 and moderate levels of PUFAs, as shown in Table 1. On the whole, these ratios show that aquatic organisms are a better source of fatty acids that are beneficial to human health, whereas terrestrial animals, especially poultry and pork, are more likely to be biased towards omega-6 fatty acids (Ponnampalam et al. 2024; Priyashantha 2024; Prates 2025).

The mineral content of the meat ranges between 0.7 to 1.5%. The mineral salt composition of meat comprises: potassium, iron, phosphorus, sulphur, sodium, magnesium, and minor traces of calcium. The availability of easily assimilable iron in meat is preferential to the development of red blood cells (Wu 2020; Elbir and Oz 2021; Boskovic Cabrol et al. 2022). The vitamin content in meat is also variable, with vitamin A being predominantly present in liver, and vitamin B1 in liver, kidneys, and heart. Cattle liver is high in vitamin B6, whereas cows' and pigs' hearts and muscles are loaded with it. Liver, kidneys, and muscles are high in vitamin B3 and B5. Pantothenic acid is also present in the brain and heart. Vitamins B9 and B12 are mainly found in liver, with other vitamins, such as C, D, and E, present in meat in minute amounts (IANIŢCHI et al. 2024).

Dietary Meat Intake and Its Association with NAFLD and Obesity

Both processed and unprocessed red meat have been empirically linked to a markedly elevated risk of developing non-alcoholic fatty liver disease (NAFLD), which is a common hepatic pathology, defined by the ectopic accumulation of lipid in hepatocytes, and is also associated with a high likelihood of hepatic injury and a continuum of systemic comorbidities in which obesity is the main mediator of this pathogenic association. It is also emerging that an animal-rich diet, especially fatty meat, can have a harmful effect on the gut microbiota, triggering increased inflammatory reactions and insulin insensitivity, which, in turn, can contribute to the development of adiposity (Lee et al. 2023; Abbasi and Khodadadi 2025; Mamun et al. 2025). Besides, the consumption of fatty meat can also disrupt endocrine balance, affecting the levels of insulin and leptin. Adiposity may be enhanced by insulin resistance, and hyperphagia may be promoted by low levels of leptin, which is a major appetite-regulating hormone (Jaime-Lara et al. 2025). Processed meats, being also loaded with additives and preservatives, can also negatively affect health and can contribute to weight gain.

Demographic statistics showed that every third person in the world is either obese or overweight, and the trend of obesity has been increasing tremendously over the past few years, such that obesity and obesity-related diseases account for almost 8.4% of the healthcare system budget around the globe (Ashraf et al. 2025). Obesity is a

Table 1: Lipid composition across varying animal species

Species	Triglycerides (%)	Phospholipids (%)	Cholesterol (mg/100 g)	Saturated Fats (%)	Monounsaturated Fats (%)	Polyunsaturated Fats (%)	Omega-6: Omega-3 Ratio	Bioactive Lipids	References
Fish	5–10	15–20	30–50	20–30	25–40	30–50	1:1 to 3:1	High in omega-3 PUFAs	(Mariamenatu and Abdu 2021)
Cattle	85–90	5–10	60–80	40–50	40–50	5–10	4:1 to 8:1	Moderate CLA	(Nogoy et al. 2022)
Sheep	80–85	10–15	60–80	45–55	35–45	5–10	4:1 to 7:1	High CLA	(Toral et al. 2018)
Pigs	90–95	5–8	50–70	35–45	40–50	10–15	8:1 to 12:1	Low CLA	(Bekenev et al. 2021)
Chicken	90–95	5–10	50–70	30–40	45–50	10–20	10:1 to 15:1	Low bioactive lipids	(Dal Bosco et al. 2022)

significant public health issue because it raises the probability of a variety of illnesses, including T2D, hypertension, cardiac diseases, stroke, certain malignancies, and osteoarthritis. Obesity can also cause psychological and behavioural issues, including low self-esteem and discrimination (Afzal et al. 2025; WHO n.d.). Obesity occurs when energy intake exceeds energy expenditure over time, often due to consuming more calories than needed and/or insufficient physical activity. Generally, weight gain results from a combination of these factors, making obesity a complex and multifactorial condition (Afzal et al. 2025).

Obesity treatment usually consists of dietary modifications, exercise, and behavior therapy. Obesity prevention is a significant public health objective that can be achieved by encouraging healthful diets, promoting physical activity, and considering environmental conditions that induce obesity (Wadden et al. 2020; Christensen and Nelson 2025). According to Khodayari et al. (2022), a meal plan rich in chicken and white meat is favorably correlated with the chances of developing general obesity, however a diet high in processed meat is associated with an increased risk of central obesity. Another research conducted by Kim et al. (2022) showed a positive correlation between dietary red meat consumption and the development of NAFLD, with higher chances associated with women who are particularly obese or overweight. Another study by Ivancovsky-Wajcman et al. (2022) also noted a twofold increased risk of NAFLD and red meat intake. Recent research also showed an increased risk of NAFLD with higher consumption of fructose, carbohydrate, and red meat, along with lower fish meat consumption. It is also seen that consumption of more than 34 g of red meat per day and more than 10 g of processed meat per day has been associated with the development of NAFLD (Noureddin et al. 2020; Hashemian et al. 2021; Paredes-Marin et al. 2025). Hence, it is established that the increased intake of total meat, processed meat, and unprocessed red meat has been associated with an increased risk of developing NAFLD, whereas an increased consumption of oily fish has been noted to reduce this risk, as also reported by Wang et al. (2025).

Moreover, increased dietary intake of red and processed meat has also been a main culprit in exacerbating obesity, and its impact on the environment is also a concern as well. Also, increased consumption is associated with elevated levels of inflammatory biomarkers (Sares-Jäske et al. 2024; Zandvakili et al. 2024; Papier et al. 2025). Some studies also indicate that heme iron in red meat can play a part in the development of obesity, along with triggering inflammation, due to its effects on the gut microbiota (Diakité et al. 2022; Malesza et al. 2022).

Effects of Fatty Meat Consumption on Cardiovascular Health

CVD encompasses a range of illnesses impacting the heart and blood vessels, including coronary heart disease (CHD) or coronary artery disease (CAD), ischemic heart disease (IHD), Peripheral artery disease (PAD), and stroke. Fatty meat typically contains elevated amounts of saturated and trans fats, which are recognized for raising low-density lipoprotein (LDL) cholesterol levels in the bloodstream. Research indicates that increased consumption of saturated fat, prevalent in fatty meats, might elevate blood cholesterol levels and heighten the risk of CVDs, as illustrated in Figure 2. This may result in plaque build-up in the arteries, hence elevating the risk of CVDs and stroke. Consumption of meat high in fat can also cause a state of inflammation in the body that may harm the endothelial lining of blood vessels (WHO 2023; Afzal et al. 2025; Givens 2025).

Research shows that an increased frequency of red and processed meat consumption positively correlated with an elevated risk of developing or dying from CVDs, particularly IHD and CAD, regardless of higher body weight with statistics showing that 50 g/day consumption of processed meat and unprocessed red meat increased the chances of developing CAD by 18% and 9% respectively (University of Oxford 2021, Zhang et al. 2021; Wang et al. 2024). Findings by Neuenschwander et al. (2023) and López-Moreno et al. (2025) indicate that switching from a high intake of animal-based foods, particularly red and processed meat, to plant-based foods (e.g., nuts, legumes, and whole grains) is linked with a lower risk of all-cause mortality, CVD, and T2D. Demographics are given by Glenn et al. (2024) that shows that replacing 3% of animal protein with the equivalent amount of energy from plant protein is associated with an 18% and 24% decreased risk of CVD and CAD, respectively, with no relationship with stroke. Al-Shaar et al. (2020) noted higher CVD mortality rates among the United States population due to the increased intake of unprocessed red meat. However, studies by Papier et al. (2023) and You et al. (2023) highlighted that although the intake of both processed and unprocessed red meat has been positively related to a greater CVD risk, this relationship is not true for poultry, indicating that chicken might be a safer option for patients diagnosed with CVD.

It is worth noting that not all research has identified a direct association between fatty meat consumption and the risk of CVD. Some research suggests that the meat quality, along with the employed cooking technique, can influence its possible health implications (Geiker et al. 2021). A study conducted by Hill et al. (2024) showed otherwise. They found no causal relationship between CVD risk and red or processed meat consumption, suggesting the need for more research in this field of study. Overall, data suggest that having large portions of fatty meat increases CVD risk, and that lowering intake may be helpful to cardiac health (You et al. 2023).

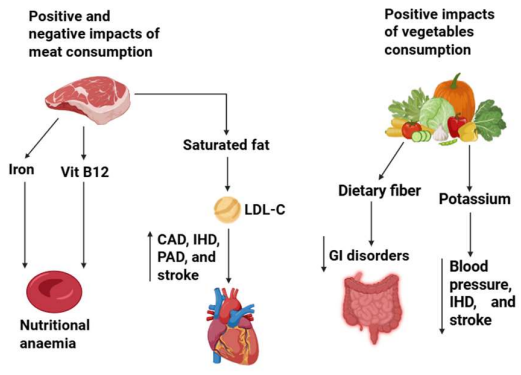

Fig. 2: Health effects of meat and vegetable intake.

Association Between Fatty Meat Consumption and Diabetes

Several studies have indicated a correlation between the consumption of red and processed meat and the risk of developing T2D, which is closely linked to obesity, as a number of studies found a direct relationship between obesity and insulin resistance (IR), with one study indicating that excessive consumption of processed red meat is associated with a 51% higher chance of developing T2D, as fatty meat, being dense in energy, can lead to weight gain, resulting in obesity (Wondmkun 2020; Gu et al. 2023; Arneth 2024).

Fatty meat is high in saturated fat and cholesterol, which is hypothesized to contribute to the development of IR and impair glucose metabolism, both of which are risk factors for T2D. Another process is the production of advanced glycation end-products (AGEs), which are produced while cooking fatty meats via the Maillard reaction. These products have been found to enhance oxidative stress and inflammation in the body, both of which are linked to IR and diabetes (Rungratanawanich et al. 2021; Gu et al. 2024; Gan et al. 2025; Sivri and Akdevelioğlu 2025; Zhang et al. 2025). Multiple studies have shown a strong positive correlation between the onset of diabetes and the over-consumption of total red meat, processed meat, and unprocessed red meat. However, research found no significant risk associated with the consumption of poultry. (Gu et al. 2023; Li et al. 2024). Gu et al. (2023) also highlighted that substituting fish, dairy, nuts and legumes, poultry, or eggs for red meat is associated with a lower risk of T2D.

Both Allen et al. (2022) and Zhang et al. (2024) found that individuals who consume meat on a regular basis are likely to have higher values of total plasma, LDL cholesterol, blood pressure, hypertension, and a higher body weight, all of which contribute to CVDs, which are the primary risk factors in T2D. However, Sanders et al. (2024) proposed in their research that regular unprocessed beef consumption does not significantly affect the values of most of the blood lipids, apolipoproteins, and blood pressure, except for a minute increase in LDL. No gender bias has been noted in past studies, indicating that both male and female participants are equally prone to developing T2D, which is associated with higher consumption of red meat. (Gu et al. 2023).

These findings strengthened the assertion that dietary factors significantly influence the onset of T2D and emphasized the necessity of advocating for proper dietary practices to avert this chronic condition and to make improved public health interventions.

Association Between Fatty Meat Consumption and Cancer

Conflicting results have been found in studies on the relationship between a diet high in fatty meat and the risk of cancer. Consuming red and processed meat has been linked in some studies to an increased risk of some malignancies, while no significant correlation has been identified in others. Numerous epidemiological studies conducted in recent years have discovered a link between red meat, more especially, processed red meat, and the chance of developing cancer. The International Agency for Research on Cancer (IARC) declared in 2015 that processed meat is carcinogenic to humans (IARC 2015; WHO 2015).

Some research suggests that preparing meat at extreme temperatures as in grilling or frying, can produce cancer-causing chemicals, such as heterocyclic amines (HCAs) and polycyclic aromatic hydrocarbons (PAHs), which are found to harm DNA and raise the risk of cancers (Adeyeye and Ashaolu 2021; Adeyeye et al. 2025). Some research indicates that the gut microbiota may play a role in the link between fatty meat consumption and cancer. Consuming high quantities of saturated fat and cholesterol present in fatty meat may increase levels of certain hormones and bile acids, as well as affect the balance of gut microbes, with a potential impact on inflammatory markers linked to specific forms of cancer (Tong et al. 2021; Deng et al. 2023; Hamamah et al. 2024; Saha et al. 2024). Several research studies have found an increased risk of colorectal cancer (CRC) related to the high consumption of meat, such as Zouiouich et al. (2025) noted that red meat intake is related to a 10% higher risk of developing CRC. Similarly, Poorolajal et al. (2024) found that both processed and unprocessed red meat overconsumption has been reported to cause CRC, pancreatic, colon, and rectal cancers. However, no statistically significant association is seen in the risk of developing stomach cancer. Woon et al. (2025) also noted a significant risk associated with beef consumption in the development of CRC, with a 30% general risk increase. Higher red meat intake is also noted to cause an increase in the risk of developing breast cancer in premenopausal women (Lee et al. 2025; Tong et al. 2025).

Overall, the evidence indicates that elevated intake of red and processed meat correlates with a heightened risk of CRC, although the association with other cancer types is less definitive and not consistent among various studies, as stated in Table 2. Additional research is required to elucidate the correlation between fatty meat consumption and cancer, as well as to ascertain the underlying mechanisms.

Alternative Protein or Lean Meat in a Balanced Dietary Approach

There are also articles discussing the role of meat in the human diet, that is, the proportion of nutritional value and possible health risks. The authors underline the importance of a more sustainable and healthy diet by incorporating adequate quantities of not only meat but also other foods rich in nutrients, such as fruits, vegetables, whole grains, and legumes. Lean meat options such as chicken breast, turkey, domestic duck breast, ribs, and tenderloins are all low in fat, hence beneficial to fatty meats. In the same manner, salmon, tuna, and trout are also good sources of omega-3 fatty acids, vital nutrients, and protein. Plant-based protein, including beans and legumes such as chickpeas, lentils, and kidney beans, and soy products are also a good substitute for animal-based meat due to their equal protein value.

Through consuming alternative sources of proteins, we can be able to reduce the consumption of fatty meats in the menu in addition to enhancing general health and wellness. Moreover, it is found that people observing a vegetarian diet are found to have lower risks of CVDs, including a 24% reduced risk of developing IHD (Dybvik et al. 2023;

Table 2: Meat consumption and its effects on human health

Meat Type	Nutrient Highlights	Cardiovascular Effects	Cancer Risk	Metabolic Health	Gut Health	Lifestyle Effects	Overall Health Assessment	References
Red Meat (Unprocessed)	Protein, iron, B12, zinc	Higher intake linked to CVD risk	Probable risk at high intake	Excessive consumption associated with IR	Neutral to mildly negative when excessive	Often consumed with refined carbs	Moderation advised	(Zhang et al. 2021; Poorolajal et al. 2024; Wang et al. 2024; Abbasi and Khodadadi 2025)
Processed Meat	Protein, sodium, preservatives	Increased coronary risk	Convincing colorectal cancer risk	Higher T2D risk	Adverse microbiome shifts	Associated with ultra-processed diets	Best limited or avoided	(Noureddin et al. 2020; Gu et al. 2023; Poorolajal et al. 2024; Wang et al. 2024)
Poultry	Lean protein, B vitamins	Neutral to protective effect	No consistent association	Supports healthy body weight	Generally neutral	Common in balanced diets	Generally healthy option	(Khodayari et al. 2022; Papier et al. 2023)
Fish	Omega-3s, protein, vitamin D	Lower cardiovascular mortality	Possible protective effects	Improves insulin sensitivity	Supports microbiome diversity	Linked to healthier dietary patterns	Highly beneficial	(Gu et al. 2023; Wang et al. 2025)
Game Meat	Lean protein, iron	Low saturated fat benefit	Limited data; no clear risk	Supports lean mass	Neutral	Minimally processed	Healthy when available	(Nouri-Majd et al. 2022; Kwasny et al. 2025; Zhang et al. 2025)
Organ Meats	Very high micronutrient density	Cholesterol concerns if excessive	Insufficient evidence	Improves micronutrient status	Neutral	Typically eaten infrequently	Nutritious in moderation	(Nouri-Majd et al. 2022; Kwasny et al. 2025; Zhang et al. 2025)
Plant-Based Meat Alternatives	Protein, fiber (varies)	Improved lipid profiles	Lower cancer risk overall	May aid glycemic control	Often beneficial for gut health	Encourages plant-rich diets	Health varies by processing	(Dybvik et al. 2023; Glenn et al. 2024; Landry et al. 2024)

Landry et al. 2024). But animal proteins are found to have been more complete and biologically effective in supplying essential amino acids than plant proteins, owing to the fact that plant proteins are less nutritionally available because of their low and inefficient digestibility. Plant proteins are generally less favourable in terms of their hydrophobicity, aggregation, and flexibility as compared to animal proteins, which can often make it very difficult to process them (Day et al. 2022). However, CRISPR-Cas9 makes it possible to improve the digestibility and essential amino acid composition of plant proteins, bioavailability of micronutrients (e.g., iron and zinc), and decrease antinutritional factors, which may help close the nutritional divide between plant-based and animal-derived proteins (Kaur et al. 2025). CRISPR has demonstrated its potential to reduce the gliadin content in wheat crops, making it safe for consumption by patients with celiac disease or gluten intolerance (Afzal et al. 2024). Nevertheless, the long-term effects on health of gene-edited plant meats are not fully studied yet, including the impact on gut microbiota, metabolic health, and immunity. Therefore, a nutritionally balanced diet including the proper ratios of meat, vegetables, grains, and legumes is necessary to sustain a satisfactory nutritional and health status, hence to ensure effective bodily functioning.

Conclusion

This paper points to the outcomes of meat eating on human health and concludes that the excessive intake of red and processed meat has always been associated with an increased susceptibility to various chronic diseases, including CVDs, T2D, and other malignancies. There are studies that have also argued that a replacement of red and processed meat with a source of plant-based proteins may be healthy. It has also been found that the effects of these complications depend on such factors as the type of meat and its cutting, the cooking method applied, and personal genetic variations and metabolism. Collectively, the current evidence suggests that excessive meat consumption, particularly red and processed meat, can have harmful effects on health. Hence, the modality of choice should be a balanced diet. However, further studies are needed to clarify the complex interconnections between meat intake and health to identify the particular modifiers of such risks.

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