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Nutritional and Industrial Value of Turkey Meat "Meleagris Gallopavo": Review

A. M. Al-Baidhani [a)] and Haider K. Al-Qutaifi [b)]

Department of Food Science, College of Agriculture, University of Basrah, Iraq.
[a)]Corresponding Author: alaa.sadkhan@uobasrah.edu.iq
[b)] yesiraq77@gmail.com

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Abstract. The relationship between meat consumption and health is complex and should be analyzed in detail, paying particular attention to the relevant differences that characterize the effects of different types of meat, and in several studies on poultry meat, including turkey, which is characterized by its highly digestible proteins (with low levels of collagen), and of good nutritional quality as well as unsaturated fats (found mainly in the skin and easily removed) and vitamins of group B (mainly thiamine, vitamin B6, and pantothenic acid), Minerals (such as iron, zinc, and copper) make its meat a valuable food. Through this study, it was found that there is a relationship between the consumption of turkey meat within a balanced diet and good health. Consuming it as part of a diet rich in vegetables is associated with a reduced risk of weight gain, obesity, cardiovascular disease, and type 2 diabetes. White meat (and poultry in particular) is considered moderately protective or neutral against cancer risk. The importance of poultry meat to humans has also been recognized by the Food and Agriculture Organization of the United Nations (FAO), which considers this widely available and relatively inexpensive food to be particularly beneficial in developing countries, as it can help fill in the deficiency of essential nutrients. Consumption of Turkey also contributes to the overall quality of the diet at specific ages and conditions (before conception, during pregnancy until the end of breastfeeding, during growth, and into old age) and is suitable for those with an increased need for calories and protein compared to the general population. And it was found that turkey meat contains some vital amines, which are an indicator of quality, as well as having antioxidant and antibacterial activity, and it has been proven that eating this type of meat reduces the incidence of COVID-19 disease.

Keywords. Poultry meat, Turkey meat, Health, Antioxidant

I. INTRODUCTION

Animal foods, including red meat, poultry meat and their products, are important foods with high nutritional value, as they are an important source of protein because they contain all the essential amino acids. It is also considered one of the sources of energy-rich foods, long-chain fatty acids, and essential fatty acids such as linoleic and linolenic, which a person needs to eat daily [1].

The global production of meat of all kinds is constantly increasing, as production has increased with the increase in population growth, and then the interest in raising livestock, sheep, and poultry of all kinds has increased. (chicken, ostrich, duck, and turkey). Poultry meat is distinguished from other sources of red meat by a high percentage of refinement, as it reaches 63%, while the percentage of refinement in livestock and sheep reaches 50% and 60%, respectively. Studies indicate that the continuous increase in the population has led to a decrease in global production of red meat, which necessitated the necessity to find alternative sources of red meat, the most important of these alternatives is poultry meat. The technological progress in poultry farming, the spread of means of preservation and cooling in the markets, and the prosperity of the industry of preserving various meat and poultry products led to the cheapening of poultry prices compared to red meat, and the increase in income and the rise in the standard of living increased The consumption of meat in general and the good varieties of particular, which increased the consumption of these alternatives, especially the good types such as turkey and ostriches [2].

In recent years, in addition to the increasing interest in raising poultry such as chickens, ducks, geese, turkeys and ostriches, and at the same time, consumers' mistrust of traditional types of meat produced, the use of chemical additives, the spread of diseases that affect animals, as well as consumers' search for a healthy diet, contributed to the development of breeding farms and the boom in poultry production Including turkeys around the world [3].

Poultry meat production accounts for nearly 36% of global meat production, and chicken production is the most common source of poultry meat, accounting for about 89% of total poultry production [4].

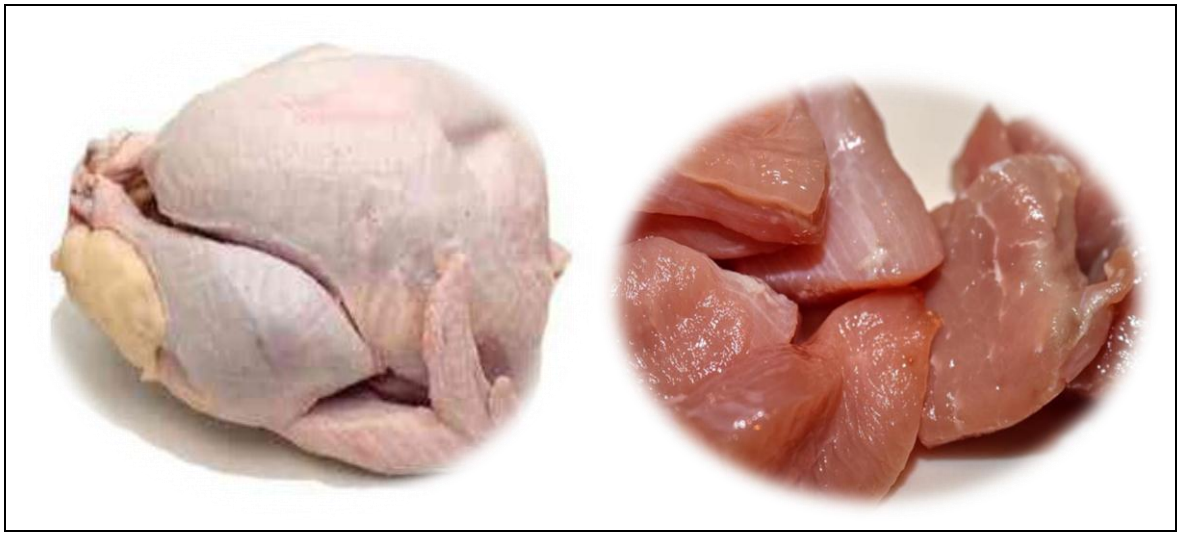
Most chicken meat is produced under extensive systems. However, in recent years there has been a growing interest on the part of consumers in chicken production, especially with regard to breeding and natural foods. The meat of these birds is associated with high-quality products. Thus, alternative poultry production systems are identified, and these increases in production are reflected in organic poultry head numbers, recording an approximately 14% annual increase between 2005 and 2015 in the European Union (2016) European Commission.(The production and consumption of turkey meat has increased rapidly all over the world. This production increased nearly 6% from 5,610 million pounds (2015) to 5,981 million pounds (2016) and Brazil produced more than 330 million pounds (2015) according to the USDA [5].

Chicken meat is rich in proteins, amino acids, carbohydrates, polyunsaturated fatty acids (PUFA) and minerals and is also low in fat, which is one of the most sought after meat all over the world [6]. Due to the balanced nutritional components, it has been suggested to eat a regular diet of chicken meat to reduce the incidence of many diseases and to have a beneficial effect on human health [7]. Moreover, the price of chicken meat is much cheaper than red meat (such as beef, lamb and pork) which also promotes large-scale production and consumption of chicken meat. It is reported that per capita consumption of chicken meat has increased about fivefold during the past four decades in Korea [7].

The function of consumer acceptance and processing of meat depends on its quality, which is influenced by a series of factors such as genetics, age, body weight and other environmental conditions [8]. Genetics has been considered the main factor affecting the quality of chicken meat in previous studies [9]. In general, it has been observed that nutritional value and physical and chemical properties are the most important aspects in consumer perception of meat and its products. Nutritional value is a major concern, but physical and chemical properties of meat, which include water-carrying capacity, tenderness and color, are also important elements of meat processing and consumer acceptance [10].

Epidemiological studies conducted around the world on highly diverse populations with different food preferences and eating habits provide strong information on the relationship between poultry consumption in a balanced diet and good health. Consumption of poultry meat, as part of a diet rich in vegetables, is associated with a reduced risk of overweight, obesity, cardiovascular disease, and type 2 diabetes. Also, white meat (and poultry in particular) is considered moderately protective or neutral against cancer risks. The importance of poultry meat to humans has also been recognized by the Food and Agriculture Organization of the United Nations (FAO), This widely available and relatively inexpensive food is particularly useful in developing countries, as it can help fill in the deficiency of essential nutrients. Moreover, consumption of poultry meat also contributes to the overall quality of the diet at specific ages and conditions (before pregnancy, during pregnancy until the end of breastfeeding, during growth and into old age) and is appropriate for those with an increased need for calories and protein compared to the general population [11].

In particular, the effective value of poultry meat differs between chicken breasts and skinned chicken thighs (Table 1) [12]. The presence of the skin (due to its fat content) increases the caloric value by about 25-30%. It should be noted that cooking also affects the vital value, which increases by 30 - 50% for meat with skin (mainly due to the loss of water during the cooking process [13]. Among the most important nutrients that the human body needs are:



- *First: Protein*

Poultry meat, like other meats, milk and eggs contain a protein component that is usually known to be of high quality. Animal-derived foods have a PDCAAS value equal to or just below one [14]. Conversely, plant-derived foods that, although containing an adequate amount of protein, have less favorable protein properties (they generally lack one or more essential amino acids or too many are difficult to digest), have a lower PDCAAS value. much (eg 0.75 for cereals and 0.5 for wheat). Of all the macronutrients, protein is the smallest contributor to your daily calorie intake. It is generally assumed that the recommended protein intake is also increased for men and women over 65 years of age in order to counteract sarcopenia, which occurs more frequently in the elderly. Based on the analysis of data collected in the context of the Nutrition

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Examination Survey (NHANES) III on more than 6,300 men and women, at this stage of life, protein intake should equal about 1.2-1.3 g/kg per day. It is especially a protein of high biological value [11].

The protein content of most meats (including poultry) is between 15 and 35%, depending on the water and fat content of the product. Cooking also increases the protein concentration, which is up to 60% by weight for skinless turkey thighs and skinless chicken breast. The low content of collagen (a structural protein) is another preferred characteristic of poultry meat. Collagen reduces the digestibility of meat, and higher levels of this protein in muscle meat are associated with a lower proportion of digested product per unit time [15].

- *Second: Fats*

Meat contributes to the formation of fats, especially saturated ones, and therefore its consumption is likely to be associated with excessive intake of these nutrients and the corresponding negative health consequences. However, the suggested dietary target for fat in a generally healthy population is 25 to 35% of total energy, so that an average intake of 2,000 calories results in 70 grams or more of these nutrients per day. In addition, when consumed in appropriate quantities (that is, compatible with a healthy balanced diet). Fats also play a number of important roles, as they provide "essential fatty acids" (such as linoleic and alpha-linolenic acids) and fat-soluble vitamins (A, D, E and K) and represent a major source of energy and enhances the feeling of satiety due to a slowdown in their digestion in the stomach, for the same reason reduces bioavailability. carbohydrate (and thus, glycemic response) and finally, enhance the taste, aroma and texture of foods [11].

It should also be noted that the muscular part of the animals, which lacks visible fat, has a rather limited fat content, which has decreased further during the past decades, thanks to advances in farming techniques and feed quality. The fat intake associated with poultry meat is variable and depends On the part taken from it however, the fat is mainly found in the skin and therefore can be removed easily (Table 1) [16]. The fat content in chicken and turkey is about 1% in leaner cuts, such as chicken breast and turkey, and about 17% in skin-on chicken wings. Skin inclusion can increase these ratios. Cooking can also increase the fat content concentration (although lower compared to the protein content), by removing water from the meat, or by adding the fat found in seasonings used during preparation (eg roast chicken). However, when compared to other types of meat, poultry appears to be relatively low in fat. From a nutritional point of view, the composition of poultry fat contains large amounts of monounsaturated fatty acids (only one third of the total fat is saturated fatty acids) (Table 1) Compared to cows, sheep or pork possess higher amounts of polyunsaturated fats, especially omega-6 or n-6 linoleic acid (18:2 n-6) and arachidonic acid (20:4) n-6, which can be found It is mostly found in the skin Thanks to vegetable-derived feeds rich in alpha-linolenic acid (a precursor to omega-3 or long-chain fatty acids), poultry also provides a measure of this class of fat. In most Western countries, where consumption of fish (a major source of omega-3s) is relatively low, poultry meat may be an important source of these fats [16, 17].

TABLE 1. Content of n-6 and n-3 polyunsaturated fatty acids (mg/100g) in some types of meat.

	n-6		**n-3**			
	LA 18:2 n-6	**AA 20:4 n-6**	**ALA 18:3 n-3**	**EPA 20:5 n-3**	**DPA 22:5 n-3**	**DHA 22:6 n-3**
poultry meat	1,443	98	73	5	18	25
Chicken meat with skin	2,880	80	140	10	10	30
Chicken meat without skin	550	80	20	10	20	30
Turkey meat with skin	1,700	110	110	0	20	20
Turkey meat without the skin	640	120	20	0	20	20
Bovine meat	277	24	105	5	8	4
Beef sirloin	94	9	20	5	15	10
Goat and lamb meat	369	84	54	5	7	10

- *Third: Carbohydrates*

Animal-derived foods contain very few carbohydrates, which, on the contrary, are abundant in plant foods. The only naturally occurring carbohydrate in muscle is glycogen, the content of which decreases rapidly after slaughter. In some processed meats, sucrose or glucose is added during the manufacturing process [11].

- *Fourth: Vitamins and Minerals*

Meat is an excellent source of most of the hydrophilic vitamins, and is the ideal dietary source of vitamin B12. The amounts of B group vitamins (such as niacin, vitamin B6 and pantothenic acid) in poultry are very similar to those found in other meats and do not decrease significantly during cooking. While red meat is the most abundant in vitamin B12, poultry provides an important amount of niacin. Fat-soluble vitamins such as vitamins E and K found in muscle are less abundant in meat than in plant foods. Meat also provides many minerals. As shown in Table 3, despite the large variation in iron concentration across different types of meat, poultry also provides this mineral (100 g of chicken thighs provide 1.4 mg of iron, compared to 1.3 mg of an equal amount of beef thigh steak) Sodium is only minimally present in fresh meat and poultry as well, and does not contribute significantly to total dietary intake. On the other hand, processed meat products can contain high or very high amounts of sodium, added as a preservative or flavor enhancer. Chicken meat is also an excellent source of selenium. Furthermore, lean meats contain factors that enhance the bioavailability of a variety of nutrients, which are often

greater compared to the same nutrients found in plant foods. Besides hem iron, zinc, copper and B vitamins are highly bioavailable when consumed with meat. At the same time, meat also enhances the bioavailability of nutrients found in other foods when eaten concurrently. For example, the absorption of non-heme iron found in other foods increases when eaten with meat Poultry [18].

- *Meat Consumption Levels*

According to the data of the Food and Agriculture Organization, the consumption of poultry meat, like all other types of meat, has increased gradually from the last century to today in Europe and the USA and has remained generally stable over the past years. European behavior regarding food consumption in general and poultry consumption, in particular, differs significantly from that of the United States. The results of the National Health and Nutrition Examination Survey (NHANES) confirm that in the United States, the shift in consumption from red meat to white meat has been higher than in any other country yet red meat still accounts for the majority of meat consumed in the United States (58%), while processed meat occupies about 22% of the market. According to the study, in 2003 and 2004 total meat intake in the American diet was equivalent to an average of 128 grams per day, with significant variation in the type and amount of meat also based on age and gender. This survey showed that meat consumption in the United States is about three times higher than the global average. This aspect must be taken into account when defining health policies directed towards reducing the spread of chronic diseases. In Europe data on poultry meat consumption from the European Prospective Study in Cancer and Nutrition (EPIC) provide values that vary across several geographical regions: total meat consumption is highest in Spain (126.9 g per day in San Sebastian). The minimum in Greece (45.6 grams per day)19, while the daily consumption of poultry meat ranges from 7.6 grams in Umea (Sweden) to 29.2 grams in San Sebastian. In Italian population groups, the average daily intake of poultry meat is about 20 g (chicken account for 65% of total poultry meat), with a peak of 23.4 g for subjects assigned to the center (Florence), and lowest levels (14.6) for residents in the south (Naples). Similar consumption levels of poultry meat were recorded in the representative sample of the Italian population recruited in the 2005/2006 INRAN-SCAI Italian National Food Consumption Survey. As reported in the FAO database, poultry meat accounts for less than 30% of the meat in the Italian diet, and is more abundant in cured meats, sausages, and other processed products [19].

Poultry consumption and human health Epidemiological studies conducted in different parts of the world, in very diverse population groups, with different food preferences and dietary habits, provide powerful information on the relationship between diet and health. Several prospective studies support the association between poultry consumption, in a balanced diet, and reduced risk of cardiovascular disease (CV) and its risk factors, such as being overweight, insulin resistance and tumors [20].

- *Benefits of Protein Consumption in Controlling Weight (Obesity)*

The benefits of protein consumption, including animal proteins, in managing weight control are supported by studies, experiments and results on foods containing high protein meat compared with low protein foods on body weight [21]. There was a statistically significant difference in weight loss between the two [22]. Groups in most cases in favor of higher protein intake Only very few small studies provide contradictory results, possibly due to different compliance of subjects enrolled [23]. There is evidence that in the short term (ie up to 6 months), weight loss on high-protein diets is increased when compared to low-protein diets [24]. Possible mechanisms responsible for this effect include increased satiety, followed by a lower calorie intake during subsequent meals and lower carbohydrate consumption, on higher protein diets. Proteins are also responsible for increased thermogenesis (by increasing protein synthesis and expenditure of ATP associated with peptide bond formation, as well as urea production and glucose formation) [25]. Eating one serving of protein as a substitute for the same amount of carbohydrates lowers the total blood sugar for the meal [26].

On the other hand, eating large amounts of meat was associated with increased body weight. In the previously mentioned EPIC study, for example, a 250g increase in meat consumption per day (including all types of meat) was associated with an additional 2 kg weight gain over 5 years, in both normal-weight and overweight men and women [21]. It is worth noting that 250 grams per day (1,750 kilograms of meat per week) is a particularly large serving size, equivalent to about 450 extra calories per day. This is currently considered incompatible with any weight control strategy and is very rare in European countries [27].

- *The Relationship of Protein Consumption With Cardiovascular Disease*

Cardiovascular disease, too The effect of protein intake appears to depend on dietary sources [28]. A very large observational study conducted in the United States on females reported an inverse relationship between poultry and fish intakes and the risk of coronary artery disease, as well as no clear relationship between red meat consumption and the same risk [29]. Analysis of data collected 26 years after the start of the study also reveals a positive relationship between levels of consumption of different protein sources (poultry, fish, nuts), health status and survival [30]. In particular, replacing one daily serving of red meat with a daily serving of poultry reduced the risk of fluid infection by 13-19% if red meat was replaced with low-fat dairy products and by 24% if it was replaced with fish. Researchers suggest that these benefits are the result of a reduction in heme iron and sodium and an increase in polyunsaturated fats. Thus, replacing red meat with other protein sources such as poultry can be an effective coronary risk reduction strategy [28]. Possible basic mechanisms linking different meat consumption levels and the risk of coronary artery disease. It is possible to reduce exposure to disease when conducting

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chemical analysis and studying the structural differences between red meat and white meat, and in particular estimating the percentage of saturated fat, cholesterol and heme iron, which is higher in red meat and responsible About the color red [11].

- *Diabetes Type 2*

Diabetes Type 2 There is extensive evidence showing how lifestyle interventions can reduce the risk of developing type 2 diabetes by modifying several risk factors, including excessive fat intake, especially saturated fat [31] Studies dating back to the first half of the twentieth century have highlighted that diabetes-related deaths are increasing in Western society, which is also characterized by high meat consumption [32]. Recent studies have confirmed a link between hyperinsulinemia and insulin resistance and the intake of saturated fats of animal origin [30, 33].

Many studies have been reviewed on this subject, as they were characterized by a large discrepancy in the results. These studies confirmed the relationship between the risk of developing type 2 diabetes and the consumption of fatty and processed meat [34]. In their study, [35] reported that most other studies led to the same result as the Health Professionals Follow-Up Study (HPFS), which followed 42,504 adults for 12 years and identified a high risk of diabetes with 5 Weekly portions of processed meat and there was an increase in the risk if it was absent when consuming poultry. In the European Prospective Investigation into Cancer and Nutrition (EPIC) study, this study was conducted on more than 340,000 adults from eight European countries and analyzed The results, which were relied upon after conducting these studies, which were conducted by the Harvard Group, conducted 20 studies for a total of 1,218,380 individuals (in this case, the link between risks and processed meat was preserved) and updated [36,37].

A recent paraphrase of the data from the EPIC-InterACT study showed that the incidence of type 2 diabetes was higher in people with higher levels of total and animal protein intake, especially in females and in particular in those with higher levels of total and animal protein intake. Body mass (BMI) over 30 [38]. Despite this result, specific data related to poultry consumption confirmed the absence of a statistically significant relationship between the increased weekly intake (100 g rations) of chicken and turkey and the development of the disease [30].

It appears that a diet that includes a high intake of poultry, along with whole grains, fish, fruits and vegetables, and low consumption of red meat, processed foods, starches and simple sugars is effective in fighting diseases [39]. The results of the EPIC study also confirm that a healthy lifestyle and consumption of poultry, as well as fruits, legumes, nuts, grains and vegetable oils, is associated with a reduced risk of mortality in a group of people with type 2 diabetes, confirming that these patients can obtain significant benefits from a comprehensive change in lifestyle life which includes consumption of white meat [40]. Among the dietary factors likely to increase the risk of diabetes, it was suggested that heme iron could play a role as it increases oxidative stress and insulin resistance [31, 41]. However, this hypothesis does not explain the negative effects of processed meat in which heme iron is generally reduced [37]. Another confounding factor to consider is the difference between processed or processed meat and fresh meat, which contains different concentrations of preservatives and sodium. It is estimated that processed meat contains, on average, approximately 400% more sodium and 50% more nitrate than fresh meat [36]. With regard to manufactured products, the temperature used in the preparation can also affect the effect on health. The high temperatures commonly used in industrial meat processing can stimulate the formation of heterocyclic amines and polycyclic aromatic hydrocarbons that can increase the risk of coronary artery disease, diabetes and cancer [42]. In particular, the studies shed light on the potential risks associated with the end products of glycation and protein glycation and the process of lipid oxidation in processed foods, as well as the mechanisms by which the function of pancreatic cells can be affected by the protein composition of processed meat [43].

- *Cancer*

Epidemiological studies in groups with high or very high consumption levels of animal products show that excessive meat intake is a potential risk factor for specific cancer sites [44]. Saturated fats, heme iron, sodium, N-nitroso compounds present in meat, and heterocyclic aromatic amines generated during cooking at high temperatures have been indicated as possible factors responsible for the positive association with meat cancer [45]. Differences in the composition of poultry meat compared to red meat and especially the lower quantitative and potentially dangerous components along with the content of other elements that are on the contrary nutritionally beneficial (eg polyunsaturated fats), can at least partly explain the different effects. The recorded risk of developing certain types of cancer across the two food groups. In general, increased consumption of red meat is associated with a higher risk of cancer, while white meat is considered moderately protective or neutral [46, 47]. It should be noted that red meat is characterized by a higher percentage of total fat (up to 20% versus approximately 4% in lean poultry), especially saturated fat, and a lower content of polyunsaturated fat [12, 48].

According to the periodic report of the World Cancer Research Fund, individuals who typically consume animal products should prefer poultry and all types of fish to red meat, the latter in the general population should not exceed 300 grams of cooked red meat per week, and on an individual level, they should It is limited to a maximum of 500 g per week (equivalent to about 750 g of raw meat), which is the maximum processed meat possible [11]. Among all cancers, those related to the digestive system are most commonly associated with the consumption of animal products. This observation emerged from studies conducted in populations with consumption levels much higher than those recommended by dietary guidelines (close to excess); It has been hypothesized that myoglobin supplied by red meat causes precancerous lesions through the stimulatory

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effect of heme iron on the production of carcinogenic N-nitroso compounds, and the development of cytotoxic and genotoxic aldehydes through lipid peroxidation [49].

This hypothesis that excludes the involvement of white meat in cancer risk has been confirmed by several analyses. For example, an analysis of the results of 13 studies with a total of more than 500,000 people and 4,100 cases of oropharyngeal cancers, shows that the risk of these cancers is increased for regular consumers of processed meat (3-6 servings per week), but Not for consumers of other meats [50]. This result confirms that obtained in a case-controlled study conducted by Mario Negril of the Milan Institute in the late 1990s across three provinces in northern Italy (Milan, Padua and Pordenone), which showed that chicken and turkey were among those foods (along with pasta, fresh vegetables and citrus fruits). And fruit in general he consumed was associated with a lower risk of esophageal cancer. The effect was more pronounced (with an odd ratio equal to 0.4, therefore, a relative reduction of risk of about 60%) for higher levels of consumption. The association between reduced risk of esophageal cancer and white meat consumption was confirmed, on Although not statistically significant, for both esophageal and esophageal squamous cell carcinomas in the graphical analysis of four cohort studies and 31 control cases [51].

Studies conducted between 1990 and 2011 The most recent systematic review of studies confirms an inverse association between the number of poultry feedings per week and the risk of esophageal cancer [47]. associated with an overall risk reduction of about 53% [52]. The protective effect of chicken and turkey on esophageal tumors, similar to that of other gastrointestinal cancers, was also associated with nutritional status and lifestyle quality, which are generally higher in people who preferred these foods [53]. The negative impact of excess salt in preserved foods and processed meats on stomach cancer risk has been widely described [54]. In contrast, a few researchers have observed that the risk of developing such cancers is inversely related to high levels of consumption of vegetables, fruits, vegetable oils and poultry, which leads to a protective effect at the level of the gastric mucosa [55].

The survival of patients already affected by colorectal cancer also appears to be negatively affected by red meat intake and treatment [56], with the diagnosis of non-metastatic colorectal cancer being a prominent example [57]. As shown by the statistical analysis, no relationship, on the other hand, was observed in cohort and epidemiological studies between chicken and turkey evaluated separately and in the general context of white meat and colorectal cancer risk [58]. Available information regarding the effects of meat consumption on breast cancer risk in women is somewhat heterogeneous. However, the absence of any statistically significant relationship between poultry and this type of cancer was evaluated across different population groups [59, 60]. In a prospective study in a subpopulation of American premenopausal nurses, the incidence of invasive breast cancer over 20 years of observation was inversely associated with poultry consumption [61]. Assessing the effect of different protein sources on disease progression enables one to estimate that substituting one portion per day of red meat for one of the poultry's can reduce the risk of breast cancer by about 17% overall and by 24% in postmenopausal women. Both cohort studies and private case studies tended to exclude an association between meat consumption and ovarian cancer, postulated on the basis of the results of environmental studies, which is likely influenced by confounding factors [62].

Despite the limited number of high-quality studies, both a meta-analysis of prospective studies [63] and the EPIC study of more than 350,000 European women [64] showed no significant effect of meat. white on ovarian tumors. In addition, analysis of the effect of different nutrients led to the exclusion of any association between this type of cancer and total fat and saturated fat, and more specifically meat fat [65]. A positive relationship was observed only with industrially produced polyunsaturated fats. Research evidence remains inconsistent with regard to endometrial carcinoma [66], lymphocytic leukemia and myeloid leukemia [67], and hepatocellular carcinoma [68]. However, eating large amounts of poultry can reduce the risk of lung cancer by approximately 10% according to a statistical analysis of 23 control cases and 11 cohort studies.

- *Consumption of Poultry Meat (Turkey) and The Overall Quality of The Diet at Different Life Stages*

The importance of poultry meat to humans has been assessed by the Food and Agriculture Organization, which states in a recent document that human populations benefit greatly from poultry meat and eggs, which provide a food containing a high quality protein, low level of fat with a desirable fatty acid profile. In particular, these foods, which are widely available and relatively inexpensive, may be particularly useful in developing countries, as they can help fill the deficiencies in essential nutrients for the poor. The incidence of many common metabolic diseases associated with deficiencies of dietary minerals, vitamins and amino acids can be reduced through the contribution of poultry products rich in all essential nutrients except for vitamin C. Moreover, consumption of poultry meat also contributes to the overall quality of the diet at certain ages and conditions. For example, in the period prior to conception, during pregnancy and until the end of breastfeeding, the quality of the mother's diet is among the factors that influence the health of both the mother and the infant [69]. Guidelines for this precise period generally refer to the variety of foods to be eaten, the number of servings [70] and modes of consumption (chewing slowly) [71]. Well-cooked lean meats (such as chicken and turkey) are a privilege during pregnancy. increase During pregnancy the required dietary intake of vitamins (A, D, C, B6, B12, and folic acid), minerals (calcium, iron, phosphorous) and essential fatty acids. Poultry, which is a good source of some of these nutrients [72], as well as the essential fatty acids linoleic and alpha-linolenic, can be a good source of healthy food. At the same time, consumption of poultry meat can also help reduce salt intake and thus reduce sodium intake, which should be as moderate as possible for both the mother and her baby. Chicken and turkey are also valuable components of a balanced diet during growth, as meat can meet specific

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growth requirements due to its high protein content (characterized by the presence of the essential amino acids lysine, histidine, and arginine), and moderate fats (especially after skin removal), which It is generally unsaturated as opposed to saturated and is highly bioavailable; vitamins (such as vitamins of group B); and minerals (eg iron) [73]. In particular, among the meats recommended for weaning, chicken and turkey (with fish and lamb) are the easiest to puree. Moreover, baby food containing these meats is easy to digest and has low allergenicity [47]

The level of minerals, especially iron, in poultry meat makes it suitable even for the most advanced stages of development, such as adolescence, during which the increased independence is greater than the risk of an unbalanced nutrient intake. Old age is another life period in which well-being is more stringently linked to diet and lifestyle, as evidenced by epidemiological observations in many countries [75]. The increased availability of high-quality food has eliminated most nutritional deficiencies in the elderly and contributed to a healthy life expectancy. However, nutritional balance cannot be taken for granted at this stage of life, even in developed Western countries. Increasing the required intake of certain nutrients such as calcium (useful in controlling bone mass loss, especially in females) and protein parallels a decrease in total caloric needs (mainly due to decreased age-related physical activity). Several studies have found that adequate protein intake in old age helps fight the physiological sarcopenia associated with aging, the gradual decrease in muscle mass with serious consequences in terms of movement and individual independence [76]. Specifically, poultry (turkey) is a high-quality protein source that is highly digestible and chewable, especially when prepared using mild cooking methods. Especially important for the elderly, who often have to deal with digestive disorders or chewing difficulties. It should be noted that turkey meat is significantly less expensive compared to other meats and is an unimportant aspect in the context of the nutrition of the elderly, as this population group is generally subject to low incomes and is at risk of an unbalanced diet due to their limited financial condition [11].

- *Evaluating The Quality of Turkey Meat and Comparing it With Other Poultry Meat*

Meat quality is a term used to describe the general characteristics of meat including physical, biochemical, morphological, microbial, tactile, mechanical, hygiene, hygienic, culinary properties, appearance, surface, freshness, water, firmness, taste, odor and flavour. Among the most vital meats, this includes the influence on the primary and final quality judgment by shoppers when acquiring the meat ingredient as well as the 7 quantifiable meat characteristics, eg, water-holding, ductility, good cooking, pH and time. The usability, collagen content, protein solubility, consistency and fat reduction are essential to the processes involved in making embedded meat items with high nutritional value. Super 7 elements affect meat quality [77].

- *The Color*

In poultry as well as in different types of meat, color in meat is one of the traits that has attracted wide attention from analysts due to its direct impact on the marketing process. The color of the meat is so essential that since buyers associate it with freshness and quality in general, it applies a noticeable influence to their choice to purchase a variety in meat types and thus increase the buyer's worthiness [78]

One of the qualitative characteristics of many fresh meats is the color of the meat, which is one of the most important characteristics that affect the purchasing value of meat. The bright red color is used as an indicator to judge the quality and quality of meat. Myoglobin (Mb) is the muscle hem protein that is mainly responsible for the animal's color after slaughtering. [2].

- *Texture*

Freshness is one of the most important palatability properties for the consumer, and it is the first sense that an individual feel when eating meat and cutting it into small pieces in the mouth. Despite the high nutritional value of meat, it is possible to increase this value and the ability to consume meat by improving its palatability, especially its tenderness. The texture of meat depends on two main things: the quantity and quality of collagen in muscle tissue on the one hand, and the myofibriar proteins of muscle mechanics on the one hand. Muscle tissue contains two types of collagen bonds: the first is heat sensitive and the second is heat resistant. When the muscle contains a greater amount than the first type, it causes the meat to become more tender when cooking. A good example of this is the meat of young veal. But if the muscle contains collagen bonds that are resistant to heat in large quantities, then when cooking meat, it will be solid and this is what we notice in the meat of old animals, and poultry meat is characterized as having high quality collagen bonds - therefore, it is of high quality than collagenous meat [3].

- *Biochemical Changes*

After slaughter, biochemical changes occur in muscle transformation. And for these biochemical changes will determine the quality of the last meat. Rigor mortis occurs under anaerobic conditions after the death of the bird, as glycogen is hydrolyzed to lactic acid and thus the pH will decrease and ATP generation will stop, and the use of ATP continues to cause myosin separation. Death changes associated with the conversion of muscle to meat are similar in bird and mammal species on any However, molting stiffness occurs faster in poultry in contrast to that in red meat types rather than different types, changes after death mainly take less time in poultry muscles, and ends in about 60 minutes [77].

- *Water Carrying Capacity*

Water carrying capacity (WHC) is defined as the ability of meat to retain water during exposure to external forces such as cutting and chopping. Dry when chewed in the mouth, especially if the cooking time is very long, and the low level of fat in the meat of the bird accelerates this drying and thus leads to a decrease in the juiciness during chewing [2].

Several studies have been conducted to show the quality of turkey meat and its various nutritional and health benefits. A study was conducted by [79] and there are two types of turkey meat (white and red) by analyzing their chemical components, amino acids and vitamins. Red and white meats were evaluated from 3–4 months of age (beginning of the fattening period) and 6–12 months (end of the fattening period) for turkeys (N = 10 turkeys each). Amino acid and vitamin composition was measured using a Shimadzu LC-20 Prominence liquid chromatography system. White turkey meat was found to contain 11.4-12.0% fat, while red meat contained 20.3-21.7% fat. The protein content of white meat ranged between 21.4-21.7% and 18.8-19.5% in red meat. Furthermore, the amino acid composition of white turkey meat was richer in essential amino acids than that of red turkey. It was concluded that white turkey meat had high nutritional value properties, including low fat content, high protein content, and essential amino acids. However, the vitamin composition of white and red meat does not differ significantly. Furthermore, the meat of 6-12 month old turkeys has a higher content of essential amino acids and some vitamins than a younger turkey). Several studies were also conducted in which the nutritional value of turkey meat was shown, as it was compared with other types such as ostrich and chicken by [80], where the test was conducted on 5 samples of meat of ostrich, turkey and broiler, weighing 500 to 550 g.

The qualitative and nutritional characteristics of meat of different types of poultry are evaluated. The chemical composition, pH value, tenderness and softness of meat and ability to bind water and cooking of ostriches, turkeys and broilers were analyzed. Meat quality test was carried out and the results of the analysis showed that broiler meat had the highest fat content. The pH values for ostrich, turkey and broiler meat were very similar and slightly more pronounced in turkey and the lowest water binding value was determined in ostrich meat and the highest value in turkey meat. When analyzing meat tenderness, it was determined that ostrich meat had the lowest ductility, ie. The maximum hardness of the meat. The highest cholesterol content was obtained in ostrich meat, while the lowest was in turkey. A study was conducted by [81], where turkey meat was used in the production of pies because of its high nutritional value in terms of high protein and low fat content compared with other red meat, which has increased rates of disease in recent years.

- *Presence of Biogenic Amines in Turkey Meat*

Biogenic amines are formed in a wide range of foods, including meat and meat products, and meat is an important component of the diet in developed countries, and the interest in the presence of these amines in food is due to two reasons: First, because high levels of biological amines can be toxic to the consumer And secondly, for their role as quality indicators, that is, they are used as a means of food quality control, and there are studies that focus in particular on the factors that affect the production of vital amines, including temperature, salts, pH and others, with reference to other storage standards related to its composition, such as the presence of microorganisms and the raw material And the conditions of processing meat and meat products, as well as the factors that determine its composition, and therefore its production can be controlled, which limits its presence in the final product and thus makes it less toxic. Biogenic amines are sources of nitrogen and generators for the manufacture of hormones, alkaloids, nucleic acids and proteins, and they also play a role in regulating body temperature and controlling blood pressure. internationally [82].

Vital nutritional amines such as butyrosin, spermidine and spermine, which are aliphatic bases of low molecular weight [83] have been distinguished for their role in normal cell growth due to their method of formation [84]. As there have been many studies in which their quantity was estimated in turkey meat and its products, including the study of [85], which proved that the presence of some vital amines in turkey meat is an indicator of meat spectacle. [86] also studied the estimation of some vital amines in turkey breast using HPLC device. The study showed that their presence in natural concentrations allowed internationally, as they do not cause harm or toxicity when eating this type of meat and thus be of good nutritional benefit.

- *The COVID-19 Epidemic and Its Relationship to The Use of Turkey Meat*

The COVID-19 pandemic is still circulating around the world and there is no exact medicine or herb that can be used to completely eradicate the virus for all types of people. People with comorbidities are more likely to get COVID-19 than normal people [87]. People with chronic diseases have weak immune systems, which makes them susceptible to COVID-19. As a result, people should be selective in consuming types of meat that are safe for their body. Red meat from poultry contains less cholesterol than red meat from mammals [88]. Poultry refers to birds that are domesticated for the purpose of meat stock. Broiler is the most common type of poultry worldwide, because broiler chickens can breed and grow quickly. Almost everyone in the world uses broiler chicken as an ingredient, especially fast food that contains fried chicken as the main dish. Turkeys are also poultry but are popular only in the United States [89]. The USA has the largest active case of COVID-19 as well as the number of deaths in the world. One of the reasons is the high number of people with chronic diseases caused by obesity or excessive fat intake. Americans like to eat fast food and foods that are high in fat. Fast food such as burgers, sausages, tacos, barbecue, and steak are often paired with a high-fat sauce [90]. A study was conducted on the use of turkey meat, as the data was taken from the website of the US Department of Agriculture, which provides free data

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on agricultural products to the public [91]. The duration of the data started from February when the first case of COVID-19 appeared in the USA until September 2020. The data is estimated in million pounds. The data are presented in the table [92]. Another sample is the data on COVID-19 cases in the USA. The data are the number of infected cases, death status, and recovery status. The data is from worldometer as a free statistics source that reports daily COVID-19 situation globally. The active case and death report starts on the 15th of each month, because the first active case was found on February 15th, 2020. The recovered case report starts at the beginning of each month. The data is also presented in the table [93].

It can be concluded that the number of turkey and broiler chicken production has an effect on the number of infections and deaths. Between August and September, the number of cases and deaths reached the highest level compared to other months when broiler production was highest. But the number of hospitalizations is also the highest between August and September, which means that the highest production of turkeys and broilers was accompanied by an increase in recovery cases (Table 2) [93].

TABLE 2. The number of turkey and broiler chicken production has an effect on the number of infections and deaths.

Month	Active case	Death	Recovered
February	12	0	0
March	3694	73	7
April	580491	33.339	5510
May	1.067.069	91.380	130.000
June	1.160.511	121.140	418.000
July	1.864.873	140.775	800.000
August	2.505.918	173.458	1.620.000
September	2.587.443	200.713	2.490.000

CONCLUSION

Poultry meat in general and Turkey, in particular, is characterized as having a high nutritional value, as it is characterized by its high content of proteins, vitamins, and minerals, as well as its meat with low-fat content, compared to other red meat, as the proportion of unsaturated fatty acids in it is high. Also, turkey meat is characterized by the fact that it can be adopted when using an ideal healthy diet for all ages. And what supports this is the existence of many and multiple studies that prove this opinion, as these studies have shown the possibility of consuming it in a sufficient manner that can facilitate the control of body weight due to its high protein content. As well as its role in protecting and protecting the body from diseases such as diabetes, cancer, and heart disease, as this has been proven through several studies, especially recent ones, which have proven that turkey meat has the ability to resist infection with Covid-19 disease. Because of its distinctive nutritional properties, turkey meat can play an important role for individuals in specific age groups (pregnant women, children, and the elderly). The consumption of these meats contributes to a balanced diet along with an adequate amount of foods depending on the availability of protein, including plant foods in the overall quality of the diet of the population.

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