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Review Article

Meat protein quantity and quality-a perspective

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Abstract

Ethiopia had largest livestock populations in Africa and 10th in the world. It contributes in agricultural growth domestic product and supporting the community of the population, earning currency from foreign of country. Higher animal-source food consumption has been shown to have important positive impacts on health and nutrition outcomes. However, the patterns in consumption of meats and drivers for these alters are doesn't good understand in Ethiopia. An attention is needed to overcome the problems that affecting meat quality attributes, post- mortem animal and beef particularly protein quality and quantity. Major meat quality may be affected by both pre-slaughter handling of the live animals and the post-slaughter handling of the carcasses. Potential solutions to the limitations are forwarded as future research ideas and policy inputs. Therefore, implementations of GMP and HACCP principles as strategy should be adapted to control pathogenic microbial.

Keywords: Meat; Protein; Production; Post-mortem; Quality; Quantity

Introduction

Meat is an essential part of human food plan with robust implications in fitness, economy, and tradition worldwide. Meat manufacturing entails several home species, relying on many elements like non secular and cultural beliefs, convenience, availability, and so forth [1] It is properly hooked up that meat has numerous key dietary elements, like lipids, proteins with excessive organic cost, hint elements, and vitamins [2] Meat best intrinsic traits together with coloration, flavor, tenderness, texture, juiciness, and smell in addition to its dietary houses rely upon animal genetics, feeding, and cattle practices and at the submit mortem procedures that take area for the duration of the conversion of muscle into meat [3]. Due to the said reasons, red meat intake as a part of balanced diets in growing areas will sell nutrients protection [4]. Said the significance of animal agriculture now no longer best for the manufacturing of awesome proteins however additionally for maintaining rural livelihoods and probably contributing to meals protection. Nevertheless, it's miles essential to commentary that for the reason that electricity and protein transformation performance in ruminants could be very low, meals protection may be efficiently promoted best if feeds given to the animals aren't in opposition with humans. The World Food Summit of 1996 described meals protection as present while anyone always has gotten admission to enough, safe, nutritious meals to hold a wholesome and energetic lifestyle. Commonly, the idea of meals protection is described as inclusive of each bodily and monetary get admission to meals that meets human being's nutritional desires in addition to their meal's preferences. Food protection is a complicated sustainable improvement issue, related to fitness via malnutrition, however additionally to sustainable monetary improvement, environment, and trade. Food and Agriculture Organization talked about that the best of diets has additionally been improved. In growing areas.

Numerous enhancements have been located during the last decades. For instance, according to capita availability of culmination and vegetables, cattle merchandise, and vegetable oils improved via way of means of 90, 70, and 32 percentage for the reason that 1990–92, respectively. A 20% boom in protein availability according to man or woman became additionally noted. FAO said that those improvements have been now no longer absolutely visible in Africa or Southern Asia. In those areas, diets continue to be imbalanced and closely depending on cereals and roots and tubers. These monotonous diets regularly comprised negligible portions of meat, fish, or ascorbic acid. As a consequence, they usually contained a preponderance of meals that inhibit ferric absorption. It has to be emphasized that absorption of micronutrients is strongly encouraged via way of means of the aggregate of meals eaten in a given meal [5]. Moreover, growing fats content material of diets regularly enables absorption of provitamin a, carotenoids, and diet A. Meat intake might also constitute a few dangers to human fitness. Depending on numerous elements, many reviews warn in opposition to its metabolic deleterious results mainly related to cholesterol saturated fatty acids levels. Low polyunsaturated fatty acids levels, or beside the point SFA/PUFA, have been represented as an inconvenient in ordinary meat intake. It's additionally, sparkling meat is a relatively perishable product because of its organic composition. Several elements together with garage temperature, packing conditions, endogenous enzymes, moisture, light, and microorganisms can have an effect on shelf lifestyles and freshness. In this sense, meat processing and preservations technology play vital roles in meals protection, so that it will deliver the increasing populations with enough portions of good-best and less costly meat merchandise. Several mentioned techniques and technology to be carried out in sparkling meat with the goal of extending meat shelf lifestyles [6]. One of the not unusual.

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place procedures utilized in meat maintenance is involved with inhibiting microbial spoilage, and making use of those techniques' deteriorative modifications together with coloration and oxidative method have to be minimized offered a prolonged evaluate comprising contemporary techniques and technology for sparkling meat maintenance, their applications, and implications for extending meat shelf lifestyles. To summarize the current development in medical studies concerning the impact of agricultural practices, with unique attention on African actions, at the development of dietary cost and best traits of red meat as a contribution to enhance red meat health and wellbeing and worldwide meals protection. Meat is the maximum precious cattle product and for lots human beings serves as their first-desire supply of animal protein which gives all of the vital amino acids and diverse micronutrients in right share to the human beings. Meat described as all animal tissues appropriate as meals for human intake. This consists of all processed or synthetic merchandise organized from animal tissues [7]. The paper is prepared in 3 sections that offer an define of the lipids and proteins in red meat and an outline of red meat manufacturing structures in Ethiopia as a specific case for maximizing its useful results and minimizing its bad impact.

Meat Production Trends in Ethiopia

Meat manufacturing gives possibility to serve a large export marketplace in addition to Ethiopia's home marketplace. The overall meat manufacturing growth from 578,240 heaps in 2004 to 749,430 tons in 12 months 2014 and reduced to 596,765 heaps in 12 months 2017 Despite the truth that Ethiopia is the 10th biggest farm animals' populace withinside the world, the manufacturing of meat continues to be low and contributed to approximately 0.2 percentage of the arena overall meat manufacturing, of which maximum is sheep and goat meat. This ranked.

Ethiopia the fifty fifth biggest meat generating use withinside the world. The motives at the back of low manufacturing of meat in Ethiopia are because of low off-take rates, maximum animals slaughtered and exported stay have been now no longer produced in commercially orientated way and promote handiest in want of coins or whilst animals get too antique after serving for draft reason and incapacity to satisfy minimal preferred required withinside the worldwide marketplace for processed meat. The fashion of meat manufacturing in Ethiopia indicates it became growing moderately, of route with a few fluctuations from 2004 to 2017 [8-9] (figure 1).

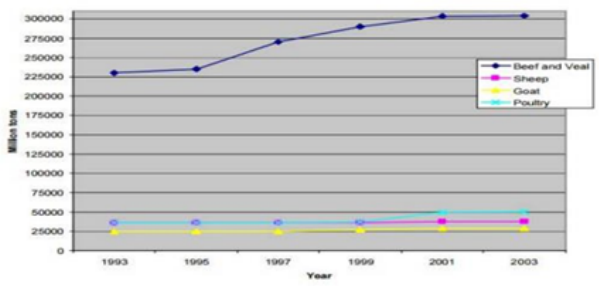

Figure 1: Meat production trends by type in Ethiopia (in tons).

Meat consumption in ethiopia

The home meat call for is assumed to increase with growing population, urbanization, and earnings in well-known and specifically for pork because of desire for consuming meat. Meat intake is regularly a hallmark of financial popularity of a rustic or an individual. People with a better social or financial popularity call for an extra quantity of brilliant meat products [7] the according to capita intake of meat in evolved international locations is a whole lot better than in growing international locations. With the quick boom of Ethiopian financial system and population, the home call for meat is growing; however, the country is one of the lowest according to capita of meat intake withinside the global that is eight kg, of which approximately 5.3 kg comes from pork. This is because of low according to capita incomes, non- industrial orientated animal husbandry practices, excessive home meat expenses and the fasting days over two hundred days according to 12 months through the Orthodox Christians.

Meat quality

Meat quality is a vast time period and covers loads of characteristics. According to the co-author [10-11] described meat quality on the basis of its conformational and practical qualities. Functional qualities because the proper attributes of a product whilst the conformance features think about generating merchandise that precisely meets consumer's specifications. Meat excellent is a function of tenderness, pH, shade, juiciness, taste and nutritive value [12] Quality attributes number one suffering from shipping and dealing with in farm animals encompass pH, shade, tender, texture and moisture and degradation of those variables is together known as darkish organization and dry, excessive pH, and coffee glycogen meat [13] Appearance quality inclusive of shade is measured instrumentally. However, different components juiciness and taste require a subjective approach, and the best methods to assess meat quality are ratings of educated flavor panelists who examine exclusive additives of meat-consuming excellent. Meat with properly sensory homes is what consumers' desire, so pork enterprise have to deliver meat with those attributes on a regular and uniform basis [14] Carcass fats proportion, mainly intramuscular fats (marbling), performs Meat quality is a vast time period and covers loads of characteristics. According to the co-author [10-11] described meat quality on the basis of its conformational and practical qualities. Functional qualities because the proper attributes of a product whilst the conformance features think about generating merchandise that precisely meets consumer's specifications. Meat excellent is a function of tenderness, pH, shade, juiciness, taste and nutritive value [12] Quality attributes number one suffering from shipping and dealing with in farm animals encompass pH, shade, tender, texture and moisture and degradation of those variables is together known as darkish organization and dry, excessive pH, and coffee glycogen meat [13] Appearance quality inclusive of shade is measured instrumentally. However, different components juiciness and taste require a subjective approach, and the best methods to assess meat quality are ratings of educated flavor panelists who examine exclusive additives of meat-consuming excellent. Meat with properly sensory homes is what consumers' desire, so pork enterprise have to deliver meat with those attributes on a regular and uniform basis [14] Carcass fats proportion, mainly intramuscular fats (marbling), performs. a crucial function withinside the meat sensory characteristics, because it contributes without delay to its sensory homes. Based in this observation, marbling score has been utilized by the United States pork enterprise because the number one predictor of pork meat excellent [15]. Hygienic excellent covers wholesomeness and protection components, especially infection with pathogens and ability presence of undesirable chemical residues inclusive of antibiotics, sulfonamides and different pesticides, heavy metals and mycotoxin. There are

predominant components of meat excellent, dietary excellent that's goal and consuming excellent as perceived through the consumer - taste, juiciness, tenderness and shade - that's exceedingly subjective. There are massive variations among the alternatives of people such as alternatives for exclusive cuts of meat, lean or fatty, muscle or organ meats, strategies of cooking, etc. In the industrialized nations the call for what's perceived as consuming excellent and additionally the call for specific features for various merchandise from the beef processing enterprise dictate the breed, feed and control of the animals with in depth rearing and mainly formulated nutritional dietary supplements and a bent to slaughter earlier. On the alternative hand, the call for in maximum growing areas of the sector is for greater animal merchandise of just about any kind. The animals stay beneath neath variable situations regularly of tough grazing and develop greater slowly, yielding older animals for slaughter; whilst animals are mainly used for draught, they're very vintage on the time of slaughter. Old animals yield meat this is much less juicy and of an excellent that differs substantially from that demanded withinside the industrialized countries.

Meat pH

The pH is the maximum critical meat exceptional indicator that is associated with biochemical techniques in the course of the muscle transformation to meat. Consequently, modifications with inside the pH in the course of the postmortem length has an impact on the organoleptic traits of the beef. The pH cost of meat intently correlated with many different houses of meat together with water-maintaining capability, color, tenderness, taste and shelf-life [16] The meat pH affords treasured facts approximately postmortem muscle glycolysis, therefore allowing to hit upon exceptional defects of meat such DFD [17] The pH of the beef varies because of element together with pre-slaughter strain, chilling temperature, season and animal element together with age, breed and intercourse. The final pH is decided 24 hours post-slaughter the usage of a pH meter. The muscle of a dwelling animal has a pH of 7.1. The pH variety of ordinary meat of an unstressed animal is 5.4-5.7. After slaughtering, a number of the glycogen withinside the meat will become lactic acid. As a result, the pH cost is diminished. The volume to which pH is diminished after slaughter relies upon on the extent of strain prompted in the course of transportation and pre-slaughter process, the quantity of glycogen withinside the muscle previous to the animal's death, and the fee of glycolysis. The fee of autopsy glycolysis can be too fast, main to a fast drop in pH, or too slow, ensuing in too excessive final pH [16] Water Holding Capacity of Meat.

Water Holding Capacity of meat is one of the most important factors of meat quality because it influences consumer acceptance and the final weight of the product. It refers to the ability of meat to retain its own water content when subjected to external force during cutting, heating, grinding and pressing [18] many physical properties of meat such as color, texture and firmness of raw meat, juiciness and tenderness of cooked meat are partially dependent on water holding capacity [19] The majority of all water held is loosely by proteins and moves easily due to weak attraction force and is therefore an important determinant of WHC. The WHC is determined at 24 h post mortem. The two methods that are in common use for the estimation of water holding capacities are Press method and Centrifugal method. The press or the filter-paper wetness method, described by [20] is recognized as the simplest, less cost and fastest technique to evaluate the meat WHC. This method has been used to evaluate the amount of squeezable water. The sample is compressed between two glass plates and subjected to a specified pressure for a given time. After compression the free water squeezed out on a pre- weighted filter paper [21]. A number of pre-and post-mortem factors influence WHC of meat. Among pre-slaughter factor age, genotype and stresses on the animal such as fasting, lack of sufficient rest or extreme hot or extreme humid air condition and different stunning methods have been playing a large role in influencing WHC of the meat [22] Colour of Meat.

Meat color is an important parameter in meat quality. It is an important characteristic of meat that influences consumers purchasing decisions because consumers use meat color as an indication of freshness and quality [23] . Fresh meat has a bright red color due to the presence of oxymyoglobin which results from the combination of myoglobin with oxygen. It is normal for meat to change color depending on the presence or absence of air. Colour of meat depends upon several individual factors and their interactions, and concentration of meat pigments, essentially myoglobin and the chemical state of myoglobin [24].

Considerable versions in color, tenderness and water-maintaining arise in pork, lamb and beef, in addition to in different meat species. These exceptional tendencies are critical as they decide visible appeal, and sensory acceptability. These tendencies also are critical for financial motives because the enterprise loses cash because of unwanted color and because of weight reduction of product. The enterprise also can obtain better costs for confident tenderness and ingesting exceptional [25] Meat color is a critical parameter in meat exceptional. It is a critical feature of meat that affects purchasers shopping choices due to the fact purchasers use meat color as an illustration of freshness and exceptional. Fresh meat has a vivid pink color because of the presence of ox myoglobin which ends from the mixture of myoglobin with oxygen. It is ordinary for meat to extrade color relying at the presence or absence of air. Color of meat relies upon numerous person elements and their interactions, and attention of meat pigments, basically myoglobin and the chemical nation of myoglobin .Differences in meat color had been related to versions in intramuscular fats and moisture content material, age dependent, muscle-fiber kind and modifications in muscle myoglobin content material. Color is likewise significantly suffering from muscle pH. At an excessive pH, muscle has a closed shape, and hence, seems darkish and the beef has a tendency to be difficult [26] Myoglobin is the primary pigment in sparkling meat and its content material varies with manufacturing elements together with species, animal age, intercourse, feeding systems, sort of muscle and muscular activity [27]. The color of sparkling meat is species-dependent. In pork, lighter flesh, that is greyish-purple in color, is taken into consideration ideal to purchasers, while sparkling meat from ruminant livestock (beef, lamb, and chevon) is darker than pig meat, and a vivid cherry-pink color is deemed ideal in those species. Meat color variations among species are in large part because of the variations in Myoglobin content material [28] The attention of Myoglobin in meat will increase as animal age will increase Fat deposits additionally generally tend to grow to be greater yellow in color over age because of a boom in carotenoid deposits [29] which might also have an effect on the perceived color of meat. Regarding to intercourse the beef from intact male animals is darker [30] than meat from girls and castrated adult males, that is attributed to better concentrations of myoglobin in intact adult males possibly because of more degrees of bodily activity. Considering feeding gadget pasture- completed animals had excessive myoglobin content material than grain (concentrate) primarily based totally gadget because of excessive muscular iron (pigment) concentrations in pasture compared

to grain feed Difference in color among exceptional kinds of muscle because of distinction in muscle fiber which affects the quantity of myoglobin present. Muscles with better percentage of oxidative fibers are a darker, deep pink color in evaluation to people with better percentage of glycolytic fibers because of excessive myoglobin content material [31] Pre-slaughter managing elements together with loading, transportation, unloading, distance traveled and time spent withinside the lairages, the process and technique of slaughtering additionally have an effect on the color [32] Tenderness.

Tenderness is defined as the ease of mastication, which involves the initial ease of penetration by the teeth, the ease with which the meat breaks into fragments and the amount of residue remaining after mastication Tenderness is one of the most important meat palatability attributes, and consumers are willing to pay more for beef which is tender [33] Meat tenderness is the most difficultly predicted trait, but it is very important to meat quality and consumer acceptance. Tenderness is based on ease of chewing that is contributed by many factors. Among them, the fibrous nature of muscle contributes to chewing resistance. The fact that many myofibrils are arranged across the muscle fibers leads to more strength for muscle and decreases muscle tenderness. Variation in beef tenderness may be attributed to breed, age, carcass composition (marbling), and environmental factors. A study conducted by have shown that meat obtained from Bos indicus tougher than Bos taurus, due to lower proteolysis of myofibrillar proteins, as a result of the higher activity of calcium-dependent protease inhibitor (calpastatin). Regarding to age the older the animal, the tougher the meat in general because number of connective tissues (insolubility of collagen) increase with age. The greatest tenderness and quality of beef is achieved with cattle less than 36 months of age there after the meat become tougher [34] Longer time on feed had positive effects of on tenderness, marbling and sensory characteristics of beef [35] Stressed animals before slaughter present increased Warner-Bratzler shear force values, and produce tougher beef [36] Tenderness, measured by shear force, increases when better marbling is attained [37] The connective tissue rigidity is weakened with increase marbling accumulation resulting in tender meat. Variation in meat tenderness is the main factor for consumer dissatisfaction; hence this trait must be controlled in order to improve customer satisfaction and decision to repurchase (figure 2).

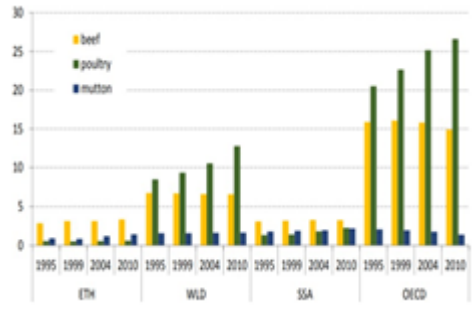

Figure 2: International comparison of per capita consumption of beef, poultry, and mutton, 1995.

Source: OECO-FAO Agricultural outlook (edition, 2016), (FAO, 2026) Note: ETH = Ethiopia = SSA = Sub-Saharan Africa; OEC-D=Organization for Economic Co-operation and Development.

Flavor

Flavor is the very important components of the eating quality of meat. The flavor of meat, is a combination of its taste and aroma or smell, and influenced by sensations such as mouth feel and juiciness [38] It is a subjective property and difficult to evaluate. Flavour is thermally derived, since uncooked meat has little or no aroma and only a blood-like taste. There are a lot of compounds present in meat which contribute to the flavor, and many of these compounds are altered during storage and cooking. Among these, the proportion of different fatty acids in the fat, and, in particular, the unsaturated fatty acids, which are more susceptible to oxidation to volatile compounds, such as aldehydes, ketones hydrocarbons and alcohols, are the most common. Phospholipids, which are rich in polyunsaturated fatty acids, also play a fundamental role in the flavor of meat [39] during cooking, a complex series of thermally induced Maillard reaction occur between non-volatile components of lean and fatty tissues resulting in a large number of reaction products. Although the flavor of cooked meat is influenced by compounds contributing to the sense of taste, it is the volatile compounds, formed during cooking, that determine the aroma attributes and contribute most to the characteristic flavors of meat [40] Breed, sex, nutrition, and post slaughter treatments of the carcass, can all affect carcass fat and hence the flavor of the meat. The flavor intensity increases with increasing age of an animal regardless of the type of animal. Generally, meat from an older animal of the same species exhibits stronger flavor than meat from a young animal [41]. Juiciness is an important factor in the eating quality of meat and playing a major a role in meat texture. It is a subjective sensory trait which determined by consumers or sensory panels [42]. Meat juiciness is an impression of moisture and lubrication when meat is chewed in the mouth. It's could be separated into two components. The first being the impression of wetness during the initial chews, produced by the rapid release of meat fluids, and it related to the water content of the meat. The second component is the impression of juiciness during sustained chewing and is thought to be related to the fat content of the meat [43] Hence, water retained in the meat and lipids or fat determine the juiciness of meat. There are numerous factors which affect meat juiciness. These factors include ultimate pH, fat content, enhancement level, cooking method, and end point temperature or degree of doneness [44]. The higher end-point temperature, the more the cooking loss and the lower the juiciness [45] With Increased amounts of intramuscular fat, the meat juiciness also increased [45] increase juiciness of meat, the most important factor must be to educate consumers not to over-cook the meat.

Cooking loss

Cooking is a process of heating beef at sufficiently high temperatures that denatures proteins and makes it less tough and easy to consume [46]. It can be achieved either by boiling or by roasting [47] and in all cases losses occur. Cooking loss is one of the meat quality parameters that not given too much consideration by meat processors and consumers due to inappropriate cooking time and temperature. It refers to the reduction in weight of meat due to evaporative (volatile) and drip loss during the cooking process [48]. During cooking process all water-soluble vitamins, minerals, some parts of soluble proteins has been susceptible to losses. The increased loss of such nutrients deteriorates the meat nutritional quality and has large substantial economic loss to beef industry. Cooking loss affected by many factors such as cooking temperature, time, meat pH, collagen content, ageing and the state of the meat before it is cooked -frozen versus thawed.

Meat cooked at high temperature had lower meat yield with more cooking loss, less moisture and less protein content [49] This high temperature causes denaturation of myofibrillar proteins, primarily the actomyosin complex, and consequently results in shrinkage of the muscle fiber which causes loss of meat liquid which results in mass loss [50] Other factors such as breed age and cooking method also affect cooking loss [51,52] Meat Quantity.

The inadequacy of meals delivers because of the population increase collectively with urbanization, force a sizeable call for animal sources. Consequently, some of technology were evolved and are getting used commercially to decorate profitability of animal production and to enhance their high-satisfactory and decrease amount of protein meat. The amount and quality of meat protein and their contribution in maintaining meals safety and enhancing high-satisfactory of lifestyles. To enhance meat production and enhance meat quality. These compounds complement to the animals with feed, as an injection or implant to decorate the charge of gain, the feed usage efficiency, carcass percentage, and shelf-lifestyles of meat, enhance meat's nutrient content material and/or meat palatability. On the opposite hand, a few metabolic modifiers are both now no longer authorized from use because of poor health results to the consumer. Therefore, we agree with that utilizing to be had technology and methodologies in connection with the stated substances will assist in enhancing meat high-satisfactory and thereby growth productivity of the farm animals aid and hence, enhance meals safety from 50%, protein inadequacy became number one because of protein amount, and from 70%, to protein quality as lysine inadequacy. In Europe and the USA, nutritional protein in particular comes from animal sources (among 55% and 71%, relying at the use of an especially from pork which contributes among 16% and 35% to animal protein consumption. National suggestions have a tendency to recommend a boom in plant protein consumption (from legumes and nuts especially and boundaries on a few animal proteins cured and processed meats, pork. The most important chemical composition, of protein solubility sarcoplasmic, myofibrillar, and general protein solubility, protein amount sarcoplasmic, myofibrillar, and stromal proteins, water retaining capacity, and protein profile via way of means of analysis. The high-satisfactory of protein meat is prompted via way of means of a range of things like genotype, sex, feeding treatment, manufacturing technology, shipping and pre-slaughter handling, all of which ought to be taken under consideration to the effects of meat protein amount. A weight loss plan ok in electricity is sort of usually ok in protein - each in amount and high-satisfactory. For example, an grownup wishes an quantity of protein this is equal to 7 - 8% of the entire electricity consumption, and considering that maximum cereals incorporate 8 - 12% protein even a weight loss plan composed absolutely of cereal would, if sufficient had been to be had and might be fed on to meet electricity wishes, fulfill protein wishes on the identical time. Growing youngsters and pregnant and nursing moms have better protein necessities as do humans tormented by infections, intestinal parasites and situations wherein protein catabolism is enhanced. During the strain that accompanies fevers, damaged bones, burns and different traumas there may be massive lack of protein from the tissues which must be restored for the duration of convalescence and so excessive intakes of protein are wished right now collectively with an ok consumption of energy.

Meat as a source of protein

Human requirements for protein have been thoroughly investigated over the years [53] and are currently estimated to be 55 g per day for adult man and 45 g for woman. There is a higher requirement in various disease states and conditions of stress. These amounts refer to protein of what is termed good quality and highly digestible, otherwise the amount ingested must be increased Protein Quality proportionately to compensate for lower quality and lower digestibility.

Protein quality

The quality of a protein is a measure of its ability to satisfy human requirements for the amino acids. All proteins, both dietary and tissue proteins, consist of two groups of amino acids - those that must be ingested ready-made, i.e., are essential in the diet, and those that can be synthesized in the body in adequate amounts from the essential amino acids. Eight of the 20 food amino acids are essential for adults and ten for children. The quality of dietary protein can be measured in various ways [54] but basically it is the ratio of the available amino acids in the food or diet compared with needs.

Proteins and its amino acids

Meat ranks among one of the protein-rich foods, providing high biological value to the masses. Proteins are naturally occurring complex nitrogenous compounds having very high molecular weight consisting of carbon, hydrogen, oxygen and most importantly nitrogen. Few of the proteins also have phosphorous and sulfur in their structures. All these components chemically linked together to form different types of individual proteins, exhibiting different properties. The proteins are more complex than the carbohydrates and fats from their size and constituents. The percentage of meat protein component varies extensively in different types of meats [55] In general, the average value of the meat protein is about 22%, but it could range from high protein value of 34.5% in chicken breast to as low as 12.3% protein in duck meat. The protein digestibility-corrected amino acid scores which depict the protein digestibility reveals that meat has high score of 0.92. Protein quality is mainly concerned with the availability of amino acids present in it. Amino acids serve as the building blocks of the proteins. The nutritional value of meat can be varied to great deal by the presence or absence of numerous amino acids. One hundred and ninety-two are known among which only 20 are used to prepare the proteins. From these 20 amino acids, 8 are considered as the essential amino acids, as these could not be prepared by the human body, so must be taken by the diet. Other 12 are the non- essential amino acids that could be manufactured by the human body but only if their particular dietary sources are being ingested, otherwise, it could result in the protein malnutrition. The beef meat appears to have higher contents of valine, lysine and leucine as compared to lamb and pork. Studies have revealed that main reason of the difference in essential amino acid proportion lies with the breed, animal age and muscle location. Previous research studies reported that contents of valine, isoleucine, phenylalanine, arginine and methionine in the animal meat increase with its age [56]. The essential amino acid contents also differ with the different parts of the carcass. Their composition could also be affected by the application of processing techniques including heat and ionization radiations, but only when the severe prolonged mode of these conditions is being applied Sometimes the interaction of the other constituents with the proteins has put an effect on the availability of essential amino acids. Smoking and salting of the meat have also played its role in this regard. Apart from the effect of the processing conditions, the storage has also imparted its effect on amino acids, in case of canned meat (table 1).

Amino acid	Categories	Beef	Lamb	Pork
Lysine	Essential	8.2	7.5	7.9
Lucene	Essential	8.5	7.2	7.6
Isoleucine	Essential	5.0	4.7	4.8
Cystine	Essential	1.5	1.5	1.2
Threonine	Essential	4.2	4.8	5.2
Methionine	Essential	2.2	2.4	2.6
Tryptophan	Essential	1.3	1.2	1.5
Phenylalanine	Essential	4.1	3.8	4.3
Arginine	Essential	6.4	6.8	6.6
Histidine	Essential	2.8	2.9	3.1
Valine	Essential	5.6	5.1	5.2
Amino acid	**Categories**	**Beef**	**lamb**	**pork**
Proline	Non-essential	5.2	4.7	4.4
Glutamic acid	Non-essential	14.3	14.5	14.6
Aspartic acid	Non-essential	8.9	8.6	8.8
Glycine	Non-essential	7.2	6.8	6.0
Tyrosine	Non-essential	3.3	3.3	3.1
Serine	Non-essential	3.9	3.8	4.1
Alanine	Non-essential	6.3	6.2	6.4

Table 1: Amino acid composition in fresh meat.

Fat and Fatty Acids

Fats rank among one of the three major macro-nutrients, including carbohydrates and proteins. Fat contents are known as triglycerides that are esters of three fatty acid chains and the alcohol glycerol. Meat contains fatty tissues that have varying amount of fat. In meat, fat content functions as energy deposits, protective padding in the skin and around organs especially heart and kidney as well as provides insulation against body temperature losses .Fat content in animal carcass varies from 8 to 20%. External body fat is softer than the internal fat that surrounds the organs owing to the higher content of unsaturated fat in external animal parts. Skin is the main fat source in meat [57]. Among the fatty acid composition, meat contains unsaturated fatty acids; oleic, linoleic, linolenic and arachidonic acid appear to be essential. They are necessary constituents of mitochondria, cell wall and other active metabolic sites. Linoleic acid is abundantly present in vegetable oils such as soya and corn oils with its concentration 20 times in meat and lino]lenic acid occurs abundantly in leafy parts of plants. Eicosatetraenoic acid and docosahexaenoic acid are normally Essential amino acids [58] Amino acids Category Beef Lamb.

Meat as a Source of Vitamins and Minerals

Meat and meat products are important sources of all the B-complex vitamins including thiamin, riboflavin, niacin, biotin, vitamins B6 and B12, pantothenic acid and folacin. The last two are especially abundant in liver which, together with certain other organs is rich in vitamin A and supplies appreciable amounts of vitamins D, E and K. Meats are excellent sources of some of the minerals, such as iron, copper, zinc and manganese, and play an important role in the prevention of zinc deficiency, and particularly of iron deficiency [59-60] which is widespread.

Meat Iron

The amount of iron absorbed from the diet depends on a variety of factors including its chemical form, the simultaneous presence of other food ingredients that can enhance or inhibit absorption, and various physiological factors of the individual including his/her iron status. Overall, in setting Recommended Daily Intakes of nutrients the proportion of iron absorbed from a mixed diet is usually taken as 10%. Half of the iron in meat is present as haeme iron [60-62] (in hemoglobin). This is well absorbed, about 15-35%, a figure that can be contrasted with other forms of iron, such as that from plant foods, at 1-10%.

Post-Mortem Changes

The post-mortem modifications that take area while muscle is converted into meat have a marked impact at the exceptional of the beef. After slaughter the glycogen withinside the muscle is converted into lactic acid causing a fall in pH from a preliminary cost of pH 6.8 - 7.0 to approximately 5.4 - 5.0 at rigor mortis. If animals are stressed immediately previous to slaughter as while they may be more or less treated or combat each other the muscle glycogen is launched into the blood circulate and, after slaughter, is rapidly damaged right all the way down to lactic acid whilst the carcass remains warm. This excessive stage of acidity reasons a partial breakdown of muscle shape which leads to pale, gentle and exudative meat [63-66](PSE) - a circumstance in most cases occurring in pigs. The meat losses a number of its water-binding capability that is so critical in sure kinds of meat processing. Long-time period strain earlier than slaughter or hunger makes use of up the glycogen in order that much less lactic acid is shaped after slaughter ensuing in an odd muscle circumstance wherein it stays darkish purplish-pink on publicity to air in place of a vivid pink color. This is named darkish, company and dry withinside the case of pigs and “darkish cutting” in beef. Such meat and merchandise[67-70] made with it have a pH above 6.0 and ruin speedy for the reason that low acidity favors fast bacterial boom’s and DFD meat are flawlessly secure to consume however constrained of their processing capability. PSE meat has better drip and Meat and meat merchandise in human nutrients in growing cooking losses because of the decreased water-binding capability. DFD meat has ordinary or improved WBC and so is appropriate for scalded/boiled sausages and different cooked merchandise however it has bad meat taste. While there may be no treatment for those defects withinside the meat, DFD and PSE meats [71] may be combined with ordinary meat for the education of merchandise of excellent exceptional. After slaughter because the glycogen withinside the tissue are exhausted rigor mortis units in and the complete carcass grow to be stiff. This is because of the contraction of the muscle fibers while the actin filaments of the muscle fibers slide inwards among the myosin filaments so shortening the myofibrils. If the beef is cooked while the muscle groups are nonetheless in rigor it’s far extraordinarily difficult. This circumstance is averted with the aid of using growing old or “ripening” [72-74] after slaughter that is done with the aid of using storing the beef till the muscle groups progressively recovers their extensibility and grow to be tenderer thru partial enzymatic breakdown of the muscle’s fibers. Old animals, specifically vintage draught animals, have a excessive content material of difficult connective tissue withinside the muscle and extended cooking at a low temperature is wanted to melt the beef with the aid of using hydrolysis [75] of the connective tissue - a reality now no longer constantly acknowledged to purchasers. So, it’s far clean that during many regions’ situations militate in opposition to

excellent exceptional meat lengthy shipping of animals and bad lairage centers previous to slaughter [76-79] lessen the glycogen withinside the muscle groups, bad hygiene, excessive ambient temperature and absence of refrigeration in the course of and after slaughter cause heavy infection and boom of microorganisms and giant losses from spoilage collectively with risks of meals poisoning.

Conclusion and Recommendation

This study tried to review the meat production quality and quantity protein consumption in focus on meat quality parameters. The current meat production existing livestock population of African counties which had low number of livestock, but Ethiopia has ten in number among from Africa. The meat consumption is also very low. Meat quality parameters (pH, colour, water holding capacity, tenderness, flavor, juiciness, and cooking loss affected by animal factor (Age, breed, Sex), pre-slaughter (feeding, handling and transportation) and post slaughter factors (chilling, aging & cooking). There is need to conduct further research on the effect of these factor and their interaction on meat protein quality. In order to improve meat production quantity and quality there is need to improve animal breeding thorough implementing breeding strategy, improve Animal heath, livestock transportation system, feed quality and supply. The major problem of meat production under conditions that avoid food poisoning and satisfy the economic demands of profitability with the traditional, cultural and religious concerns of the community in question. There is a steadily increasing demand for meat in the developing countries which can be satisfied by increased domestic consumption and/or increased imports. If there is to be a significant increase in meat production it will require clear policy decisions with the necessary financial, legislative and technical support. There is considerable potential for increased supplies through better management, selection of animals, avoidance of waste and making use of indigenous species. If exports are to be considered then attention has to be paid to the strict hygienic and safety requirements involved, whatever the domestic market might tolerate and improve meat protein quality.

Recommendations for Future Work

There is a need to integrate a biochemical understanding, in order to understand and improve prediction of quality traits and ensure protein quality to the consumer. There is a need for animal scientists, geneticists and meat scientists to understand the role of meat in determining protein quality traits, especially WHC.As we consume cooked meat, and not raw meat, it is important to study the structural changes that occur during cooking or survive after cooking, if sensory qualities of the cooked product are the point of focus.

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