

Review paper

Edible by-products of meat

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Abstract

The edible by products of meat have a remarkable importance in daily life and are used in different form as products. These edible by products include hearts, livers, tails, tongues, lips, kidneys, tripe (stomach), brains, sweetbreads (the thymus and/or pancreas gland, depending on an animal's age), melt (spleen), fries (testicles), head meat, fats and other trimmings, chitterlings and natural casings (intestines), blood, and certain bones. They are used as human food and antimicrobial coating is done on it. The following review will summarize edible and non-edible meat by products and their potential uses in today's food market.

Keywords: Meat, Edible by products, Inedible by products, Human food, Blood products

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Introduction

The animal origin food (AOF) is a good source of nutrient for human diet, where their protein provides high biological value [1]. The 1st choice of animal protein for most of the people in the world is preferably meat [2]. Definition of meat in general is animal body parts that are suitable for human consumption and have been judged as safe for human health. Today wastes by products of meat are not discarded because they have important economic value and new products are made from them and they serve as valuable amount of raw materials. They are made by adding additional value to waste products of meat that makes a by-product that could be considered as desirable to consumer as a edible food item or they can be made economically profitable into inedible products like pharmaceutical, energy or plastics [3-5]. It is reported that edible meat by products are excellent nutrient source like essential amino acids, vitamins and minerals [6-9]. Edible added value types can be obtained by improving technological functions (water bonding agent, flavoring compounds and emulsifiers) better receptive quality (flavor, texture, color) and self-stability or even more convenience. Blood is a fluid and serves as enhancement of water binding, emulsification capacity and the increase in protein levels [10-11]. Ruminants like sheep and Goat slaughter by products are divided into 2 types; inedible as well as edible. The products which are not suitable for food are used in the manufacturing of cosmetics, pharmaceutical and animal feed,

while Edible by products like viscera and blood are used in meat product manufacturing or used for human consumption as semi-processed or in fresh form. [1,12]. In the meat industry the prime goal of marketable slaughter by products is to convert them into useful products to reduce the cost of waste management or to improve its economic which has environmental impact [3,13]. In past the animal byproducts are also used in early civilization, with intestines used for food containers and hides used for clothing. In the 1st century A.D. the soap made from the animal fat and lye was recorded as first cleaning compound. History of U.S. also shows production and uses for tallow and hides in the Western United States [11, 13].

Edible meat by products

The slaughter animal Edible by products are now a day commonly separated, cooled, chilled and processed. These edible by products include heart, liver, tongue kidney tails, tripe (stomach), melt (spleen), Chitterlings, sweetbreads (pancreatic gland or thymus, depending on animal age), natural casing(intestine), rinds, lips, fats, fries (testicles) and other trimmings, blood and certain bones. The yield of edible by products is around 12 % of live weight. Typically, edible byproduct yield in large ruminants like cattle and buffalo is around 12 percent of live weight when pork rinds are included. It is also reported that by products of animal volume can be estimated from dressing % and no of animal slaughtered [13].

Edible by-product of meat used as human food

The market demand depends upon the by-product processing and due to these some non-carcass products that are used as edible in some countries and have important value they may be considered as inedible in some countries of the world [2, 13]. By products include spleen, heart, blood, liver, brains, lungs, and tripe. They have excellent nutritive value and considered as food item and part of diet in different countries of the world [7, 9, 16]. For example kidney and liver contain wide variety of trace elements and minerals while liver is rich in vitamins even though the cholesterol contents are quite high [8, 10]. Same like other products like lard and tallow which are rich in fat tissue like lard and tallow mostly contribute to energy intake. Gelatin which is obtained from bones and skins is used in the manufacturing of jellied foods and ice creams. For modern human medicines development and availability by products obtained from the animal are important and are used in different medicines. The glands which are removed after the slaughtering of the animals like pituitary, thyroid, parathyroid, thymus, adrenal, ovaries, testis and pancreas. They all provide many of the important enzymes and hormones that have importance in field of medicine [14]. The medicines that are obtained from the slaughtered animal glands include; estrogen, progesterone, epinephrine, nor-epinephrine, trypsin, insulin, thyroid stimulating hormone, adrenocorticotrophic hormone (ACTH), parathyroid hormone, testosterone, thymosin and thyroxin. Many food animal tissues that are obtained during the processing of slaughtered animals are used in the manufacturing of serums, antigens, antitoxins, and vaccines [15]. For human transplantation and in other medical field skin, brain, lungs, heart, insulin and valves from the Pig are also used. In some countries of the world various part of meat by products are considered as delicate and tasty and is used as basic item for many traditional dishes while in other part of the world their ingestion is associated with low income in poor population. Consumption of meat by products is commonly by low income house holders. Two of the world leading importers of edible offer (liver, kidney, heart meat, heart and tongue) are Russia and Egypt and this is the least expensive way to obtain high quality nutrition's [16].

Blood & its products

Blood is a fluid of the body and it is a rich source of protein by products and it is mainly composed of blood cells that are hang freely on blood plasma. These cellular elements are the white blood cells (leukocytes) red blood cells (erythrocytes) and platelets. The composition of bovine (buffalo and cattle) blood is 0.07 % carbohydrates, 0.62 % minerals, 0.23 lipids, 17.3 % protein, and 80.9 % water [16]. The main source of the blood is from the bovine (buffalo and cattle). The plasma fraction contains the blood proteins and it has excellent technological properties like gelatin, emulsification, foaming agent and used in food industry as dietary supplement [11]. For example due to their gelatin and excellent emulsification properties fractionated plasma protein like serum albumin, fibrinogen and immunoglobulin may be added to food and feed ingredients [17]. Cross linking ability of protease inhibitor activity was shown by some major proteins or by plasma proteins and are used in products like pasta that are enrich in proteins [18-19]. If mixed thrombin and fibrinogen is applied to the surface of the meat pieces the soluble fibrinogen is converted to insoluble fibrin polymer and it give rise to half staggered structure called proto-fibrin and it combine to form fibers and it give rise to three dimensional network fibrin clot [20,21]. Fibrin network gives modified physiochemical and textural characteristics with meat emulsions (a colloid in which both phases are liquids) which increases the hardness and springiness [22]. Cellular fraction of the blood which is rich in red blood cells (erythrocytes) and gives dark color to credibly due to heme component of hemoglobin and gives adverse flavor to the product [12,16]. It may be remembered that microbial contamination of blood may remain relatively high despite of good hygienic precautionary measures and this make the application of preservation methods necessary to minimize the total microbes in the preserved blood [11]. In the meat industry the cellular fraction of the blood is used as color enhancer for sausage [12]. Sensory adverse effects are avoided by removing the hemoglobin to produce globins is a good alternate and it is known as decolorized blood and for replacing fat in meat by products it exhibits relevant technological functions [11,23]. Proteins like Globulins, fibrinogen and albumins are present in plasma and the main important protein in plasma is albumin [1]. For regulation of fluid distribution, colloidal

osmotic pressure and transport of small metabolites in blood albumin is the key element [24].

Antimicrobial coating & edible films for meat and meat products preservation

Edible Coating is food grades suspensions which may be delivered by dipping spraying or spreading, which when dried form a clear thin layer over the food surface. Special form of films applied to the surface of material are called coating and part of final products. In developed countries like England for increasing shelf life of meat products lard or fats were used as coating and in Europe; this process was known or called as "larding" [25]. US patent was issued in relation to preservations of meat products by gelatin coatings in the nineteenth century [26]. There is increased interest in development and use of AEFC to preserve meat quality for longer shelf life periods while maintaining food safety, which is based on consumers demand for natural and safe products. Industry is concerned about these issues, while keeping competitive production costs. Other key issues are sustainability through the use of biodegradable packaging materials and applications of byproducts from the food industry that can generate added value. EFC act as barrier between food and the surrounding environment for protecting them from biological chemical and physical deterioration and to enhance the quality of food products. The application and designing of EFC on meat products arises from the search of new preservation methods, the need to add value to by-products from renewable sources, the desire to give food products a more natural or ecological image, and reduction of environmental impact of using oil derived plastic packaging materials. The promising tool for protecting meat from contaminating pathogen is by antimicrobial packaging and it preclude the microbial growth by direct contact of package with its surface. It is more advantageous to release of antimicrobial substance from the packaging film to the food surface for long period of time than antimicrobial incorporated into foods [27].

Conclusion

It has been concluded that Edible by products have very important in daily life and used in different forms. They are important source of mineral and trace elements.

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