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**WATER INSOLUBLE DEFIBRILLATED MEAT PROTEIN**

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This invention relates to water extracted bland meat protein which is defibrillated and substantially colorless and flavorless, to a method for preparing it, and to food combinations containing the bland meat protein.

Meat, referring to the flesh of animals and fowl, has flavor and texture which make it among the most desirable of all foods. Consumers of meat, however, do not place equal value on all types of meat. Certain grades and parts, or "cuts," of meat sell at a premium while others can be disposed of only with difficulty, and the price differential between the different grades and cuts is not explained on the basis of differences in nutritional values. Familiarity of consumers with certain cuts of meat, tenderness of the meat, ease of preparation and so on, make some types of meat worth more in the market place than other kinds. There is, in effect, a surplus of many nutritionally desirable but marketably undesirable cuts of meats.

Although meat in itself generally has very desirable flavor and texture, meat characteristics are not desirable in all types of foods. Few people crave beef flavored ice cream or mutton flavored cake. Likewise, a food such as bread having a texture reminiscent of beef shank meat would be scorned. Therefore a method of utilizing less desirable types of meats in foods which are traditionally unrelated to meat is of economic and nutritional importance. Nutritional improvement of many foods which are protein deficient, or contain lower quality protein, may be accomplished by incorporating meat protein into these foods. Incorporation of meat into protein deficient foods has heretofore been hampered by the undesirably atypical flavor, texture and appearance which usually results from the blending of most non-meat foods with meats.

A method for preparing foods fortified with meat, provided the resulting foods are esthetically pleasing to consumers, offers a means for giving consumers better foods. It also offers the livestock industry a profitable means for disposing of the less desired types of meats. Accordingly, we have invented a novel and useful method for modifying meat to thereby form versatile protein products that are as nutritious as whole meat protein but do not have typical meat characters which tend to limit meat usage. This modification process renders meat susceptible to use in a variety of foods normally unrelated to meat.

It is therefore a primary object of this invention to provide meat protein products which are as nutritious as whole meat protein and which are bland in flavor, essentially colorless, soft textured, and more versatile than native meat protein. Another object is to provide a method for imparting more broadly useful flavor, color and texture characteristics to meat protein without harming the nutritional quality of the meat protein. And a further object is to provide a method for combining the meats of two or more species of animals into products which retain only the flavor and texture characteristics of one selected species, that one species being marketably more desirable to meat consumers. A still further object is to provide food materials having combined sources of proteins which are prepared so as to possess a variety of desired flavors and textures, and which in the combined

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form are nutritionally superior to the individual uncombined proteins. This invention provides as one of its advantages a simple method for utilizing less desirable meat products in an economically and nutritionally advantageous manner. Other advantages and objects of this invention will become apparent as the specification continues.

This invention rests on the discovery that meat first rendered substantially tasteless and colorless by water extraction can be alkali treated in a manner which softens and ruptures the small threadlike fibrils without degrading the resulting insoluble protein. Rupture and softening of the meat fibrils, defibrillation, yields a meat preparation which has no typical meat texture and is susceptible to many subsequent operations, such as spray drying, wherein fibrils cause interference. These fibrils, which give meat its typical fibrous texture can not be effectively ruptured by use of heat or ordinary mechanical processing.

In the main aspect of this invention, comminuted meat is washed with water to extract water soluble components. Separation, as by centrifugation, serves to remove this added water along with fat insoluble meat components. After washing, the water insoluble meat proteins are adjusted to an alkaline pH. Sufficient heat and/or time, proportional to the pH level employed, is applied to aid defibrillation. But the heat and time interval is not drastic enough or of such duration as to cause protein hydrolysis with its resulting disadvantages. After defibrillation the product of this invention may be stabilized as by drying, freezing, or further heating.

The resulting product, which is essentially tasteless, colorless, and non-fibrous, and which contains substantially all the water insoluble proteins of meat, may be advantageously added to most types of foods. Such foods fortified with bland and soft textured meat protein retain their usual flavor and texture properties but are nutritionally improved.

All types of meats may be used for raw material for the practice of this invention. Muscle meats are preferably used in that some animal organs possess marked flavors and odors which are more difficult to remove by water extraction. Meats from all species of animals and fowl may be satisfactorily employed.

The first step in the process of this invention is the preparation of finely divided raw meat particles. Any common method of comminution may be used. Preferably, ground meat mixed with water is blended by means of equipment such as a Mincemaster, silent cutter, or a sausage mill. The finely divided meat slurry is then mechanically separated as by centrifugation. The resulting supernatant contains fat and the soluble flavor components of the meat. Preferably the washing and blending steps are repeated to ensure that the meat is substantially free of color and flavor.

After washing, the water insoluble meat protein is mixed with fresh water and adjusted to pH 8.0 or thereabove. This alkaline treatment of the washed meat causes swelling and softening of the meat fibrils. Any alkaline level in excess of pH 8.0 is operable. However, we prefer to use a range of about pH 8.0 to 12.0. Although strongly alkaline conditions, as those above pH 12.0, may be used, upper levels require careful control of time and temperature conditions to avoid protein hydrolysis.

Although other alkalis may be used, we prefer to use ammonium hydroxide for alkaline treatment of the water washed meat.  $NH_4OH$  is the alkali of choice due to its volatility. After or during the softening and rupturing treatment, the softened protein will usually be subjected to heat treatment, and during this heat treatment the  $NH_4OH$  because of its volatility is largely evaporated from the defibrillated product. Therefore there is