Meats

by

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Meats.

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Meat.

Meat has been defined as the flesh of animals used for food. It is probably one of the oldest forms of food known to man. In his savage state it was his chief food together with the simple herbs of field and forest. In the early history of England it was regarded as the principal and essential dish at a meal; especially was this true of feasts and banquets. This is shown by the frequency with which it is mentioned in ancient ballads. One writer has said that the feast songs were always of meat and points to the fact that it was the boar's head which was decked with holly and brought to the table with so much ceremony and not the potato. The importance it held in the bill of fare is illustrated in Dean Swift's description of a mid-day dinner of Old England, which is as follows:-

> Oysters, Sir Lyon of beef, a shoulder of veal, fish dressed with claret, tongue, pigeons, cowcumbers, fritters, almond pudding, soup. After the soup was removed it was followed by a venison pastry, black pudding, hare and goose."

Truly the partakers of this meal must have felt little need for further refreshment.

Although at the present time meat does not occupy as important a place in the diet as formerly, still the majority of us feel that at least one meal of the day should have a fair allotment of this food and that it is one of the staple articles of diet.

The source as given in the definition is seen to be the lower animals. The kinds of meat are named for the animal from which obtained. Smith in his book on "Foods" divides animal foods into flesh, fish, and fowl, and includes under flesh what is known as butcher's meat or beef, pork, mutton, lamb and veal. Hutchinson classes meats proper under butcher's meat

poultry, game and "offal." Under the heading, butcher's meat we have the flesh of the bovines as beef or veal(depending upon the age); mutton and lamb as the flesh of the sheep; pork, the flesh of the hog; poultry the flesh of all domestic birds except squab and pigeon; game, the meat of all animals of field and forest such as quail, partridge, deer etc.

However, meat as used in this article will be limited to mean beef. This limitation is made, first because space is too limited to admit of fully treating all kinds of meat; secondly, because beef is generally considered as the typical meat; third, because beef contains more nourishment in a given amount than the other meats; fourth, it is more easily obtained and more largely used than other meats.

Beef as obtained from the animal and purchased in the market is not wholly edible; there is always more or less waste or refuse material. Hutchinson estimates the usual waste as 15% of the whole. One writer makes a distinction between waste and refuse; refuse as he uses the word is the material such as offal which can not be utilized for food and waste as that which is often thrown away in times of prosperity but may under proper treatment be utilized as food. If we accept this distinction we find butcher's meat consisting of bone, gristle, fat and muscular portions.

Upon analysis we find bone consisting principally of two substances, gelatin and mineral matter. In the bones containing cavities, we find in addition, marrow which in some cases especially in certain diseases becomes an important means of nutrition. The composition of ox bone in 100 parts as given by Smith is as follows:- Gelatin, 33.3; Phosphate of lime 57.35; Carbonate of lime, 3.85; Phosphate of magnesia, 2.05; Soda and chloride of sodium, 3.45. In addition to these substances, bone contains in varying quantities, oil, nitrogenous juices, and flavoring matters. In order that

these substances may be in a form capable of nourishing the body, it is necessary to grind the bone and extract the nutritive parts. This is usually accomplished by boiling in water. The product obtained contains in comparison to the muscular and fatty tissues a very small proportion of nutriment. However it is an economical and sensible plan to save all bones obtained by the purchase of meat and utilize them by means of the soup-pot. If the solution due to the boiling of the bones is allowed to cool it will be found to jelly due to the presence of gelatin. Gelatin has been described as an amorphous and translucent substance which swells but does not dissolve in cold water. It is soluble in hot water and jellies on cooling. It contains a considerable amount of ash. When subjected to continued action of boiling water it looses its power of gelatinization and is said to undergo hydrolysis. This process is carried out in the body during digestion and the formation of gelatin peptones being the result. Gelatin is somewhat allied to the proteids but unlike them lacks the power of building muscular tissue; however it is a proteid sparer and for this reason is valuable in the diet and yields the same number of calories of heat or energy as carbohydrates. Its use as a food is apt to be overestimated as people forget that in the ordinary gelatin mixtures we have as a rule less than a 1% solution. Nevertheless when obtained from bone along with the other products, it forms a basis for well flavored and nutritious soups.

Gristle may be treated in the same manner as bone because it is only an immature stage of bone.

The value of meat as a food depends upon its fat and protein content and to these we will devote the greatest consideration.

For convenience in treatment, meat will be considered under two heads; first, the mechanical structure, and second, the chemical composition.

Upon boiling the muscular portion it will be found to separate into into strings or fibers and with care these fibers may again be divided into smaller fibers or fibrillae. These fibrillae vary in length in the different muscles and in size from 1/200 -1/1100 of an inch in diameter. Each little fibrillae will be found to be a little tube consisting of an outer portion or tube wall made of elastin and the inner semi-solid portion which is known as contractile substance or muscle juice. These fibrillae are joined together by connective tissue or collagen to form fibers and these in their turn are bound together to form muscle.

Both collagen and elastin are allied to protein and are frequently classed as a protein. One of the prominent characteristics of collagen is its ability to gelatinize upon treatment with boiling water - in fact it is the mother substance of gelatin.

The tenderness of meat depends upon the condition of the cell walls and the connective tissue while the flavor depends upon the nature of the contractile substance. In young animals the tube walls are very thin and hence veal is very tender but it is lacking in flavor and the amount of connective tissue is relatively large. The contractile substance contains the real nutriment of meat. It is found to have a soft consistency and contains a large percentage of proteids and smaller quantities of extractives and salts. Tenderness also depends upon the length of time between the killing of the animal and the eating of the flesh. Soon after death a condition sets in known as rigor mortis which is due to the contraction of one of the proteids found in the muscle juice. During this stage the meat is very hard and tough if used for food it will be necessary to cut or pound the fibers in order to make them tender. After a time this stiffness passes away due as is now believed to the formation of lactic acid in the muscle itself and

the action of putrefactive organisms. After the meat has hung for some time the flavor will be found to be much improved. This is also due in part to the action of bacteria and the action of substances within the meat.

Upon chemical analysis we find that four of the five food principals are represented in meat, namely; protein, fat, water and ash. There are in some cases traces of carbohydrate material in the form of glycogen or muscle sugar but as this appears in such small quantities it need not be considered.

Fat is present either as visible or invisible fat as may be proven by removing all fat seen with the naked eye and then cooking the material when varying amounts of fat will be found to be present. The ideal piece of meat seems to be one which contains particles of fat more or less evenly distributed between the muscular fibers. It has not been definitely decided whether fat occurs in the true muscular tissue or as a substance apart from the true tissue and more or less entangled with it.

The amount of fat in a piece of meat depends upon the cut and the animal. According to Atwater's Analysis the amount of fat varies from 59% - .2% fat.

Fat consists of carbon, hydrogen and oxygen, and performs in the body the function of building fatty tissue and supplying energy. As a fuel fat ranks the highest of any of the foods as it possesses 2 1/4 times the calories value of both proteids and carbohydrates.

The amount of water varies as do the other constituents of meat. The quantity present is influenced by the amount of fat which replaces the water; age of animal; cut of meat. In a young animal there is a greater percentage of water and the same is true of the tenderer portions of a more mature animal.

The most important mineral substances are phosphoric acid and potash but other minerals such as iron and magnesia are found to a certain extent. As with fat, it has not been fully settled whether the mineral matter is a part of the molecule or occurs only as a foreign body. It seems probable, however, that the mineral matter is combined more or less loosely with the protein molecule. According to Schafer the amount of ash varies from 01-1.5% and according to Atwater from 0.3% - 2.2%.

The three food principles just spoken of as found in meat, are important; its chief value lies in its large protein content. The amount of protein contained in beef varies from 6.6% - 29.8%.

Schafer says, "the proteids are the most important substances present in all animal and vegetable organisms and are absolutely necessary to the phenomena of life; they are constant decomposition products of a therefore probable constituents of protoplasm." They are highly complex, non-crystallisable substances of which little is known. They contain carbon, hydrogen, nitrogen, oxygen and sulphur. Their importance to man as a food is shown in the fact that they occur in nearly all solids and liquids of the body in quantities varying from .09% - 38.30% and also from fact that the proteids are only foods capable of building muscular tissue. No definite and certain analysis of them has ever been given but nearly all authorities agree that the molecule is very large and some have attempted a formula for it.

According to Hutchinson the chief proteids found in muscle juice, are myosin, muscle albumin, and haemoglobin. Myosin is the one causing rigor mortis.

Although little is known regarding the character of these proteids it has been found that they are all very susceptible to heat some of

them coagulating at a temperature as low as 45° C.

Besides these proteids muscle juice contains what are known as extractives because of the power of water of extracting them from the muscle. They have but little food value, but are important because of the flavor to meat. The materials making up the so called extractives may be classed under two heads.

1. Nitrogenous- Creatinin, uric acid, urea, and others.

11. Non-nitrogenous as fats, glycogen, dextrose, and lactic acid.

The nitrogenous extractives are sometimes called meat bases and are the chief ingredients of beef tea and meat extract.

One authority(U.S.Bulletin 23.) states that the extractives are formed by decomposition(clearage) of albumenoids and probably gelatinoids. They consist largely of creatin and creatinin,-substances resembling theinaand caffein. They are of almost no value as food but are important as they give flavor. It seems not unreasonable to suppose that to these substances are due the stimulating effects of meat.

As a composition of beef as a whole we have the following:-

Water 75 - 77%.

Muscle fiber 13 - 18%.

Connective tissue 2 - 5%.

Fat 1/2 - 3.

Ash .8 - 1.8

Extractives 1/2.

When using meat as a food it is better to get the composition of the different cuts from a reliable source as the composition varies so much in the different cuts. U.S.Bulletin No.28 on the "Chemical Composition of American Food Materials" is a good authority on the composition of other foods as

well as meat.

In the uncivilized stage, man ate meat in the raw state but with the higher development of his mental powers, raw meat became distasteful to him and he learned to cook it in various ways.

Perhaps the oldest method of cooking is roasting. In this process meat comes in direct contact with the heat rays as it is held directly over glowing coals, and turned from side to side until done. Meat cooked in this manner has an excellent flavor and is one of the most hygienic methods of cooking.

Baking is a modified process of roasting and the effect is much the same. The advantage of baking over roasting is that the meat is subjected to heat on all sides at once while in roasting the meat must be turned frequently in order to prevent loss of juices and the unequal cooking of the different sides. As will be readily seen in cooking large joints, the outer surface of the meat will be subjected to more heat than the inner portion as it will take some little time for the heat to penetrate to the center as will be shown later. To prevent the surface of the meat from becoming too dry, it is moistened at intervals with a mixture of fat and water.

Broiling differs from roasting in that the quantity of meat is much smaller being as a rule from 1 - 2 inches in thickness, is used and treated the same as for roasting. With this method the protein is coagulated throughout the entire piece in a short time - usually about 8 - 10 minutes. A modified process of broiling known as pan-broiling is often used. The principle is essentially the same in both, the only difference being that in pan-broiling the meat is cooked in a hot skillet instead of directly over the flame. Boiling and stewing are much alike as in both processes water is the medium used to cook the meat. In boiling the meat is usually

left in a large piece and the broth is not considered important while in stewing, the meat is cut in smaller pieces and meat and broth are served together.

Frying is cooking in a bath of smoking hot fat. Sauteing is the process where just sufficient fat is used to prevent the material from sticking.

When we remember that exercise tends to harden the connective tissue and strengthen the walls of the muscular fibers we readily see that the parts of the animal most used during its life can not be successfully cooked by the quicker processes. The following is a list of the different cuts and the ways to prepare them as given by Miss Farmer in the Boston Cooking School Cook Book.

Hind-Quarter.

Divisions.		Ways of Cooking.
Flank(Thick and Boneless).		Stuffed, rolled and braised or corned and boiled.
Round	Aitchbone	Cheap roast, stew, braised
	Top	Steaks, beef tea.
	Lower part	Hamburg steaks, curry of beef, cecils.
	Vein	Steaks.
Rump	Back	choicest large roasts and cross cut steaks.
	Middle	Roasts.
	Face	Inferior roasts and stems.
Loin	Tip	Extra fine roasts
	Middle	Sirloin and porterhouse steaks.
	First cut	Steaks and roast.
Tenderloin(sold as a fillet or cut in steaks)		Larded and wasted or broiled.

Hind shin - Cheap stew or soup stock.

Fore Quarter.

Five prime ribs - Good roast.

Five chuck ribs :· Small steaks and stews.

Neck - Hamburg steaks.

Sticking piece - Mince meat.

Rattle rand { thick end. / second cut / thin end } corned for boiling.

Brisket { Navel end / Butt end or / Fancy brisket. } Finest pieces for corning.

Fore-shin - Soup stock and stews.

We are all more or less familiar with the different ways of cooking meat but are perhaps not so fully acquainted with the object and the effect of cooking.

Cooking may be defined as the application of heat to the food principals. Hutchinson says that "the ideal to be aimed at in cooking meat is to decompose its red coloring matter or haemoglobin.so as to remove its raw appearance and this must be done without over coagulating the proteids or removing the extractives which give to meat its desirable flavor." We may add that not only do we wish to retain the extractives but also to enhance their flavor by the application of heat and also to destroy any bacteria or other parasite which may be present and thus render the meat unwholesome. How nearly this object is attained will be shown in the account of the experiments on the cookery of meats.

Since meat is essentially protein surrounded by elastin and

collagen, the principle in meat cookery is the combined principles of protein, collagen and elastin. As has been previously shown, the proteids coagulate at a very low temperature, some of them as low as 45°C. while collagen and elastin are not dissolved until subjected to a temperature of boiling water or its equivalent. However both these substances are soluble by a continued application of heat below 100° C. Hence meat may be rendered palatable and digestible by cooking for a long time at a temperature between 80 - 85° C. That such a temperature is desirable for the cookery of meats especially of the tougher cuts is shown by the following experiments which were conducted at the K.S.A.C. In connection with the cooking experiments tests were made concerning the asceptic condition of the meat.

Experiment 1.

The object of this experiment was to determine the solubility of proteid and its point of coagulation. Beef steak was cut into very small pieces after all visible fat and gristle had been removed and allowed to soak in cold hydrant water for 1/2 hour. At the end of this time the meat had assumed a whitish tinge due to the loss of extractives and the water had become enriched by the proteids dissolved out of the meat. Upon heating the liquid coagulation of the proteids was first noticed at a temperature of 50°C.

Experiment II.

Four pounds round as nearly spherical as could be obtained was placed in boiling water of quantity to barely cover the meat and boiled 5 minutes. At the end of this time the temperature of the water was lowered to 80°C and a temperature varying from 80 - 85° C was maintained for 1 1/2 hours. The result was not satisfactory as the meat which was gray throughout showing that it was entirely coagulated, lacked flavor and had a "raw"

taste. The inner temperature of the meat was 69°C and the outside 79° C. Samples taken from the meat and tested in the Bacteriological Laboratory showed that the meat was not asceptic.

Experiment III.

Eight pounds round cooked 5 minutes in boiling water sufficient to cover; temperature reduced to 80°C. This temperature maintained for 2 hours. At the end of that time the meat cut open and inside temperature found to be 29°C. Bacteriological test showed as excellent temperature for the growth of germs. Meat coagulated to a depth of less than 1 inch. This piece was then returned to the water and cooked at a temperature varying between 79°C-85°C for 19 hours. At the end of that time the meat was a beautiful brown in color; was very tender as was shown by the fact that it could be readily cut across the grain with an ordinary kitchen case knife; exceedingly well flavored; and the fibers had not fallen apart forming strings but were still held together although the connective tissue had become gelatinized.

Experiment IV.

An 8 pound piece of round divided into as nearly equal parts as possible. The first was cooked by a slow process(temperature 80-85°C) 4 1/2 hours. The second portion was cooked as an ordinary house wife might cook it that is at a temperature of 100°C. or a little less at times. In the first cut the time of cooking was not of sufficient length as the meat was gray in color, flavorless and somewhat tough. The second piece had reached that appetizing brown color in 2 1/2 hours and had also fallen into pieces. The flavor was good but the meat was tough. The broth was very rich.

Experiment V.

Four pounds round boiled 1 hour before lowering temperature to

80°C. Kept at this temperature 5 1/2 hours. Meat cut easily, had good flavor, pink in color and was germ free.

Experiment VI.

One half pound round steak 3/4 - 1 inch thick, was divided into three pieces. First piece was pan-broiled 5 minutes. Second 8 minutes and third 10 minutes. In first piece meat only warmed through and coagulated on the outside. To me this piece lacked flavor and tasted "raw". The second piece had a better flavor and was a delicate pink on the inside. The third piece was not as thoroughly cooked as the second owing to the fact that it was thicker. The piece broiled 8 minutes was the most palatable.

Experiment VII.

Four pounds meat from the neck; place in boiling water and boiled 15 minutes; temperature then reduced to 80°c and maintained for 8 hours. Meat proved to be very tender; of good flavor for a neck piece. Several attempts previous to this one had been made with neck pieces but proved unsatisfactory owing to the fact that sufficient time and care could not be given to the cooking.

Experiment VIII.

Four pounds roast baked in oven at a temperature of 290°F at end of 2 1/2 hours it was taken out and tested. Found to be raw in the center. At end of 5 hours brown throughout and of good flavor.

Experiment IX.

The object of this experiment was to see the effect of previous browning on flavor. The meat was browned before cooking and then cooked in water. Browning gives and added flavor.

In summing up these experiments, I have arrived at the following conclusions:-

1. Meat cooked at a low temperature is superior in flavor, tenderness and appetizing appearance. By this method of cooking the cheaper cuts may be made into easily digested and palatable dishes. To my taste the cut of neck which was cooked at a low temperature, was more desirable than the piece of round cooked at boiling temperature. It is true that the flavor of neck was not as good as the round but the meat was much tenderer and more pleasing.

2. Low temperature with a short period of cooking is very unsatisfactory.

3. Meat in pieces larger than 8 pounds should be divided and cooked in two pieces as the period required for cooking so large a piece would allow the germs to form undesirable products in the center of the piece before the meat had become sterilized.

4. If meat is once removed from the fire and allowed to cool, it can not be reheated and cooked into a tender piece.

The experiments performed by Miss Abbie Marlatt on the cooking and digestibility of meats, tend to disprove my statements and show that meats are more completely digested when given the longer cooking and the higher temperature.

During the process of cooking, meat undergoes losses which must not be overlooked. Although it is true that 4 ounces of cooked meat are equivalent to 5 ounces of raw meat, the nature and extent of these losses are necessary to a thorough understanding of the art of cookery of meat.

The loss is in water, fat, mineral matter, nitrogenous matter and digestibility. These losses can probably be best explained by quoting from a summary of such losses which is taken from U.S. Bulletin No. 141 "Experiments on the Losses in Cooking of Meats."

1. Chief loss in weight during boiling, sauteing and pan-broiling meats is due to the amount of water removed by the heat of cooking. In roasting

the chief loss is due to the removal of both water and fat.

2. There is less loss of material in pan-broiling meats than in boiling, roasting or sauteing.

6. Beef which has been used for the preparation of beef tea or broth has lost comparatively little in nutritive value though much of the flavoring material has been removed.

7. In boiling meats, the fatter kinds and cuts other things being the same, loose less water, nitrogenous and mineral matter but more fat than leaner kinds and cuts.

8. In cooking by the four methods given in the experiments, the losses increased in proportion to the degree of cooking. The longer the time and the higher the temperature of cooking, other things being equal, the greater the losses resulting.

9. As a rule the larger the piece of meat boiled or roasted, the smaller the relative losses.

10. Different cuts of the same kind of meat behave very differently as regards the amount and nature of the losses which they undergo when cooked in hot water.

11. Thorough investigation confirms the conclusion that when meat is cooked in water at 80-85° C., placing meat in hot or cold water at the start has little effect on the amount of material found in the broth.

Digestibility and Absorbability.

Shafer says, "Digestion may be described as the physical and chemical alteration of food stuffs into forms better fitted for absorption by the action of certain soluble ferments, the digestive enzymes."

In the mouth the meat is only affected in a mechanical way as the ferment ptyalin does not act upon either fats or proteids. However

thorough mastication is essential as it favors digestion in the stomach. In the stomach, the proteids are acted upon by the pepsin of the gastric juice. It is interesting to note that this action is carried on only in acid solutions. During the digestive process the proteids first swell up with acid, then they are dissolved and then converted into syntonin or acid albumin. This acid albumin is attacked by pepsin, giving rise to albumoses, proteases or propeptones and these are slowly and incompletely converted into peptones. The time of digestion varies with the nature and condition of the proteid to be digested. Schafer says "The conclusion ought not, however, to be too hastily drawn that those forms of proteid which are most easily dissolved by gastric juice are therefore best and most nutritious; gastric juice is not the only proteolytic fluid which acts on food. If the food is properly masticated it is not necessary that it be dissolved before leaving the stomach. It does not follow that foods which are more rapidly dissolved are also more rapidly peptonized, nor, indeed, that those which are more rapidly peptonized a are also more thoroughly utilised by the organism."

From the stomach the meat passes into the intestines. Here the proteid not previously digested is acted upon by the trypsin which has in general the same effect as pepsin. As in peptic digestion, the nature of the proteid has a marked effect upon the rapidity of the process. When proteids are subject to tryptic digestion, a portion of them are decomposed beyond the stage of peptone and there are formed several nitrogenous bodies of much simpler composition, some amido-acids, others organic bases. The various bodies allied to proteids such as mucus and nucleo-proteids, first undergo a clearage process into proteid and "other body" and this proteid then undergoes digestion in the usual manner. The other substances formed is frequently not changed.

Collagen is said to be converted into its hydrate of gelatin then protogelatose - deuterogelatose and then into gelatin peptone. Collagen is not attacked by the pancreatic juice unless previously boiled with water or swollen by the action of dilute acids. In tryptic digestion gelatin looses its power of gelatinization. Elastin is dissolved by pepsin and HCL but is more difficult of solution than collagen. It is changed first into hamelastin and then into elastin peptone. Elastin is directly attacked by trypsin and dissolved forming proto and deuteroelastoses. But neither in peptic or tryptic digestion is peptone formed.

The fats are acted upon only in the intestines where they are subject to steapsin or pialyn of the pancreatic juice. This ferment has the ability to split up neutral fats into fatty acids and glycerin. Its activity is greatly increased by the presence of bile and also by bile and HCL. There has been a great deal of controversy over the digestion and absorption of fats and the matter has not yet been settled.

The absorption of some substances are begun in the stomach but the main part takes place in the intestines. Products of proteid digestion fall in this class but are absorbed only to a slight extent. There is one noticeable difference between gastric and intestinal absorption; gastric absorption is increased by concentration of the substance to be absorbed while the opposite is true of the intestines.

The channels of absorption are two, first the blood capillaries in the walls of the digestive tract and secondly the villi in the intestines. The villi consists first of epithelial cells, second loose tissue in which are numerous blood vessels, third enclosed by the blood vessels is the central hollow portion, the lacteals which run together at the base forming a lymphatic plexus. The contents of the intestines are taken up and changed

by the epi

by the epitholial cells of the intestines and the product of these cells passes into the lymphoidal tissue of the villus. The modified proteids then pass in solution into the lymph which bathes this tissue and in this form are absorbed by the capillary vessels. Fats leave the epithelial cells as fat globules and are carried in this form past the capillary network of villus to enter the lacteal situated in the axis of the villus. Under normal conditions all the soluble constituents which leave the epithelial cells are taken up by the capillaries. Strange as it may seem, many forms of native proteid are capable of entering the epithelial cells without previous change by digestion or otherwise also that complete peptonization is not necessary to ensure absorption. However albumose and peptone are the forms in which proteid is chiefly absorbed. In spite of fact that the proteids are absorbed in this manner, these two substances are not found in the b blood thus showing that absorption is a complex process of which all is not yet fully known. The probabilities are that albumose and peptone are changed by the epithelial cells.

Not all of the changes taking place in the digestive tract are due to the action of the digestive ferments as the bacteria which are always present exert either a helpful or injurious influence on all of the digestive processes.

Very little is known about the food from the time it leaves the intestines until it is excreted as waste.

We know that the bioplasm is continually changing and that this change is due to two processes which are an alternate building up, anabolism and a tearing down, katabolism. Sometimes one is greater than the other and many conditions seem to influence these changes as occupation, condition of body, temperament etc.

As waste products of the metabolism we find the fats excreted as CO2 and water and the proteids as urea.

To the majority of normal people, meat is one of the essential foods of the diet. It is the most important and most economical source of protein both as regards bodily energy and cash outlay. Taking it pound for pound meat costs more than vegetables but when we consider how much more nourishment is derived from a pound of beef than from a pound of potatoes, for instance, we see that meat is an economical food.

As in other foods the cost of the meat does not indicate its nutritive value but rather its desirability from an aesthetic standpoint so that by exercising proper judgment in the purchasing, cooking and utilization of all portions, the necessary nutriment may be obtained without an extravagant expenditure of money.

The following table taken from an article on "Cost and Composition of some cuts of meat". by Wilson will be an aid in obtaining nutritious and economical meats for the table.

Cost and Composition of some cuts.

	Total per cent.	Calories.	Cost per pound.	Amount of Nutrient for 25.
Beef.				
Neck.	30.4	880	6 and 8.	.95-1.27.
Chuck ribs.	35.9	1125	11 and 12	.56-.75
Ribs	40.8	1405	22 and 18	.47-57
Brisket	45.1	1580		
Cross Ribs	49.2	1765		
Shoulder	31.6	895	10 and 14	.57-.79
Shin	15.7	310		

Beef.	Total per cent	Calories	Cost per pound	Amt. of nutrient for 25.
Plate	45.7	1600		
Navel	46.4	1610		
Sirloin	32.2	970	22 and 18	.37 - .45
Socket	27.5	880		
Rump	45.5	1570	18 and 15	.63 - .76
Round 1st cut.	31.5	855	18 and 15	.44 - .52
Round 2nd cut	20.7	505	16 and 8	.52 - .65
Leg	10.5	235		
Top of sirloin	55.9	2025		
Flank	64.2	2435	15 and 10	.74 -1.11

From this table it is evident that of the usual cuts, one gets most for the money in neck and flank next in round, ribs, first cut of round and last the sirloin.

In conclusion I would say that this paper does not in any way exhaust the subject of meat as several subjects such as Preservation, Bacteria etc have not been touched upon and others only lightly dealt with. Its aim has been to give something of an idea of the nature, value and conduct of one of our most important foods.