

POULTRY AS FOOD.

INTRODUCTION.

Poultry has for many centuries supplied a large proportion of the food of civilized man, and in almost every country of the world the poultry industry is an important branch of agriculture. According to the returns of the census for 1900, the total number of chickens, including guinea fowls, on farms in the United States was 233,598,085; the total number of turkeys, 6,599,367; geese, 5,676,863, and ducks, 4,807,358. From the statistics gathered it appeared that poultry was kept on 88.8 per cent of the farms in this country, and that the total value of the poultry raised on farms in 1899 was \$136,891,877. Although many chickens are kept for eggs rather than for their flesh, a good proportion of them finally appear in the meat market, and almost all of the other varieties of poultry are bred primarily for the table. It is safe to say that 250,000,000 chickens and other kinds of poultry are consumed in this country each year.

DEFINITION OF POULTRY.

In its strictly technical sense the word "poultry" is used to describe birds domesticated for their eggs or flesh. Game birds are often used on the table, and, as in the case of some wild ducks, may be closely related to domestic varieties; but as long as they are in their wild state they can not be classed with poultry. Nor are all domesticated birds necessarily poultry. Pigeons bred for ornament or as carriers would not come under that head, though they do belong there when bred for their flesh. Peafowls were formerly often bred for the table and were an important variety of poultry; but now they are bred mainly for ornament and form an almost negligible part of the poultry industry.

From this it will easily be seen that the kinds of birds included under the term poultry may differ in different places and at different times. Here and in Europe, however, it now commonly includes chickens, turkeys, geese, ducks, guinea fowls, pigeons, and occasionally peafowls, pheasants, quail, and swans.

Chickens, turkeys, guinea fowls, pheasants, and quail belong to the same scientific order of birds—the Gallinaceæ, or comb bearers—and

resemble each other more or less closely in structure and habits. They are distinguished from other birds in that the flesh on the breast and wings is lighter in color than on the rest of the body. This difference in the flesh in different parts of the birds is not fully understood; it is generally supposed that the light flesh has less muscular power. At any rate, these birds, whose chief means of locomotion is walking and who consequently do not need as strong wings and breasts as flying or swimming birds, have paler breast and wing flesh. The difference in color is apparently due to variation in the amount of hemoglobin (the principal red substance of blood) present in the flesh. Investigations carried on in France a number of years ago showed that the red color was a product of muscular activity. In other words, when muscles work as actively as those of the breast of flying birds this red coloring matter is produced.

Pigeons belong to the order of Columbidae, or doves, and are its only representatives in the poultry world. They, in a way, stand between the comb bearers and swimmers, as there is a slight difference between the color of the flesh on the breast and on other parts of the body, but not so great a difference as in the comb bearers. They are, however, sometimes classed with the white-fleshed birds.

Ducks, geese, and swans belong to the order Natatores, or swimmers, characterized by their web feet and long, thick bills.

VARITIES OF POULTRY.

CHICKENS.

In all probability chickens were at a very early period domesticated from the jungle fowl native in southwestern Asia and Oceania. By mating individual birds which are bred under peculiar conditions or which showed especially desirable traits, many breeds have been developed, each of which has certain distinct qualities fixed in it. American poultry experts designate as "meat or table breeds" the Asiatic class, which includes Light and Dark Brahmas; Buff, Partridge, White and Black Cochins, and Black and White Langshans.

A good table bird should have a large proportion of flesh to the size of its bones, and a large, full breast, on which is found the delicate white meat. Long, thin legs and wings are undesirable, as they contain much bone and little meat. In England dark-legged birds are considered better than those which have legs and body of the same color, but in this country the preference is for the latter, though the reason for either choice is not clear. Light-colored birds perhaps pluck cleaner than dark ones, and are easier to make attractive for the market, which demands a skin free from visible pinfeathers. It is safe to say that almost any of the standard breeds, except some of the fancy varieties, can be made into good table birds. However, some of

the fancy varieties, notably Games, are thought to be especially desirable for the table, and the Pit Game, it is said, has always been considered satisfactory for this purpose, the flesh being fine grained, tender, and sweet.

Ordinarily the breeder depends on eggs as well as table birds for his profit, and selects free-laying, well-shaped, hardy varieties, relying on care and feeding to develop the quality and flavor of the flesh. Plymouth Rocks and Wyandottes are probably the most satisfactory of the common breeds used in this country for "general purpose" birds.

Next in importance to the qualities of the breeds are proper care and feeding. Cleanliness is especially important when the birds are destined for the table, for dirt or taint of any kind injures their appearance or affects the flavor of the flesh and makes it very unattractive and often actually harmful.

Hens under usual conditions, at least in temperate regions, lay most abundantly in the early spring and summer, and hence the best season for "spring" chickens and broilers—i. e., chickens from two to four months old—is from May to September or October. Older chickens are of course to be had at all times of the year, but they are most frequently sent to market in the winter months, when the hens are laying poorly.

The flesh of a mature cock is usually thought to be too tough and highly flavored to be very palatable; accordingly, if a poultryman has more cockerels than he can dispose of advantageously as chickens he often resorts to caponizing. If successfully performed the bird will bring a fine price whenever marketed, for capons are considered the choicest of table fowl. Their flesh has the tenderness of a pullet, with a much better flavor; moreover, the tender parts of the body develop more than in ordinary chickens, giving a larger proportion of white meat. Poulards, as the spayed females are called, are fattened to some extent, notably in France, though it is doubtful if their flesh is much better than that of the ordinary pullet.

TURKEYS.

These birds were imported into Europe from North America, where very similar varieties are still found wild. Their English name is probably due to a misapprehension with regard to the country from which they came. At present they are much more common here than in Europe. Many breeders find that the birds improve in hardiness and their flesh in flavor by an occasional introduction of wild blood, and a wild "gobbler" is often kept for mating. Birds with three-eighths or one-quarter wild blood are considered the most satisfactory table birds.

There is little demand for young turkey chicks, which are very scrawny and do not bear shipping well. However, in July and August

growers near fashionable summer resorts can sometimes sell "broilers," weighing from $1\frac{1}{2}$ to 4 pounds each, for \$3.50 or \$4.50 a pair. The general market rarely sees fresh turkeys before September, and the season can hardly be said to begin before the last of October. Many of the birds are fattened to very large size (25 to 30 pounds) for the Thanksgiving and Christmas trade, but from January until the season for fresh turkeys ends in late February or March medium-sized birds are most abundant. New England turkeys are to be had in eastern markets up to Christmas time, but later in the winter the birds are supplied mainly from the West, whence come also the "cold-storage" turkeys of the summer months.

GUINEA FOWLS.

As the name implies, these birds are natives of Africa. They have been carried to many parts of the world, but do not yield to domestication as easily as some other kinds of poultry. They are quite commonly bred, especially in the southern United States, as egg producers and for the table. With proper treatment they can be made very profitable, as both flesh and eggs are highly prized delicacies. Young birds are ready for market in the early autumn, and older birds may be bought all through the winter. The young chicks and caponized birds have tender flesh, with a flavor like that of partridge, while older birds are thought to resemble pheasants in taste. Coming as they do when game is scarce, they are much esteemed as a substitute for it. To get the best flavor many believe the bird should not be cooked until it has been killed for some days, or just before it begins to "turn."

PEAFOWLS.

These birds, as we have seen, are not always to be regarded as poultry, but they are bred for the table frequently enough to warrant mention here. In classic days they were considered very delicate eating, especially the hen, and during the middle ages the peacock, served whole and garnished with his own gorgeous plumage, made the principal dish at many feasts. Like many other kinds of poultry, they were introduced into Europe from Asia.

The hens lay during the summer months, which brings the market season for young birds into the winter. They have a large amount of flesh in proportion to the weight of bone. Some persons consider the flesh of peahens as delicate as that of pheasants; others call it dry and tasteless; but nowadays all agree that a mature peacock is not worth the eating, and peafowl of all ages are rare in our markets.

PHEASANTS.

These birds originated in Asia. Strictly speaking they have even less place in the poultry world than peafowl, for they are bred almost exclusively for sport or ornament; but they are coming to be used so much on our tables that it will not be out of place to speak of them here.

Pheasants have always been considered a delicacy, and now are especially valued for the variety they give to the bill of fare. Their flesh is tender, but has little taste until it has been kept for some time. The hens are preferred to cocks for table purposes. The birds are usually shot in their first year and weigh from 3 to 4 pounds on the average. Most of those seen in our markets have been sent from England or from Russia in cold storage, although the number reared in this country is constantly increasing.

QUAILS.

These delicious little birds have long furnished some of the choicest titbits of the hunting season, but it is only quite recently that they have been domesticated to any appreciable extent. The industry of taming and raising quails for aviaries and for the table is still very small, but if reports can be relied upon it is perhaps well enough established in the United States to suggest classifying the birds with poultry. The European quail is not found in America, but the name is loosely applied to various similar birds in the United States, most commonly perhaps to the species known as Bob White, or in some regions as partridge. It is this bird which is ordinarily tamed. As yet quail, like pheasants, are too expensive for common use, but they give a most delicate variety to the epicure's bill of fare.

PIGEONS AND SQUABS.

The varieties of pigeons used for food have been developed from the wild blue rock dove, but are considerably larger than their wild ancestors. They have always been used as food in Europe, but in this country they have only recently become generally common. The flesh of birds which have been allowed to fly becomes so tough that it requires very long and careful cooking to make it palatable. Consequently the young birds, called squabs, are most usually eaten and are in great demand for restaurants, hotels, etc. The young birds are generally at their best for the table when about four weeks old, that is, after they have begun to grow plump, and before they leave the nest to fly. Squabs are most plentiful in midsummer, but when artificial mating and breeding is practiced the young birds can be obtained the year round, the best often appearing in midwinter. Adult

pigeons, which are rarely seen in any but the largest markets, are much cheaper than squabs. A recent publication of this Department^a treats of squab raising for market and the various topics which would naturally be included under this subject.

DUCKS.

Most of the domesticated breeds of ducks have been derived from the wild Mallard. Duck breeding has long been practiced in the Old World, where the birds are extensively used for the table, but until recently they have been raised in this country only incidentally by farmers who happened to have access to pond or stream. Of late years, however, the duck-raising industry has been greatly developed, with the result that the birds are much improved in size and quality, and are more commonly eaten than formerly. The young of certain early maturing breeds are known to poultry dealers as "spring ducks," and begin to reach the market in May and may be had until January. Old ducks can be obtained at any season, but are best during the winter months.

GEESE.

Geese have been used as table birds at least ever since the days of ancient Egypt. They are now common all over the world, but perhaps most abundant in Germany, where their flesh is relished in every imaginable form, from the smoked Pomeranian goose breast to the popular "Pökelgans," pickled, stewed, and preserved in fat. Goose fat is also preserved in Germany, and is often eaten on bread in place of butter, and is considered unexcelled in the preparation of many dishes. Among orthodox Jews everywhere it is frequently used as a culinary fat. Pâté de foie gras, made from the livers of specially fattened geese, will be described in a later section (p. 16).

Geese live to a great age, but for table purposes they should be killed when 3 years old at the latest, and most persons would probably consider even that much too old. Their flesh becomes very tough as the birds grow older, and loses its agreeable flavor.

Green geese (half-grown birds) can be had from May until early winter; older birds can ordinarily be procured at any season.

SWANS.

These birds are usually bred for ornament rather than for the table, but occasionally a few are kept among a flock of geese, and the young, called "cygnets," are killed for eating, perhaps most commonly in England. Some persons consider them delicious, but most regard their flesh as too highly flavored to make them popular table birds. In earlier times they were more commonly eaten than at present.

^a U. S. Dept. Agr., Farmers' Bulletin 177.

POULTRY FEEDING IN ITS RELATION TO FOOD VALUE.

There are many conditions which influence the flavor and quality of poultry flesh. Doubtless one important factor is breed, but our information on this point is as yet so scanty, and is so little considered by marketmen—size being more often the prime requisite—that not much can be said of it. Another factor is age. Everyone knows that a young bird has tender, delicately flavored flesh and that an old one is tough and stronger in taste, the changes being doubtless due to the toughening of the muscle fibers and an increase in nitrogenous substances called extractives, which give the flavor to all kinds of meat. Sex causes similar differences, the female birds as a rule being more tender and less highly flavored than males. Flavor and especially toughness are also increased by too much exercise.

The effect of food on the quality and flavor of the flesh is even more important and more easily controlled. It has been observed, for example, that if geese and ducks are allowed to eat too many of the fish and water bugs of which they are so fond, their flesh develops an undesirable "fishy" flavor; and if poultry eat onions or wild garlic habitually the effect on their flesh is also marked. On the other hand, the peculiar and delicious flavor of the Chesapeake canvas-back ducks is said to be due to the wild celery on which the birds feed along the shores of the bay.

All these facts and many others must be taken into consideration by the man who is raising poultry for the table, as they will help him to get the best returns in flesh for the least expense for food and care. But the subject of poultry feeding and management with reference to the profitable production of eggs and birds for market is too large for discussion in this place, even if it were desirable.

The essential points for raising table birds are, briefly, sufficient variety in the feed and proper proportions of protein, fats, and carbohydrates, with grit (and lime), pure drinking water, and sanitary surroundings. In most of the feeding experiments with poultry which have been reported the question generally studied has been the profitable production of eggs or of marketable birds; that is, the comparative merits of different feeds and rations for increase in egg production or inducing gains in weight quickly and economically. In a few cases the effect of the feed on the appearance, flavor, or quality of the flesh has also been considered, and some reference should be made to such studies.

Many breeders believe that soft food, that is, crushed grains or paste, is more easily and completely digested by the birds, and that it produces more tender flesh. In experiments made at the New York State station, chickens, laying hens, and capons all produced better results with ground than with unground grain. According to a test

at the Canada Experimental Farms, chickens fed a ground-grain ration were when dressed 5 per cent heavier, were plumper, slightly yellower, and of better appearance than chickens fed a similar ration of unground grains. When cooked the flesh of the birds fed the ground grain was regarded as juicier, "owing evidently to a marked (though not excessive) deposition of fat in the tissues."

Some have advanced the theory that warm food was preferable to cold, but experiments made along this line at the Ontario Agricultural College and Experimental Farms indicate that mixing feed with hot water has little effect on the quality of the flesh.

In regard to the influence of food on the color of the flesh, it is said that animal feed, as meat meal, scraps, etc., tend to make it darker, and it seems fair to say that this may be true of any food rich in nitrogen. At the Cornell station two similar lots of chickens were fed, one a nitrogenous ration of wheat and skim milk, the other a carbonaceous ration of Indian corn. When they were killed the flesh of the first lot appeared darker, more tender and juicy than the second, which, however, contained larger masses of fat. On the other hand, a ration of yellow corn used at the Ontario Agricultural College and Experimental Farms produced "dark yellow" flesh, while oats, buckwheat, and milk gave a "creamy white" color. In later experiments the presence of a considerable amount of corn meal in the ration with ground buckwheat and pearl oat dust produced a rather cream-colored flesh. From these somewhat conflicting statements it will be seen that although the food eaten apparently has an effect on the color of the flesh, our actual knowledge of the subject is as yet very uncertain. It is commonly believed in the United States that the fat fowls with yellow skin which are wanted can be secured most cheaply by feeding a grain ration composed largely of Indian corn for two or three weeks before the fowls are slaughtered.

FATTENING POULTRY AND ITS EFFECT ON FOOD VALUE.

GENERAL METHODS OF FATTENING.

Wherever the poultry industry has been highly developed, fattening has formed an important and often a separate branch. In France, especially about Houdan and in Normandy, the art of fattening has long been extensively and very skillfully practiced. Very often the rearing and fattening are done in separate establishments. The largest poultry market in the world is held in Houdan. Here live birds are brought in by breeders by the thousands, and bought by fatteners who, a few weeks later, bring them into another section of the market plump and fattened for the table. In Great Britain, also, fattening forms a separate branch of the poultry industry. Thousands of Russian chickens are annually sent into Germany to be fattened for German

markets. Belgian poultrymen are said to make a regular practice of importing fine laying Leghorn pullets from Italy, keeping them one season for their eggs, and then fattening them for the market. In the United States the fattening of poultry is less commonly practiced in separate establishments, nor is it anything like as general in Europe, although probably most poultrymen keep their birds on a special ration for awhile before marketing them. Within a few years experiment stations and private breeders have been making very interesting investigations of the subject.

One of the points most discussed is whether birds fatten better when confined in small pens than when remaining at large. The advocates of liberty maintain that the abnormal quiet of the penned birds prevents their getting the full value of the large rations, or induces the formation of fat rather than flesh, while those who prefer the use of pens hold that the flesh of the resting birds becomes equally abundant and much more tender. To help settle the question, experiments were made in Canada in which turkeys and chickens were fattened, part at large, part in small pens. The results were that "the penned fowl, both turkeys and chickens, were plumper and in every way more inviting than those which had been running at large; but that close confinement appeared to injure the chickens otherwise." In other tests the conclusion was reached that the practice of fattening chickens in crates is to be commended and that by using a cramming machine to feed them chickens can be given a finer appearance when dressed than those fed in the ordinary way. In a subsequent experiment, however, it is said the pen-fed birds presented a finer appearance as to color and size when dressed than similar birds fed in a crate. Other experiments have been made at the Maine Station, in which chickens were fattened, some in small pens, and some having the run of a small yard. The penned chickens made gains as great or greater than those obtained by similar methods in Europe, while those with a little liberty made still greater gains and appeared in every way as inviting. If these two sets of experiments may be relied on, the verdict seems to be that a little exercise is better for fattening than either close confinement or full liberty.

SPECIAL FATTENING OF GEESE—FOIE GRAS.

The most extreme method of artificial fattening is employed with geese whose livers are to be used for the delicacy known as "foie gras" (fat liver). This art of fattening geese until fatty infiltration of the liver has set in and that organ weighs from 2½ to 3 pounds is practiced on a large scale about Strasburg, and to a less extent about Toulouse and elsewhere. The birds are usually confined in small, dark cages, where they can move only a few inches, and are fed two

or three times a day, commonly with all the ground maize or wheat-flour paste they can be made to eat. When they have become very fat, usually at the end of about three weeks, they are killed and the livers removed.

The livers, which are perhaps no more abnormal than the flesh of an over-fat hog, commonly appear in our markets in jars or tins in three distinct forms: *Foie gras au naturel*, *pâté de foie gras* (by far the most popular), and *purée de foie gras*. The *foie gras au naturel* is simply the liver preserved without any dressing. The *pâtés* are made of large pieces of the liver, cooked and dressed with truffles and other condiments. These pieces are fitted into cans by trimming off the edges, and are covered with melted goose fat or suet. Many persons find the flavor of the goose fat too strong and prefer the suet. The trimmings of the liver in the *pâtés* are preserved with truffles, etc., and sold as *purée de foie gras*.

DRESSING AND MARKETING POULTRY.

CLEANLINESS.

Poultry of different kinds and in different places is prepared and marketed in a variety of ways, but, however it is done, the dealer and the purchaser should insist on cleanliness everywhere—in killing, plucking, and packing, as well as in storing and displaying. Not only is any suggestion of dirt very disagreeable in connection with our food, but dirt, especially about flesh foods, is an open door to decay and disease.

LIVE POULTRY.

In the United States poultry is usually killed before it is sent to market, though in country districts and often in southern cities it is sold alive. Of course this insures freshness, but it entails on the purchaser the bother of killing and plucking, which most persons gladly avoid. Birds sent to market alive should be humanely treated. Too close confinement, lack of water, etc., are needless cruelties and, besides, injure the appearance or quality of the birds for the table.

KILLING AND PLUCKING.

It is well to make the bird fast for twelve hours or more before it is killed, in order that its crop may be quite empty and the other organs as free as possible from excrementitious substances. It is generally conceded that the best way to kill a bird is to sever the main artery in the roof of the mouth. When this is done the bird quickly bleeds to death. As soon as cut it should be hung head down, to allow the blood to run out of the body. Immediately after the bird is dead, and before the animal heat has left the body, the feathers should be plucked out,

pains being taken to remove all the pinfeathers and not to tear the skin. The feathers come out more easily if the carcass is put in boiling water for a few minutes; but this method, although very common, injures the wholesome look of the skin and, it is believed, makes the flesh decompose more quickly. Dry picking is therefore far preferable and should be insisted on.

COOLING AND "PLUMPING."

If a bird is to be kept before using, it should be put in a cool place to drive out the animal heat, which if left in might hasten decomposition. Some poultry men put the plucked birds into cold water, which serves the double purpose of cooling them and of making them look plumper. There may be no objection to it if the water is clear and they are left in only a few minutes, but if they are allowed to soak until they swell beyond their natural size it is certainly fraudulent and probably injurious. A still more objectionable way of plumping birds is by blowing them out. This is bad enough when a bellows is used, but when, as is often the case, the dresser blows directly from his mouth it is disgusting and dangerous.

CHANGES IN DRESSED POULTRY FLESH.

In the Southern States and other warm regions chicken is often prepared for the table just after it is killed, a practice almost unknown in the North. In that case the bird is cooked before the animal heat has left the body, and the flavor of the meat differs somewhat from that of a bird which has been kept. If the bird is not to be cooked immediately after it is killed, it should be kept twelve hours or more before it is used. After the animal heat leaves the body a change known as "rigor mortis" sets in, which stiffens the flesh and tendons until they become quite hard. After some hours, however, this stiffness gradually passes off, probably as the result of the growth of micro-organisms or the action of natural ferments in the flesh. The first noticeable effect is the softening of the flesh and tendons, which increases for some days. Other changes also take place, which after a time, when they become more apparent, we call decomposition or putrefaction. These in their later stages are accompanied by a characteristic odor and a disagreeable, acid taste. The younger the animal the more rapidly does this decomposition set in. Pheasants, wild duck, and some other wild birds are by many considered best for the table just as this taint begins to appear and give the meat a so-called "gamey" quality; but no animal flesh should be eaten after the taint becomes strong, for it is often the herald of ptomaines, very poisonous substances sometimes developed by micro-organisms.

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DRAWN AS COMPARED WITH UNDRAWN POULTRY.

One of the much-debated questions among poultry dealers and consumers is whether or not birds keep better when marketed drawn (i. e., with the internal organs removed) or undrawn. Practice varies in different localities. Opening the body and removing the viscera undoubtedly exposes the internal surface to the air, which always contains micro-organisms, and thus invites decomposition; but, on the other hand, it must be remembered that the viscera decompose more rapidly than other parts of the body, and if left in are likely to infect the rest of the bird. Of course in removing them great care and cleanliness should be observed. Washing the inside of a badly drawn bird with salt and water is said to hinder infection. In experiments reported a few years ago properly drawn birds kept sweet two or three days longer than undrawn ones. In the case of undrawn birds the digestive organs contain more or less moist, partly digested material. The liquid in such matter can pass through the walls of the intestines, etc., and it is thus possible that dissolved bodies of unpleasant flavor can find their way into the adjacent flesh and that the flavor of undrawn poultry which is kept for any considerable time may be injured.

COLD STORAGE.

The micro-organisms which produce the undesirable chemical changes in flesh grow more quickly at a moderately high temperature than at a low one, and in a damp place than a dry one. Ordinarily poultry will remain sweet for a week or more in a temperature of 50° F., but if it is to be kept longer it must be stored in a dry place at a temperature no higher than 34° F. In such "cold storage" it will keep almost indefinitely. Many dealers buy large quantities of poultry when it is most plentiful and keep it over until few fresh birds are available. The ordinary cold-storage season for poultry lasts, roughly speaking, from October until May, though our midsummer turkeys are proof of its occasional extension. Very young birds and some of the delicate game birds do not stand cold storage well, but others keep in excellent condition. Once taken from the storehouse, however, they decompose much more quickly than fresh birds and in the off season buyers should be on their guard against birds which have been unpacked too long.

Sometimes, especially in hot weather, birds are frozen before storing. For this they should be subjected for a time to a temperature of from 5° to 10° F., and then stored in a temperature of about 30° F. Frozen meat of any kind decomposes very quickly when exposed to warmth, and many persons consider that freezing injures the flavor of poultry. For both these reasons ordinary cold storage is preferable to freezing.

MARKS OF GOOD POULTRY.

Nothing is more important to the average buyer of poultry than to know how to distinguish between good and bad, young and old birds. A good, fresh bird shows a well-rounded form, with neat, compact legs and no sharp, bony angles on the breast, indicating a lack of tender white meat. The skin should be a clear color (yellow being preferred in the American market) and free from blotches and pin-feathers; if it looks tight and drawn, the bird has probably been scalded before plucking. The flesh should be neither flabby nor stiff, but should give evenly and gently when pressed by the finger.

FRESHNESS.

In a fresh bird the feet feel moist, soft, and limber, and if dressed with the head on the eyes look bright and full. As it becomes stale the eyes shrink and the feet dry and harden; when too stale, i. e., when decomposition is well under way, the body turns dark and greenish. Cold-storage birds are commonly packed so closely that the wings and legs remain pressed against the body even after the birds have been unpacked some time. They can usually be distinguished by this squeezed look from fresh birds, which should lie or hang in a natural position.

AGE.

One of the commonest ways of testing the age of dressed poultry is to take the end of the breastbone farthest from the head between thumb and finger and attempt to bend it to one side. In a very young bird, say a "broiler" chicken or a green goose, it will be easily bent, like the cartilage in the human ear; in a bird a year or so old it will be brittle, and in an old bird tough and hard to bend or break. Unfortunately tricky dealers sometimes break the end of the breastbone before exhibiting the bird, and thus render the test worthless. If the feet are left on the carcass they furnish a test of the age. In a young bird they are soft and smooth, becoming hard and rough as the bird grows older. The claws are short and sharp in a young bird, becoming longer and blunter with age and use. The spur above the foot is also to be observed; when the bird is very young like a "broiler" chicken, it is hardly apparent; a few months later it is long, but straight; in a mature bird it is larger still and crooked at the end. It is more developed in males than in females and capons.

Turkeys up to a year old are said to have black feet, which grow pink up to 3 years old and then turn gradually gray and dull.

The age of pigeons can sometimes be told by the color of the breast. In squabs the flesh looks whitish as seen through the skin, but becomes more and more purplish as the bird grows older. Red feet are also said to be a sign of age in a pigeon.

In ducks and geese the flexibility of the windpipe is a mark of youth. . When the bird is young it can be easily squeezed and moved; later it grows rigid and fixed.

Some of the dealers in fancy and out-of-season goods handle more or less poultry which is only partly plucked, the neck, tail, and wing feathers being left, probably to give the bird a better appearance. However, an unplucked chicken so seldom reaches the average American market that feather and comb tests are of little value here. More commonly the wings of turkeys, ducks, and geese are left unplucked and furnish a clew to the age. If the tips of the quills at the end of the wing are sharply pointed, the bird is probably young; the blunter they are the older the bird.

SEX.

Commonly it takes a trained eye to distinguish sex in dressed birds, but fortunately this is not important save in the case of capons. When caponizing has been properly done the head is small for the size of the body, the comb is pale and withered, the body plumper, rounder, and larger than in an ordinary fowl, and the spur abortive. If the operation was incomplete, the head will be like that of an ordinary bird and the body less rounded. Such birds, known technically as "slip capons," are much inferior to true capons.

COOKING POULTRY.

The heat of cooking develops pleasant flavors, but this is only one of several uses which cooking serves. If carried far enough, the heat kills dangerous parasites or micro-organisms, if such be present, and produces certain chemical and physical changes which probably make the meat somewhat more digestible.

CHANGES PRODUCED BY COOKING.

The muscular tissues which form the greater part of poultry flesh are composed of fibers and connective tissue of varying toughness. Long, slow cooking, as in stewing, gradually softens these fibers and connective tissues, and thus gives the digestive juices a better chance to act upon them. On the other hand, the protein (nitrogenous substance found in the lean of meat) is hardened by the strong heat, much as white of egg, which it resembles in chemical composition, hardens in boiling. Protein thus hardened or coagulated is probably less easily digested than slightly cooked or raw protein, but this disadvantage in the cooked meat is more than compensated by its more attractive taste and appearance. The heat of cooking also develops acids in the lean of the meat, which soften the fiber much as the digestive juices themselves do, and thus aid digestion. The fats,

too, are affected by the heat, being separated from the flesh to some extent and in part changed in flavor by browning more or less. Of course in cooking some fat tries out from the meat, and water is driven off as steam or vapor by the heat. Hence a fowl or any piece of meat when cooked will weigh perceptibly less than before it went into the pot or oven. Such loss is less noticeable in poultry than in cuts from larger animals, in which a greater surface of the flesh is directly exposed to the action of the heat.

METHODS OF COOKING.

Boiling, stewing, roasting, broiling, and frying are the methods of cooking ordinarily used with poultry, as with other meats.

- In boiling and stewing the heat reaches the flesh through water in which it is placed, and the chief difference between the two lies in the amount of heat applied at one time. The choice to be made between them should depend on whether the flesh only is to be used, or the poultry and also the water in which it is cooked. If the flesh only, the bird should be boiled; that is, plunged into water which is already at or near the boiling point and allowed to stay at that temperature for from ten to twenty minutes. This exposure to the greater heat will cause the protein near the surfaces to harden and form a sort of coating through which the juices of the interior can not so readily pass. Later the pot should be set in a cooler place and the meat be left in water below the boiling point until the desired changes have taken place in its inner parts. When, on the other hand, the water also is to be used, the bird should be stewed; that is, put into water while it is still below the boiling point and kept there until thoroughly cooked through, since at a moderate temperature no impervious coating of coagulated protein will form, and part of the juices, etc., will escape from the meat into the water. If a bird is cut up before it is stewed, greater surface will be exposed to the action of the hot water and more material will pass into the water. Part of the nutritious material in the bones, which would otherwise be wasted, can be cooked out in this way, adding to the nutritive value of the broth. If the stewing is kept up long enough considerable material, especially the bodies which give flavor, will pass into the broth, leaving the rather tasteless muscle fibers. But it must be remembered that these fibers are the most nutritious parts of the flesh. Well-made broth is fairly rich in nutritive ingredients and is thought to be more easily digested than the original meat, and for this reason chicken broth is often given to sick persons who need their nourishment in return for a small amount of work of digestion. Furthermore, the broth often enables the invalid to take with it the more nutritious bread, rice, or other food which would not be relished otherwise.

An old fowl can sometimes be made tender without having all its flavor stewed away by cooking, as in a French bain-marie, where the pot is kept in warm water for a long time, or in a special oven with walls which do not conduct away the heat readily, where it is set for hours in a warm air chamber.

In roasting and broiling poultry the heat reaches the meat through the air instead of through water. As in boiling, the flesh is put at once into a high temperature which causes the protein near the surface to harden, thus partially preventing the escape of the juices. If recourse is had to basting, or pouring the escaped juices over the hot meat, a coating is formed over the surface which aids in keeping in the remainder of the juices. The larger the fowl the longer the time required for the interior to become hot. With a large fowl there is not much danger of drying up. On the other hand, if the bird is small there is more danger of this, and it should be cooked as quickly as possible. Hence the rule that the smaller the bird the hotter the oven and the shorter the period of cooking should be.

When the layer of meat over the bones is very thin, as in young chicks or squabs, broiling is preferable to roasting. Here very intense heat is applied to one side of the meat until the surface is coated over with coagulated protein, then to the other side, the interior being cooked at the same time. In this way almost all the juices are retained and the bird is cooked through without drying up.

In frying the meat is surrounded by fat instead of water or air and, like broiling, this process seems appropriate only for thin pieces of meat. The hot fat coagulates the protein on the surface, forming a coating which keeps the juices in. It should be very hot when the meat is put in, else it will soak into the flesh and spoil the flavor. Fat, if overcooked, is commonly believed to be quite indigestible, and chicken or other meat not properly fried is probably less easily digestible than that cooked in other ways.

The amount of heat needed to soften the fibers and develop the flavor of a bird, of course, depends largely on its age and toughness. Long, slow cooking, as in stewing or boiling, softens the fibers more thoroughly than a shorter exposure to intense heat, as in roasting. These methods are therefore preferable for an old, tough bird. An old rule given in many cookbooks is to boil or stew a fowl "an hour for each year of its age and one for the pot." A large bird, of course, needs a longer exposure to the heat than a small one, and a general rule for roasting chickens and turkeys is twenty minutes to the pound. Ducks and geese, having tougher fibers, require a longer time for thorough cooking. Some persons, however, prefer ducks, especially wild ducks, rare.

STUFFING AND SAUCES.

In roasting birds stuffing or dressing—a mixture of crumbs, egg, seasoning, etc.—is very often put inside the carcass. Stuffing serves the double purpose of seasoning the bird and holding it out in shape. Onions are supposed to be indispensable in a good roast duck. Italian chestnuts or pecans are considered especially fine in roast turkey, and so on through the list. These stuffings do not greatly change the food value of the birds, save as they add their own material to its total composition, or indirectly as they stimulate appetite and through that the flow of the digestive juices. The various sauces and gravies serve much the same purpose; if they are made with the gizzard and other organs which would otherwise be unused, they have the added advantage of saving these from waste.

FANCY DISHES MADE WITH POULTRY.

Cookbooks and bills of fare suggest almost endless ways of cooking poultry, but the differences between them usually lie in the way in which the dishes are flavored by dressing or sauce or in the way they are treated after their first cooking. Chicken pie is nothing but stewed or boiled chicken plus the crust and a little sauce, and chicken croquettes are rather finely divided boiled or roasted chicken plus the seasoning, etc., with which the meat is mixed and the crumbs in which it is rolled before frying. The nutritive value of these dishes depends, of course, on all the materials which go into them.

POTTED AND CANNED POULTRY.

The meat for these goods is prepared in essentially the same way as if it were to be used immediately, and then is treated much as any other canned meat product, the object being to sterilize the can contents and exclude the air with the micro-organisms always present in it. If sterilization is not complete there is, of course, danger of decomposition and its attendant evils. Another possible but slight danger is that of poisoning from improper tin and solder, but this is not so great with meats as with fruits and vegetables in which the acids aid in the formation of dangerous substances. There is no reason why canned poultry, properly put up, should not be just as healthful as fresh, for which it is often a most convenient substitute.

COMPOSITION OF POULTRY AND POULTRY PRODUCTS.

The value of poultry or any substance as food, of course, depends upon the amount and kind of material contained in it which the body can actually use. Not all parts of food materials are suitable for nourishment. The bones of poultry, shells of eggs, and the entrails of poultry, meat, and fish, etc., are almost or entirely useless as food.

At different times and in different countries opinions have varied as to the parts which should be eaten. Chicken feet, skinned and properly dressed, are used for making broth or other purposes in Europe, though they are usually thrown away in this country. Few American cooks would use cocks' combs, yet the French cook prizes them. As regards the skin, which is seldom removed from poultry in the ordinary household methods of preparation, some consider it very palatable, especially if cooked until rather crisp, while others will not eat it under any circumstances. The liver and less commonly the heart are liked by many and are often sold separately in large markets as delicacies, though in many small towns and country regions they would not be so considered. In large markets the demand for the liver is so great that it is often necessary to insist that it be left in the dressed fowl, otherwise it will be removed by the dealer, as he can readily sell chicken livers for a fancy price. The head of a bird is not commonly eaten in the United States, yet European cooks frequently leave it on the cooked fowl, since the brain is considered a delicacy. These usages recall traditions of Roman or mediæval feasts with dishes of larks' tongues and peacocks' brains, and they, perhaps, do not seem unreasonable even to one not familiar with them. The same can hardly be said of the custom observed in some regions of Germany, and possibly elsewhere, of eating the partially digested green feed removed from some game birds. This is especially cooked and is said to be palatable. Apparently this custom is limited to birds which have fed, as they do at certain seasons of the year, almost exclusively on a plant like cress or peppergrass.

The waste parts are usually grouped together as refuse, and in considering the nutritive value of any kind of food, especially in relation to its cost, the proportion which they bear to the really valuable parts must be taken into account. In experiments on the fattening of chickens at the Canadian experimental farms the proportions of different materials removed in dressing and drawing the birds were ascertained, the average results for 72 chickens of different breeds, as calculated on the basis of the weights of the chickens as killed, being as follows: Dressed and drawn carcass, not including the giblets, 66.4 per cent; giblets, 5.5; head and feet, 11.2; feathers, 8.3; and entrails, 8.5 per cent.

In discussions of food the term edible portion is applied to all the parts of any article which are not included under the term refuse. In case of poultry and other meats the edible portion includes the muscular tissue, fat, etc. All food materials are made up of a comparatively small number of chemical compounds, namely, water, protein, fat, carbohydrates, and mineral matters or ash. Water is essential to the human body, but it is to be had from so many other sources that the

amount found in solid foods is not ordinarily thought of as adding to their nutritive value. That poultry flesh contains water is evident from the fact that it is moist and has more or less visible juice.

The functions of the different nutrients have been discussed at length in other publications of this series.^a Suffice it to say that protein or other nitrogenous material (especially the true proteid or albumin) is essential for building and repairing body tissue, while this and the fats and carbohydrates together supply the needed energy. The value of nutrients as sources of energy is commonly expressed in terms of heat, the calorie being selected as a unit. The mineral matters or ash, present in food supply material needed for building bone and other parts of the body and have various physiological uses besides. Poultry, like other flesh foods, contains protein as a characteristic constituent; fat will also be found, some of it collected together in larger or smaller masses, which may be readily removed by mechanical means, and some so intimately associated with the muscle fibers that it can not readily be separated thus. Carbohydrates, chiefly in the form of a sugar-like body called glycogen, are present in very small amounts in poultry and other flesh, but, excepting in the liver and some other internal organs, the quantity is so small that it is not ordinarily estimated in laboratory analyses. Poultry flesh also contains mineral matter in small amount, though there is no common household process which shows its presence. Should anyone care to make the test it will be found that a bit of poultry flesh will not burn up completely, but will leave behind a little incombustible mineral matter.

A large number of analyses of poultry and poultry products have been reported recently by the Connecticut (Storrs) Experiment Station. Others have been published in connection with the results of feeding experiments and other investigations with poultry carried on at a number of the experiment stations, while a considerable amount of such analytical data has accumulated from other American sources. Table 1, here given, summarizes the results of such analyses of raw, cooked, and canned poultry and poultry products, similar values for a few other foods being included for purposes of comparison.

^a U. S. Dept. Agr., Farmers' Bulletin 142.

TABLE 1.—Average composition of poultry, poultry products, and some other foods.

Kind of food.	Refuse.	Water.	Protein.	Fat.	Carbo- hydrates.	Ash.	Heat of combustion per pound.
CHICKENS.							
Young:	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Calories.</i>
As purchased.....	18.8	55.5	17.8	7.2	.....	0.9	765
Edible portion.....	.....	68.4	21.9	8.9	.....	1.1	945
Meat, not including giblets.....	.....	66.9	22.6	10.1	.....	1.1	1,000
Dark meat.....	.....	70.1	20.8	8.2	.....	1.2	850
Light meat.....	.....	70.3	21.9	7.4	.....	1.1	835
Giblets.....	.....	71.0	19.8	6.4	.....	1.3	810
Visible fat removed.....	.....	74.5	21.8	2.5	.....	1.1	665
Liver.....	.....	69.3	22.4	4.2	2.4	1.7	800
Heart.....	.....	72.0	20.7	5.5	.....	1.4	770
Gizzard.....	.....	72.5	24.7	1.4	.....	1.4	696
Broiler:							
As purchased.....	29.1	51.2	15.5	8.3	.....	.8	540
Edible portion.....	.....	69.7	20.7	8.3	.....	1.1	890
Meat, not including giblets.....	.....	69.2	21.1	8.8	.....	1.1	880
Giblets.....	.....	72.8	18.7	6.1	.....	1.3	730
Capon:							
As purchased.....	17.5	46.8	17.7	17.5	.....	1.0	1,205
Edible portion.....	.....	56.7	21.5	21.2	.....	1.2	1,465
Meat, not including giblets.....	.....	55.8	21.6	22.1	.....	1.2	1,460
Giblets.....	.....	63.3	20.5	14.6	.....	1.3	1,155
Other:							
As purchased.....	25.2	47.3	14.4	12.6	.....	.7	910
Edible portion.....	.....	59.5	20.4	19.2	.....	1.1	1,350
Meat, not including giblets.....	.....	63.4	19.4	16.6	.....	1.0	1,215
Giblets.....	.....	64.7	18.7	13.7	.....	1.3	1,070
OTHER FOWL.							
Turkey:							
As purchased.....	14.3	49.2	19.0	16.2	.....	1.0	1,185
Edible portion.....	.....	57.4	22.2	18.9	.....	1.2	1,385
Dark meat.....	.....	57.0	21.4	20.6	.....	1.1	1,435
Light meat.....	.....	63.9	25.7	9.4	.....	1.3	1,065
Giblets.....	.....	56.7	17.7	23.5	.....	1.2	1,480
Dark meat, cooked.....	.....	53.7	39.2	4.3	.....	2.2	1,200
Light meat, cooked.....	.....	58.5	34.6	4.9	.....	1.8	1,090
Young, as purchased.....	32.4	44.7	16.8	5.9	.....	.9	685
Young, edible portion.....	.....	66.1	24.9	8.7	.....	1.3	1,015
Cooked.....	.....	52.0	27.8	18.4	.....	1.2	1,505
Heart.....	.....	68.6	16.8	13.2	.....	1.0	1,000
Liver.....	.....	69.6	22.9	5.2	.6	1.7	820
Gizzard.....	.....	62.7	20.5	14.5	1.2	1.1	1,170
Duck:							
As purchased.....	15.9	51.4	15.4	16.0	.....	1.1	1,065
Edible portion.....	.....	61.1	18.3	19.0	.....	1.3	1,290
Meat, not including breast or gib- lets.....	.....	55.5	17.4	26.1	.....	1.0	1,540
Breast.....	.....	73.9	22.3	2.3	.....	1.3	685
Giblets.....	.....	73.2	17.9	5.0	.....	1.8	720
Duckling:							
As purchased.....	16.2	43.3	12.0	28.0	.....	.7	1,515
Edible portion.....	.....	51.7	14.3	33.4	.....	.9	1,805
Meat, not including giblets.....	.....	48.3	13.5	37.9	.....	.7	1,950
Giblets.....	.....	70.2	18.9	8.1	.....	1.6	835
Green goose:							
As purchased.....	12.2	41.9	13.6	31.6	.....	.8	1,710
Edible portion.....	.....	48.2	15.1	36.0	.....	.9	1,940
Meat, not including giblets.....	.....	46.0	15.0	38.3	.....	.8	2,030
Giblets.....	.....	68.7	22.3	7.3	.....	1.4	995
Goose:							
As purchased.....	11.1	48.0	14.8	25.5	.....	1.0	1,475
Edible portion.....	.....	54.0	16.6	28.7	.....	1.1	1,660
Meat, not including giblets.....	.....	51.8	16.2	31.5	.....	1.0	1,755
Giblets.....	.....	70.0	20.1	8.2	.....	1.7	910
Gizzard.....	.....	73.8	19.6	5.8	.....	1.0	750
Liver.....	.....	62.6	16.6	15.9	3.7	1.2	1,175
Pigeon:							
As purchased.....	13.6	55.2	19.7	9.5	.....	1.3	915
Edible portion.....	.....	64.0	22.8	11.0	.....	1.5	1,060
Meat, not including giblets.....	.....	63.2	22.9	12.1	.....	1.4	1,100
Giblets.....	.....	68.1	22.2	5.2	.....	2.3	845
Squabs:							
As purchased.....	15.6	49.0	15.7	18.6	.....	1.3	1,205
Edible portion.....	.....	58.0	18.6	22.1	.....	1.5	1,490
Meat, not including giblets.....	.....	56.6	18.5	23.8	.....	1.4	1,470
Giblets.....	.....	69.8	19.8	7.2	.....	2.0	836

TABLE 1.—Average composition of poultry, poultry products, etc.—Continued.

Kind of food.	Refuse.	Water.	Protein.	Fat.	Carbo- hydrates.	Ash.	Heat of combustion per pound.
OTHER FOWL—continued.							
Guinea hen:	<i>Percent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Percent.</i>	<i>Per cent.</i>	<i>Percent.</i>	<i>Calories.</i>
As purchased.....	16.4	57.7	19.4	6.4	.....	1.1	730
Edible portion.....	.....	69.1	23.1	6.5	.....	1.3	870
Meat, not including giblets.....	.....	68.9	23.4	6.5	.....	1.3	865
Giblets.....	.....	69.9	20.8	7.1	.....	1.3	855
Pheasant:	.....	.....	.....	.....	.....	.....	.....
As purchased.....	12.0	61.5	21.5	4.2	.....	1.0	730
Edible portion.....	.....	69.9	24.4	4.8	.....	1.1	830
Meat, not including giblets.....	.....	70.0	24.7	4.6	.....	1.1	815
Giblets.....	.....	68.9	20.1	7.2	.....	1.6	880
Russian pheasant:	.....	.....	.....	.....	.....	.....	.....
As purchased.....	14.1	61.1	21.5	1.9	.....	1.2	635
Edible portion.....	.....	71.1	25.0	2.3	.....	1.4	740
Meat, not including giblets.....	.....	70.6	25.7	2.3	.....	1.4	730
Giblets.....	.....	74.4	21.2	2.2	.....	1.3	665
Quail:	.....	.....	.....	.....	.....	.....	.....
As purchased.....	10.5	59.0	22.3	6.1	.....	1.4	835
Edible portion.....	.....	65.9	25.0	6.8	.....	1.6	935
Meat, not including giblets.....	.....	66.3	25.4	7.0	.....	1.4	945
Giblets.....	.....	63.0	21.8	6.2	.....	2.3	970
PRESERVED POULTRY MEAT.							
Smoked goose breast (including skin and fat).....	.....	35.7	20.1	38.7	.....	5.5	2,210
Smoked goose breast (skin and outer fat removed).....	.....	61.3	26.1	4.4	.....	8.0	845
Potted turkey.....	.....	56.0	17.2	22.0	.....	3.0	1,390
Potted chicken.....	.....	56.1	19.4	20.3	.....	2.5	1,390
Canned chicken soup.....	.....	87.1	2.9	3.3	5.1	1.6	300
Canned chicken gumbo soup.....	.....	91.0	2.4	.2	4.8	1.6	160
Canned boned chicken.....	.....	57.6	27.7	12.8	.....	2.2	1,245
Canned sandwich chicken.....	.....	46.9	20.8	30.0	.....	2.6	1,825
Canned sandwich turkey.....	.....	47.4	20.7	29.2	.....	2.7	1,790
Canned quail.....	.....	66.9	21.8	8.0	1.7	1.6	935
Terrine de foie gras.....	.....	41.3	13.6	38.2	4.3	2.6	2,075
OTHER KINDS OF FOOD.							
Beef, sirloin steak, as purchased.....	12.8	54.0	16.5	16.1	.....	.9	.....
Beef, brisket, as purchased.....	23.3	41.6	12.0	22.3	.....	.6	.....
Lamb chops, as purchased.....	14.8	45.3	16.0	24.1	.....	.8	.....
Mutton, leg, as purchased.....	18.4	51.2	15.1	14.7	.....	.8	.....
Pork, chops, as purchased.....	19.7	41.8	13.4	24.2	.....	.8	.....
Pork, salt fat, as purchased.....	11.2	17.6	7.4	59.6	.....	5.1	.....
Halibut, fresh, steaks, as purchased.....	17.7	61.9	15.3	4.4	.....	.9	.....
Mackerel, salt, as purchased.....	19.7	34.8	13.9	21.2	.....	10.4	.....
Oysters, solids.....	.....	88.3	6.0	1.3	3.3	1.1	.....
Eggs, as purchased.....	11.2	65.5	11.9	9.3	.....	.9	.....
Milk.....	.....	87.0	3.3	4.0	5.0	.7	.....
Butter.....	.....	11.0	1.0	85.0	.....	3.0	.....
Cheese, as purchased.....	.....	34.2	25.9	33.7	2.4	3.8	.....
Wheat flour.....	.....	12.0	11.4	1.0	75.1	.5	.....
Wheat bread, white.....	.....	35.6	9.3	1.2	52.7	1.2	.....
Beans, dried.....	.....	12.6	22.5	1.8	59.6	3.5	.....
Potatoes as purchased.....	20.0	62.6	1.8	.1	11.7	.8	.....
Apples, as purchased.....	25.0	63.3	.3	.3	10.8	.3	.....

The proportions of the different nutrients in poultry and poultry products are shown in Table 1, but before considering this phase of the subject in detail it is desirable to speak of another important matter, namely, the digestibility of poultry; since statistics of this nature are needed in connection with any adequate discussion of nutritive value.

DIGESTIBILITY OF POULTRY.

It is not alone the amount of nutritive ingredients in a given food which determines its real nutritive value, but the amount of these which the digestive organs can set free for the use of the body. From many digestion experiments it has been learned that not all kinds of foods are digested with equal completeness. The thoroughness of digestion is learned by experiments with man and other animals, or by artificial digestion experiments in which specially prepared ferments are used and body conditions are approximated more or less closely. Few experiments have been made with the special object of learning how thoroughly poultry and poultry products are digested, but some of the investigations conducted by this Department and by others furnish information on the subject, although designed primarily for other purposes. For instance, in several of the digestion experiments carried on at the Maine Experiment Station, chicken formed a part of the diet, and an idea of its digestibility may be learned by comparing the results of these experiments with others in which chicken was replaced by beef. From all the available evidence it seems fair to assume that poultry flesh is as thoroughly digested as that of other domestic animals commonly used for food. As a result of a large number of experiments it is believed that on an average 97 per cent of the protein, 95 per cent of the fat, and 98 per cent of the carbohydrates present in fish and meat of all kinds is digested. These values may be assumed therefore to represent the digestibility of poultry until more evidence is at hand. In calculating the amounts of nutrients furnished by different foods it is a common practice with many American investigators to use the factors just quoted for all animal foods. They are somewhat larger than the corresponding factors for vegetable foods, namely, protein 84 per cent, fats 90 per cent, and carbohydrates 97 per cent. In other words, animal foods, including meats, poultry, fish, and other animal products, are, generally speaking, considered somewhat more digestible than vegetable foods.

By the use of these percentages it is easy to estimate the digestible nutrients of any kind of food whose chemical composition is known, and they have been employed in calculating the value for digestible nutrients in some of the kinds of poultry flesh included. The results of the calculations are included in Table 2, accompanying, which also includes similar values for some of the more common cuts of beef, veal, and lamb for purposes of comparison. Such values can be readily calculated if desired for the other kinds of poultry and poultry products.

TABLE 2.—*Refuse, indigestible nutrients, digestible nutrients, and available energy in poultry and some other foods.*

Kind of food.	Refuse.	Indigestible nutrients.	Water.	Protein.	Fat.	Carbohydrates.	Ash.	Fuel value per pound.
	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Calories.
Chicken:								
As purchased	18.8	0.9	55.5	17.3	6.8	.....	0.7	685
Edible portion		1.2	68.4	21.2	8.4	.....	.8	780
Fowl:								
As purchased	25.2	1.0	47.3	14.0	12.0	.....	.5	790
Edible portion		1.7	59.5	19.8	18.2	.....	.8	1,170
Turkey:								
As purchased	14.3	1.9	49.2	18.4	15.4	.....	.8	1,025
Edible portion		2.2	57.4	21.5	18.0	.....	.9	1,195
Duck:								
As purchased	15.9	1.8	51.4	14.9	15.2	.....	.8	945
Edible portion		2.0	61.1	17.8	18.1	.....	1.0	1,125
Goose:								
As purchased	11.1	1.5	48.0	14.4	24.2	.....	.8	1,320
Edible portion		1.8	54.0	16.1	27.3	.....	.8	1,485
Beef, sirloin steak, as purchased	12.8	1.2	54.0	16.0	15.3	.....	.7	970
Halibut, fresh, steaks, as purchased	17.7	.7	61.9	14.8	4.2	.....	.7	475
Eggs, as purchased	11.2	2.3	65.5	11.5	8.8	.....	.7	606
Milk		.6	87.0	3.2	3.8	4.9	.5	225
Butter		4.9	11.0	1.0	80.8	.....	2.3	3,460
Wheat bread, white		8.4	85.6	7.9	1.1	51.1	.9	1,165
Potatoes, as purchased	20.0	.9	62.6	1.5	.1	14.3	.6	305

Judged by these figures, it will be seen that poultry compares very favorably with the other flesh foods. Of course, such average values as are given in Table 2 do not represent the exact amount of nourishment each individual would get from the food materials quoted; for the power of digestion varies with individuals. Nor do they refer to the ease and quickness of digestion; such conditions also differ with different persons, and doubtless depend somewhat upon the way in which the food is cooked and upon the toughness or tenderness of the particular sample. Such variations, however, so far as we know, are comparatively slight among normal persons, and the figures in the table may be taken, until more definite information is available, to indicate the amount digested by the average healthy person.

NUTRITIVE VALUE OF POULTRY.

In trying to learn the nutritive values of different kinds of food as shown in Table 1, it should be remembered that the greater the proportion of refuse and water the smaller will be the proportion of nutritive material, and that the presence of fat raises the fuel value, while refuse, water, and ash lower it. It is evident that many of the statements in the following pages apply to such values as are included in Table 2 as well as to those in Table 1, since the former were computed from the latter by uniform factors.

It may be interesting in discussing the value of poultry as food to notice how the different kinds of meats, taken as a class, compare in nutritive value with the other classes of foods, such as milk, eggs, vegetables, fruits, cereals, bread, etc. As might be expected, poultry

flesh is very similar in composition to other sorts of meat, and in general meat contains less water than milk but more than eggs or cheese, the common animal foods with which it would be ordinarily compared. As regards its fat content, the proportion of this nutrient is on an average greater than the amount in milk or eggs, but, of course, except in such cuts as fat pork, much less than in butter, lard, or other similar materials which are mostly pure fat. Nearly all vegetable foods contain larger proportions of carbohydrates than do animal foods. Protein and fat are the characteristic nutrients in meats of all kinds, the proportions varying within rather wide limits in different kinds and cuts and within less wide limits in different specimens of the same kind and cut, the figures in Table 1 being simply the best average values which are at present available. Meats supply a considerable amount of fat, but not in such large proportions that the body could get readily all the fuel it needed from them without getting a superfluous amount of protein. Hence the ordinary custom of living on a mixed diet of meats—i. e., nitrogenous foods and vegetables or carbonaceous foods—is very sensible, because it readily furnishes a sufficiency of both building material and fuel without loading the digestive organs with a great excess of either.

COMPARISON OF POULTRY AND OTHER MEATS AND OF DIFFERENT KINDS OF POULTRY.

When we compare the meat of poultry with that of beef, veal, lamb, and pork, we find that on the average the refuse in poultry is slightly less. On an average the various kinds of poultry furnish not far from 5 per cent more protein than the other kinds of meat included in the table and a very little more ash. On the other hand, most of them contain considerably less fat and have a relatively smaller fuel value. As far as the nutritive value alone is concerned, the general advantage of poultry over the other meats thus appears to be that, pound for pound, it contains very slightly more of the building materials needed by the body; its disadvantage is that it furnishes less of the energy-giving material than the fatter meats.

As regards poultry of different sorts, in general the light-fleshed birds are richer in protein and poorer in fat than the others. Probably in all the light-fleshed varieties, at any rate in chickens, the young birds yield a larger proportion of protein and a smaller proportion of fat than the older ones of the same kind; while in the dark-fleshed varieties the young are richer in fat and poorer in protein. As a general thing the young birds contain less refuse, which means that the proportion of bone to total weight is smaller. Their flesh also contains more water, which may indicate that it is not so solid and compact as in the old birds.

Some of these differences in nutritive value in the various kinds of poultry are perhaps large enough to be carefully considered in planning dietaries. If chicken with its 8 per cent of fat were substituted in a menu for green goose with its 33 per cent, or turkey with 20 per cent protein, for duckling with 13 per cent, the proportion of building material and fuel furnished to the body might be noticeably changed. But too much importance should not be put on the differences between closely related birds, such as chicken and turkey, hen and capon; such differences are too small to seriously affect the nutritive value of the diet under ordinary circumstances. Moreover, as was noticed in the comparison of poultry with other kinds of meat, these differences vary with individual specimens, or the greater nutritive value which one kind seems from the table of composition to possess may be counterbalanced by greater losses in cooking, toughness of the particular bird, or by higher price. The consideration of price is so important that it will be discussed at length in a later section.

Various beliefs are current regarding the comparative value of poultry and other meats, and of different parts of the same bird. There is a theory that poultry, along with veal and lamb, is more healthful than red meats (beef), because it contains less of certain undesirable nitrogenous extractives, and some physicians have forbidden the use of red meats to patients, especially those troubled with gout and kidney diseases. Recent German experiments indicate that the differences in this regard between the two classes of meat are inconsiderable, and that they are quite as much in favor of the red as of the so-called "white" meats.

Many people maintain that while duck breast is very nutritious and quite easily digested the rest of the bird is hardly fit to eat. From the figures in Table 1 it will be seen that the breast contains 5 per cent more protein and 24 per cent less fat than the other edible portions. It is a matter of common belief that a large amount of cooked fat of meat or poultry is not easily digestible for many persons. If this be the case, it would naturally follow that the breast would give the digestive system less work to do than other parts, besides furnishing more protein from the same weight of meat, and would really be a more satisfactory food, especially for invalids.

There is also a theory that the light meat of chicken, turkey, etc., is more easily digested, because more tender, than the dark. A glance at the figures for chicken and turkey in Table 1 will show that the light meat of these birds, and especially of turkey, contains more protein and less fat than the dark, and may therefore yield more nourishment for the same amount of digestive effort. But this difference in nutritive value, as far as can be definitely stated, depends on the chemical composition rather than on the texture of the fibers. Artificial digestion experiments have shown that light and dark meat of poultry do

not differ materially as regards the amounts digested in a given time under uniform conditions. In some recent experiments with man it was found that boiled chicken left the stomach more quickly than roasted.

It seems fair to say that little is definitely known, save that the differences in the nutritive value of light and dark meat are certainly too small to affect any save possibly the very weakest digestions. It seems probable that as regards ease of digestion the mode of cooking, as well as differences in composition or texture, has an effect on both light and dark meat.

COST OF POULTRY.

The price of poultry varies largely with the season, region, and market. Table 3 shows the average wholesale price per pound of the more common kinds of poultry at various seasons. Its figures, like those in Table 4, were calculated from the market reports from Boston, Chicago, Denver, New Orleans, New York, and St. Louis, obtained through the Division of Statistics of this Department.

TABLE 3.—Average wholesale price per pound of poultry at different seasons.

Kind of poultry.	June.	July.	August.	December.	January.	February.	Average of seasons.
	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>
Chickens.....	11	12	11	11	11	12	11
Turkeys.....	12	13	15	14	15	15	14
Ducks.....	10	11½	14	13½	14	14	13
Geese.....	8	10	9½	12	11	11	10

One of the most interesting things shown by Table 3 is the comparatively slight variation between winter and summer prices. Chickens on an average appear to vary only 1 cent per pound, turkeys 3 cents, and ducks and geese 2 cents. Cold-storage poultry probably helps in keeping prices steady, as the storage men can put their birds on the market whenever the price tends to rise in off seasons and can put the new birds into storage when there is danger of a glut in the market. Retail prices vary very much with the season, especially in smaller towns, where part of the supply comes direct from the farms.

In the following table is shown the average wholesale price per pound of the several kinds of poultry in the markets of a number of American cities:

TABLE 4.—Average wholesale price per pound of poultry in a number of American cities.

Kind of poultry.	Boston.	Chicago.	Denver.	New Orleans.	New York.	St. Louis.
	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>
Chickens.....	14.0	12.5	9.5	^a 12.5	^b 11.0	^b 8.5
Turkeys.....	18.5	14.5	11.0	12.0	14.0	13.0
Ducks.....	13.5	13.0	11.5	^c 11.0	15.0	10.0
Geese.....	^c 13.0	10.0	11.0	.....	12.5	7.0

^a Rates for June, December, January, and February only.

^b Broilers not included.

^c Rates for December, January, and February only included.