

Turkey production for the country as a whole showed a declining trend for several years after the World War, reaching a low point in 1927. With the gradual adoption of improved methods and with profitable returns to growers, numbers have tended to increase since that year, and in 1932 the turkey crop was the largest of record, probably exceeding 19,000,000 birds. There has been a pronounced recovery during these years in the number of turkeys produced in the farming sections of the country east of the Mississippi River, as well as heavy increases in the commercial producing areas of the western half of the country, but the trend toward production of turkeys in very large flocks has probably been halted by the very low prices received for turkeys produced in 1932.

Although turkeys formerly sold for considerably more per pound than chickens, the improvement in methods of producing turkeys has lowered the cost, and the spread in price between turkeys and chickens has decreased greatly in recent years. The difference between the farm price per pound of turkeys and of chickens on November 15 was approximately 10 cents in 1926, 7 cents in 1929, 4 cents in 1931, and only 2.8 cents in 1932. The December price in 1932 was even less favorable to turkeys than that of November and in leading markets there was practically no difference in price between turkeys and chickens of similar quality.

While the prices received in 1932 will lead many turkey growers to reduce or dispose of their flocks, the very low prices for feed made it possible to produce the birds in that year at a very low price. Many experienced and efficient producers claim to have made money on their turkeys in 1932, and it is not expected that the reduction in numbers in 1933 will be very large.

Imports of turkeys have not been a large factor in the market. At the low prices prevailing in 1932 and with a tariff of 10 cents per pound for dressed turkeys, imports amounted to less than 0.25 per cent of the domestic production.

Cold-storage stocks of turkeys January 1, 1933, were almost two-thirds greater than the 5-year average. This big carry-over was partly due to the big crop, but with increasing production and lower prices the consumption of turkeys beyond the holiday season is increasing.

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**B**REEDING and Management Have Greatly Increased Average Egg Production In many respects the greatest need of the poultry industry of the United States is the use of better-bred stock by farmers and commercial poultrymen. The average annual production of laying hens in the United States is only about 80 eggs. A flock average of 150 eggs per bird is readily possible if the stock has been bred to lay. With this average relatively good profits are generally made.

In recent years much attention has been given to selecting and breeding for higher egg production, a fact which has resulted in much higher average egg production not only in large commercial poultry flocks but also in the small farm and back-yard flocks. Culling out the poor layers from the laying flocks by selection based on their ap-

pearance and condition during the summer has become a very general practice where hens are not trap nested. Egg-laying contests, which were begun in the United States in 1911, are now carried on in many sections of the country. The egg production in these contests has greatly increased in the last 10 years. In the contest in Connecticut, which was the first and is fairly representative, the average production per hen increased from 160 eggs in 1921 to 213 in 1931.

A marked increase in average production is also shown in the egg records of many commercial poultry farms and general farm flocks. In New Jersey, records of a large number of commercial poultry farms showed that average yearly egg production per hen increased from 133 eggs in 1921 to 150 in 1929. Likewise, in Missouri, a selected group of general farm flocks produced an average of 147 eggs per hen in 1929 compared with 100 eggs in 1919. With higher egg production there has been some tendency toward a greater percentage of small eggs in many flocks, a tendency which has necessitated the rigid culling of all hens laying small eggs. In practically all egg-laying contests, egg size as well as number of eggs is taken into consideration, and selection for larger eggs is a very important problem in all breeding flocks. The size of an egg materially affects its market value.

This interest in higher egg production and maintenance of good size has led to the establishment of numerous large poultry-breeding farms where all layers are trap nested and pedigrees of all chicks are recorded. Selection of breeding stock is made through progeny testing. Many of the breeders are selected for high hatchability of eggs and good livability of chicks in addition to high egg production. The keeping of records of performance under official supervision has been developed in a number of States, and has aided in the breeding of poultry for better egg production. From these poultry farms, breeding stock of high-producing blood lines is getting into the commercial laying flocks and the general farm and back-yard flocks of the country.

Breeding for increased egg production requires much careful, detailed, and persistent work to show results. The health of both males and females, as well as breed type, must be maintained.

Breeding factors especially affecting production are: Early sexual maturity, intensity of production, nonbroodiness, and persistence of production. The best birds mature early, lay at a good rate, are nonbroody, and show persistence by laying well in the summer and fall. In order for hens to lay approximately 200 eggs a year, they should be hatched in the spring and commence laying at about 150 to 200 days of age. They should lay at a rate of 60 per cent from the time they commence laying until March 1; that is, each bird should lay on at least 60 per cent of the days during that time in order to be a good annual egg producer.

At the United States Animal Husbandry Experiment Farm, Beltsville, Md., it has been found that among 971 Rhode Island Reds, 477 showed broodiness and 494 showed no broodiness. The birds that were broody at times had an average egg production of 188 eggs, whereas the nonbroody birds laid an average of 205 eggs.

Birds that lay well toward the close of their first laying year are nearly always the best layers. A good method of determining the persistent producers is to note the birds that lay during August and September at the end of the first year of laying. Among 894 Rhode Island Reds at the experiment farm at Beltsville, those birds that laid the most eggs in August and September also laid the highest number dur-

ing the first year of laying. For instance, 30 birds that averaged 47 eggs during August and September laid an average of 247 eggs during their first laying year, whereas 47 birds that laid no eggs whatever in August and September had a first-year average production of only 139 eggs.

### Development of the Baby-Chick Industry

The small lamp incubators that were kept on most poultry farms and on many general farms 20 years ago, have declined in popularity and use. The modern trend is toward the use of large incubators in commercial hatcheries. Most of these commercial hatcheries devote all their time to hatching chicks, although medium-sized incubators are still operated on many poultry farms where hatcheries are one branch of the business. However, farmers still have many of the small incubators which they use when they do not have ready cash to buy chicks. Large numbers of chicks, also, are hatched by hens. A partial survey of farms in 1928 showed that about 43 per cent of the chicks in this country were still hatched by the natural method.

A particular advantage of the artificial method of hatching chicks is the possibility of hatching them early so that pullets will mature and lay in the fall and early winter. Artificial hatching and brooding have greatly increased the proportion of early-laying pullets. Other developments in the manufacture and use of incubators have been improvements in methods of controlling the temperature, humidity, and ventilation and also the introduction of labor-saving devices for handling the eggs. The use of large, compact cabinet machines in which the hatching eggs are kept in a series of shelves, seems to be increasing more than the use of the older style of long incubators constructed as single or double tier machines.

The business of producing day-old chicks commercially began in this country about 1910, and has grown immensely. The 1930 census reported 272,403,462 baby chicks bought by farmers in 1929. This business has had a marked effect on the poultry industry and has resulted in replacing mongrel with purebred flocks, in earlier hatching of chicks, and in better-producing flocks on farms. The baby-chick industry, which at first gave most of its attention to increasing the number of chicks handled, has now reached the stage at which much more attention is given to producing better-quality chicks. Most hatcheries now get their eggs from carefully selected flocks, many of which are tested for pullorum disease. A closer cooperation between hatcheries and poultry-breeding farms offers great possibilities for continued improvement in the reproduction of the poultry flocks of the country.

### Improvement in Brooding Methods

Changes in brooders have been almost as great as those in incubator equipment. Stove brooders used in portable colony houses are the most common type and are especially suited for farm flocks. A very marked increase has taken place in the use of artificial methods of brooding both chickens and turkeys on general farms. Artificial brooding enables the farmer to brood in a few flocks all the chicks hatched, and aids in producing much earlier and more uniform pullets than are obtained when the chicks are raised under hens.

It has been found that for best results in brooding there should be not more than 300 chicks in a flock. As a rule the smaller the number of

chicks per flock the higher will be the rate of growth and the lower the mortality. It has also been found that best results in brooding are obtained when each 100 chicks are allowed 50 square feet of floor space or more.

Long brooder houses heated by hot-water pipes are used on many commercial poultry farms where the chicks are started either in brooder houses without yards or having very small outside porches

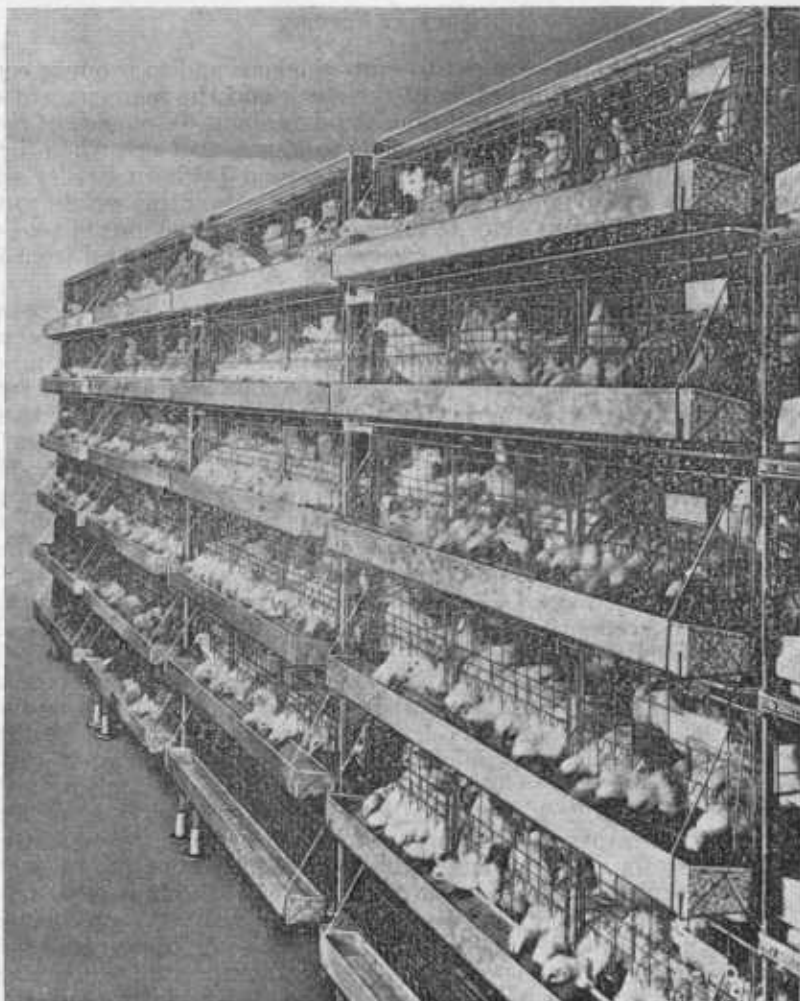


FIGURE 49.—A battery brooder, a modern device used in raising chicks for broilers and starting pullets for egg production

with wire or concrete floors. If the chicks are allowed on the ground the soil in the narrow brooder yards next to the long brooder houses soon becomes infected with disease germs and it is almost impossible to keep it sanitary. The colony brooder houses are used for growing the pullets to maturity but may be supplemented to advantage with light, portable growing shelters on range to keep the pullets from being crowded in the houses as well as to give them a better range.

The successful raising of chicks indoors has led also to a considerable use of wire-floored battery brooders in which the chicks are kept in coops five or six tiers high. These battery brooders are particularly adapted for broiler raising but are sometimes used to start chicks that are to be kept for egg production. (Fig. 49.) Best results are usually obtained when the chickens are kept not more than three to five weeks in these batteries.

### Efficiency in Feeding

The quantity of feed required to grow chickens and to produce eggs depends largely on the breeding of the stock and the management of the birds. Under average conditions it takes about  $6\frac{1}{2}$  pounds of feed to grow Barred Plymouth Rock broilers to 10 weeks of age, when their average weight is about 2 pounds. A 2-pound Leghorn broiler will have eaten about 7 pounds of feed and will not attain this weight until it is from 11 to 12 weeks old. It takes from 25 to 35 pounds of feed to raise a pullet of the general-purpose breed to laying age, and from 20 to 25 pounds for a Leghorn pullet.

Feed costs represent from about 55 to 65 per cent of the total cost of egg production. Leghorn pullets, bred to lay, which produce an average of 150 eggs a year, require about 6 pounds of feed to produce a dozen eggs. General-purpose pullets require about  $6\frac{3}{4}$  pounds of feed to produce a dozen eggs. A Leghorn hen will consume from 70 to 85 pounds of feed in a year, and a general-purpose hen from 80 to 95 pounds. Pullets are more economical egg producers than hens, and the tendency is to keep more pullets and fewer old hens on general farms. Many commercial laying flocks are made up entirely of pullets. Experience has shown that two-thirds pullets and one-third yearling and older hens is a very good proportion.

Under good conditions it takes about  $3\frac{1}{4}$  pounds of grain and 5 pounds of buttermilk to produce 1 pound of gain in fattening chickens. Milk is commonly used in most fattening rations.

Improvement in methods of feeding has tended to make poultry production more economical and otherwise efficient. These improved methods have resulted largely from experimental work in poultry feeding. Many of the experiments have been conducted in laboratories where all conditions could be carefully controlled and results accurately measured. This work has gradually transformed studies of poultry feeding from a rather rough comparison of rations and of products in common use to a more fundamental study of nutritional problems.

Protein studies have revealed facts about the relative value of different protein products in egg production as well as their effect on the hatchability of eggs. These studies have produced evidence indicating that not only is the quantity of protein important but that the quality of the protein is more important in growth and egg production than it has heretofore been considered to be. The work has shown that certain vegetable proteins, such as cottonseed meal and soybean meal, although giving satisfactory egg production, are not nearly so good for producing hatchable eggs as are animal-protein feeds such as milk and fish products.

Experiments in feeding chicks have shown the need of a high-protein diet during early growth, and there is now a very general use of all-mash rations containing about 15 to 18 per cent of animal protein for the first four or five weeks. These all-mash rations are also being used

successfully for raising chickens to market or laying age as well as for feeding laying hens. However, the use of both scratch and mash feeds in the ration is better adapted to general-farm poultry raising where some home-grown grains are usually available.

Mineral and vitamin problems have proved to be as complex as the protein studies, and that of obtaining the best mineral balance for growing chickens is not yet fully solved. A ratio of about  $2\frac{1}{2}$  parts of calcium to 1 part of phosphorus in a growing ration has given good results where the chickens are confined indoors; but this mineral balance is apparently not important to general farmers who raise chickens on free range. The increasing tendency to keep poultry confined, either indoors or in very small, bare yards, has resulted in much greater interest in the study of minerals in the ration as well as the necessity for supplying certain vitamins in the hen's diet.

A few years ago, it was found that chickens could be kept successfully indoors, if they were fed a balanced diet supplemented by cod-liver oil. This has made it possible to raise broilers in confinement with good results as well as to keep hens confined in the laying houses, both of which practices have been extensively developed. Both vitamins A and D are very necessary in a poultry ration, but are readily supplied in yellow corn meal and cod-liver oil. This oil is commonly used in feeding chickens for the first few weeks after hatching and in feeding all poultry that are kept confined indoors. Other fish oils are used for the same purpose. There appears to be no need to feed cod-liver oil to chickens in farm flocks that have a grass range and receive plenty of direct sunlight.

The production and sale of commercially mixed poultry feeds have grown into a very large business. Many of the feed companies maintain their own well-equipped experiment farms for studying feeding problems and also do extensive work in distributing poultry information to producers.

### Improved Practices in Poultry Management

The use of electric lights in poultry houses to improve fall and winter egg production has become common on poultry farms. Artificial lighting is also used to some extent for small flocks in back yards and on general farms. The extra hours of light, supplied from September to March, lengthen the pullets' working day to about 12 or 14 hours, thereby increasing egg production as a consequence of the extra feed consumed by the pullets.

Although the long, narrow poultry house is the type still most common both on general farms and on poultry farms, there is a noticeable trend toward the use of larger houses. One of the latest types of large laying houses is the multiple-story house (fig. 50), from two to six stories high, which will house from 1,000 to 5,000 hens. Large barns have been remodeled and made into very good poultry houses. The use of large poultry houses reduces labor, makes it easier to care for the hens during the winter months, and provides more comfortable quarters for the birds during cold weather. Many of these houses have well-insulated walls and mechanical systems of ventilation. Some are artificially heated. Hens are also sometimes kept in laying batteries, arranged in tiers, each hen having an individual compartment.

The use of strict sanitary measures in rearing poultry and in keeping laying and breeding stock has increased greatly in recent years. "Grow

Healthy Chicks" projects have been developed extensively in many States. Use of sanitary methods in rearing turkeys has reduced the losses from blackhead and has restored turkey raising to its former status.

A typical sanitary program of poultry raising involves the following points:

(1) Producing chicks from breeding stock free from pullorum disease and hatching them in clean incubators.

(2) Keeping brooder and laying houses clean by scrubbing the buildings and equipment with water containing lye, and then thoroughly disinfecting them.

(3) Using clean ground, that is, ground that has been entirely free from chickens and chicken droppings for one year.

(4) Keeping litter clean by frequently changing it in the laying house and by renewing it at least once a week in the brooder house.

(5) Keeping feed and water clean by using feed hoppers that prevent waste and keep out dirt, and by placing mash hoppers and water pans on raised wire screens.

Improved management likewise has contributed materially to improvement in the quality of eggs, a development that has tended to increase consumption of eggs in recent years.

#### Improvement in the Quality of Eggs

Figures of the 1930 census indicated a per capita egg consumption of 21.9 dozen in 1929 compared with 15.7 dozen in 1919. There is need, however, for further improvement in the methods of producing and marketing eggs on general farms.

Less improvement has taken place in the quality of poultry meat produced on farms, and there is also less opportunity to capitalize on meat quality, since eggs are the principal product of poultry raising. The value of eggs sold was three and one-half times the value of poultry sold in the States on the Pacific coast, three times that in the Mountain States, and approximately twice the value of poultry sold in the rest of the country. The farmer who keeps 200 or more hens has a unit large enough to make it worth while to use improved methods and give careful attention to the production and marketing of good-quality eggs and poultry. If a farmer is unable to keep a flock of 200 hens or more, there are many advantages in keeping only enough to produce eggs and poultry for home use.

The growing practice of buying eggs on grade from producers is giving farmers an incentive to produce and market good-quality eggs. Good size is required in eggs of the highest grade; this quality is largely controlled by breeding. Feeding materially affects the quality of eggs but only slightly affects their size.

Other important factors include the producing of clean eggs, producing infertile eggs, keeping the eggs cool, and marketing them while fresh. In order to produce clean eggs it is necessary to provide one nest for every four or five hens; to keep the nests well supplied with litter, which should be changed frequently; to place wire netting under the roosts so that the hens can not have access to the manure on the dropping boards; to keep the floor of the house well supplied with clean, dry litter; and to gather the eggs four times a day during warm weather and twice a day at other times.

Heat causes eggs to deteriorate; therefore, the farmer who wishes to market good eggs should put them in a cool place as soon as they are gathered. Fertile eggs are likely to spoil much more quickly than infertile eggs; therefore, farmers should remove the male birds from the breeding stock immediately after the breeding season is over. Eggs for market should never be washed and the dirty eggs should be kept for home use. All eggs should be marketed at least twice a week.

Eggs produced on commercial poultry farms usually bring much higher prices than those produced on general farms. However, the commercial poultry farmer also has the problem of needed improvement in egg quality and better marketing methods. The eastern poultryman, for instance, finds that he must improve his methods to compete with the excellent quality of eggs produced on the Pacific

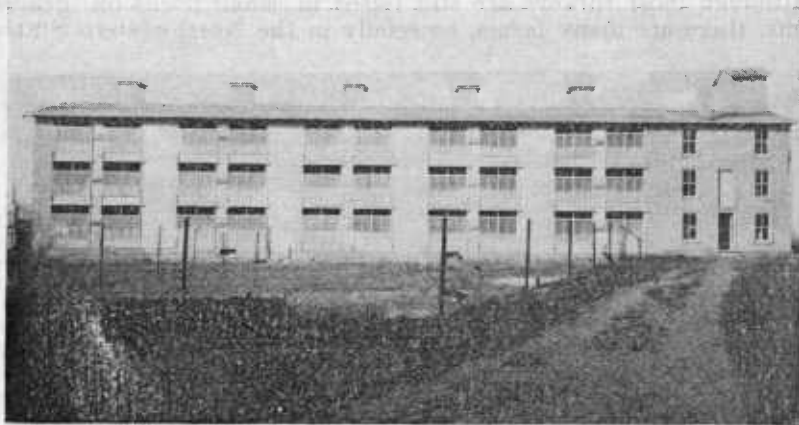


FIGURE 50.—A multiple-story poultry house. This type is now used on many farms

coast, where eggs are so carefully graded that they sometimes bring higher prices in the eastern market than do eggs produced on near-by poultry farms.

Controlling the color of egg yolk presents a problem if eggs are produced primarily for markets that pay a premium for pale yolks. Green feed and yellow corn in the ration tend to produce dark-colored yolks, whereas lack of certain green feed and the use of wheat, oats, barley, and white corn tend to produce the desired light-colored yolks.

### Poultry Products in the Diet

Hens' eggs have high nutritive value, are easy to cook, and are, in general, one of the most popular foods. They are greatly valued for their high protein content, for their varied mineral elements, and for the several vitamins that they contain. The white of an egg is made up largely of protein, the yolk is rich in vitamins A, B, D, and G, and considerable quantities of calcium, iron, and phosphorus are present. Practically all the fat in eggs is contained in the yolk, but both the white and the yolk contain proteins and minerals. Besides supplying these desirable food elements, eggs properly cooked are one of the most easily digested of foods.

Although most eggs reach the consumer in the shell, the quantity of frozen eggs used by bakers and confectioners is gradually increasing.



Poultry meat has long been a favorite food although not used in the diet so frequently as eggs. Chickens make up the main source of poultry meat throughout the year except at Thanksgiving and Christmas, when turkeys are highly popular. A marked increase in winter-broiler raising in recent years has made available a good supply of freshly killed broilers at all seasons of the year. Poultry flesh, though differing but little in nutritive value from other lean meat, is greatly relished and is an efficient protein food as well as a good source of iron and phosphorus.

Though, as previously stated, chickens predominate in the poultry industry of the United States, turkeys, ducks, and geese are also commercially important.

### Turkey Raising

Although most turkeys are still raised in small flocks on general farms, there are many farms, especially in the Northwestern States,

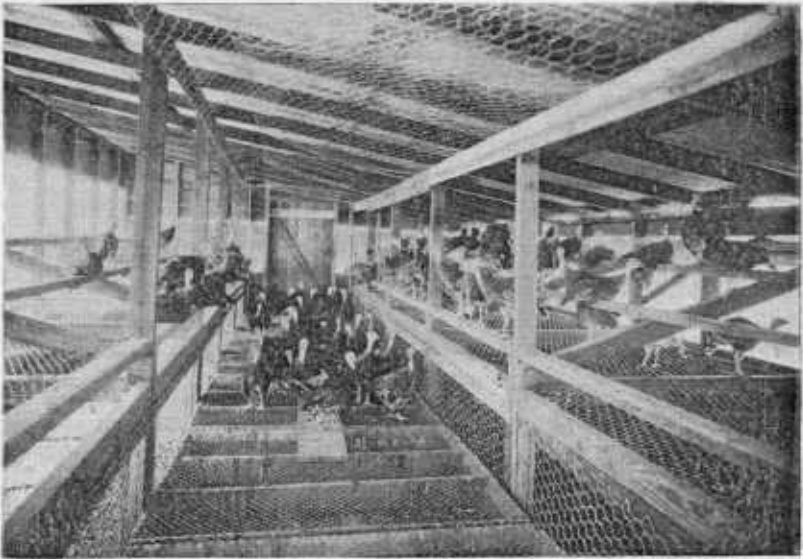


FIGURE 51.—Wire floors in a house used for growing turkeys on the range. This sanitary feature has substantially reduced mortality

where 1,000 or more turkeys are raised each year. Farmers can advantageously raise fair-sized flocks of turkeys by following careful sanitary practices in handling the stock, providing clean yards and range, brooding the poults artificially, and keeping the young turkeys away from all chickens. (Fig. 51.) Excellent results may be obtained by keeping the turkey poults in semiconfinement for the first 8 to 12 weeks and then putting the young turkeys on clean, free range where they can pick up part of their feed. The best growth is obtained when the growing turkeys are fed some growing mash even if they have an excellent range. It takes about 80 pounds of feed to raise a male turkey to 26 weeks of age, and 50 pounds for a young hen. Well-grown males, fed freely, weigh about 18 pounds at that age, and the females about 11½ pounds. Average feed consumption is about 4½ pounds for each pound of live turkey produced.

### Duck Raising

Ducks raised in 1929 made up 1.6 per cent of the total poultry production in the United States. On general farms there is but little interest in ducks and the number raised there is apparently decreasing. On the other hand, interest in raising ducks on a large scale for commercial purposes is growing. This enterprise has been most extensively developed on Long Island in New York State. There are also large duck farms in other regions.

On such commercial farms ducks are forced for rapid growth and weigh 5½ pounds at 10 weeks of age, when they are ready for market. On general farms they are not forced and usually are not ready for market until about 6 to 7 months old, when they weigh only 5 to 6 pounds. Certain breeds of ducks lay as well as chickens, if bred for egg production, but since there is very little demand for duck eggs in the United States there is but little interest in keeping ducks for egg production.

### Goose Raising

Goose raising, on general farms in this country, is in about the same state of development as duck raising; however, there are no large commercial goose farms, since geese are produced entirely in small flocks on general farms. Geese made up only 0.6 per cent of the total poultry raised in 1929; the number kept in this country has decreased materially in the last 20 years.

Prices received for market geese have been somewhat lower than duck prices, considerably below prices for hens, and very much lower than turkey prices. This condition appears to account for the decreasing interest in goose raising.

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