

# AGRICULTURAL EXPERIMENT STATION

KANSAS STATE COLLEGE OF AGRICULTURE  
AND APPLIED SCIENCE

MANHATTAN, KANSAS

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DEPARTMENT OF POULTRY HUSBANDRY

## TURKEY MANAGEMENT<sup>1</sup>

H. M. SCOTT



Turkeys in Kansas are grown primarily in small numbers on general-purpose farms. More recently specialized turkey farms have been developed where intensive methods of culture are employed. The trend toward specialization has been a major factor contributing to the large increase in the number of turkeys grown in the state annually. During the last decade the low production point occurred in 1930 and 1931 when 255,000 turkeys were grown. This number

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increased to 974,000 in 1939 or a percentage increase of slightly more than 280 percent. The trend of production in Kansas is similar to the trend for the entire United States. The increase from the 1930 low of 16,535,000 turkeys raised in the United States to 32,732,000 in 1939 represents an increase of slightly less than 98 percent. Proportionally the increase in Kansas has been slightly more than 2.8 times that of the entire United States.

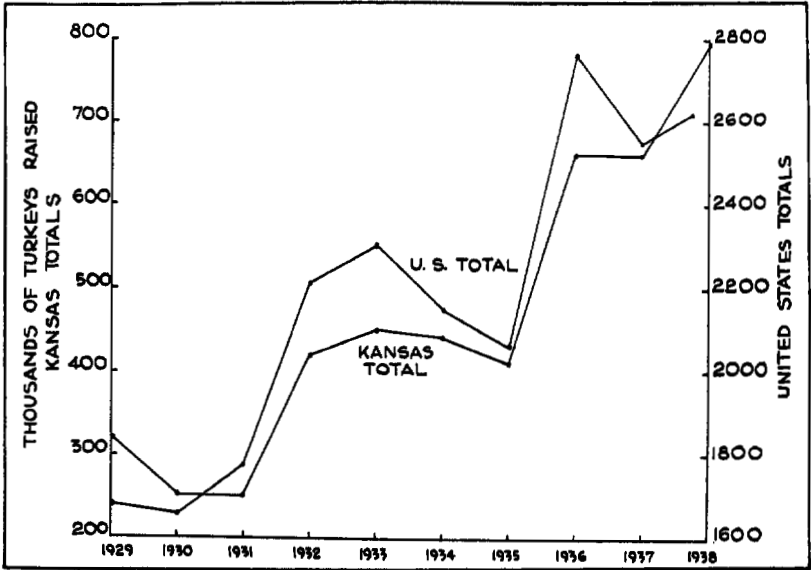


FIG. 1.—The increase in the number of turkeys raised annually in Kansas from 1929 to 1938 and the United States total for the same period. (Bureau of Agricultural Economics, U. S. Department of Agriculture.)

TABLE 1.—Per capita consumption of turkeys in the United States for the period 1929-1939. (United States Department of Agriculture, Agricultural Marketing Service.)

Year	Per capita consumption (lbs.)	Year	Per capita consumption (lbs.)
1929	1.80	1935	2.31
1930	1.77	1936	3.14
1931	1.91	1937	2.90
1932	2.42	1938	2.97
1933	2.54	1939	3.68
1934	2.38		

It follows that an increase in production will increase the consumption of turkey meat. In 1929 the average consumption per person amounted to 1.80 pounds. This was increased to 3.68 pounds in 1939 or slightly more than double. The per capita consumption by years is given in table 1.

### BREEDING STOCK

**Choice of breeds.**—Commercially the Bronze, White Holland, Bourbon Red and Narragansett breeds are grown. The former is by far the most popular breed probably because of its larger size.

There is no one "best" breed of turkeys, for there are strains possessing both good and poor qualities, such as reproductive performance, vigor, body conformation and other qualities in all of the common breeds. Even in a recognized excellent strain there will be found both superior families and others possessing few, if any, of the more desirable traits.

**Breeding flock selection.**

—External appearance, for the present, forms the basis for the selection of breeding stock. The fixing of a specific body conformation for a breed or strain can apparently be done with greater ease without progeny testing than can be done with such factors as egg production, hatchability, vigor, etc. One cannot predict these later mentioned qualities by the superficial examination of a prospective breeder's body outline.

Since the turkey is prized for its meat quality, it is only natural that emphasis should be placed on its dressed out appearance. In today's market the trend is definitely toward a plump appearing carcass. The demand for a turkey having a well-rounded breast has stimulated the production and sale of the "broad-breasted" type of turkey also known as "beef type."

An excellent specimen exemplifying this type of turkey is shown in figure 2. Here it will be noted that the breast and thigh muscles are remarkably well developed. The short neck and legs are typical of the "beef type" turkey. It is well to keep in mind that this type of conformation is not confined to any one breed, although to some the terms "Bronze" and "broad-breasted" are synonymous.

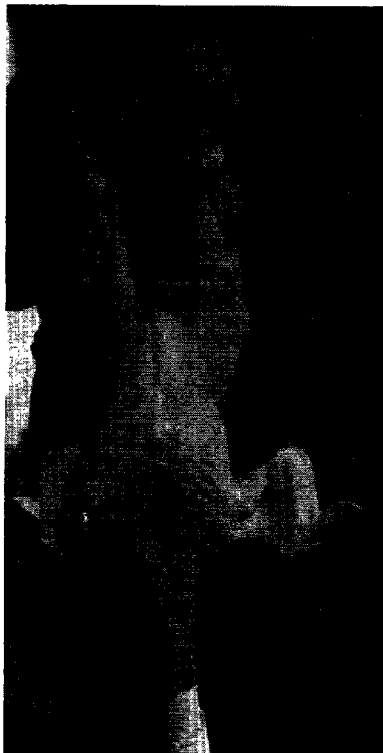


FIG. 2.—An excellent specimen of the broad-breasted type of turkey. Note the well-developed breast and thigh muscles.

Extensive use has been made of the body weight—shank length ratio in selecting for the full-breasted type of breeder. The length of the shank tends to vary not in proportion to body weight but rather with the cube root of body weight, and while tables have been prepared to indicate the degree of plumpness for various combinations of shank length and body weight they are intended more for the use of specialized breeders. The average grower can make use of the same principle by remembering that of two birds of the same age and with identical body weights, the turkey with the shorter shank length will have the plumper carcass.

Breeding stock should be free from all deformities and from crooked breastbones in particular. There is sufficient evidence available for the belief that the tendency for crooked keels is inherited. Whether the incidence in a given flock is great or small will depend (1) upon the degree to which the undesirable trait has been fixed and again (2) upon such environmental factors as roosts, age at which the roosting habit is formed, and feeding practices. Early roosting, sharp roosting surface and the failure to incorporate the correct proportions of bone-forming nutrients in the diet tend to encourage the maximum expression of this skeletal deformity.

**Mating practices.**—A vigorous young tom may be mated with 12 to 15 females. The number should be reduced to 10 or less if older males are used. Infertility due to failure of carrying out the mating act is common in turkeys. This is particularly true where matings are set up to use a single male or where one or two males dominate other males. Two practicable plans are being used to reduce infertility to a minimum, (1) rotating groups of males at stated intervals, usually every second or third day, in the breeding flock, and (2) the construction of stud pens for each male which will permit the female to choose her mate.

Females with severely injured backs tend to produce infertile eggs following the infliction of the wound. For this reason it is advisable to remove the toenails of all four toes on each foot of the males several weeks before mating starts and again during the breeding season if need be. Trimming of the toenails is not sufficient. The entire nail can be removed with tin snips or some similar tool. Blood seldom flows profusely following the operation and invariably ceases to flow without the use of medicaments.

Saddles constructed of canvas are becoming increasingly popular because of their efficiency in reducing the number of females with lacerated backs.

### EQUIPMENT FOR TURKEY RAISING

**Shelters and windbreaks.**—Breeding flocks in this latitude require little protection from the weather. In our severest winters breeding flocks consistently indicated their preference for out-of-door roosting. Windbreaks, natural or otherwise, are probably desirable, and some protection should be provided for the feeding equipment. An inexpensive shelter constructed of galvanized iron which meets all practical needs is illustrated in figure 3.

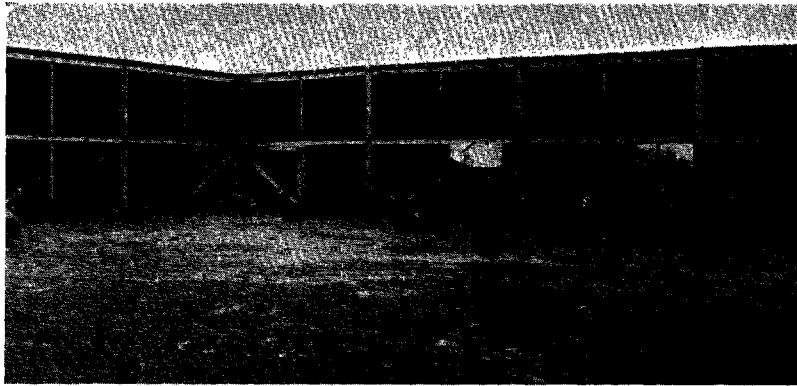


FIG. 3.—Shed type of shelter constructed of galvanized iron and used for the protection of breeding flocks.

**Feed hoppers.**—The feed hopper illustrated in figure 4 has a number of features to recommend it for both adult and growing stock. This feeder provides ample head room and feed capacity combined with antiwastage construction features.

**Nests.**—Single nests may be constructed of barrels and boxes, or especially designed, such as is illustrated in figure 5. The noteworthy features of the nest which is illustrated are (1) hinged top to facilitate the removal of the hen when trapnesting is being done, (2) fronts which permit the installation of trapnest features and (3) the raised bottom constructed of hail screen.

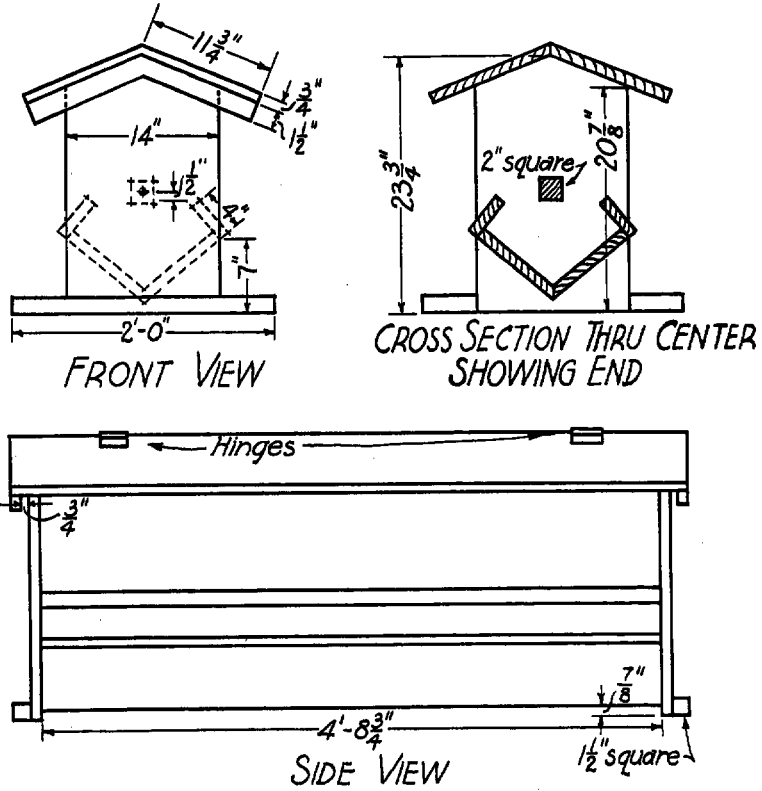


FIG. 4.—Working drawings of a satisfactory feed hopper for turkeys.

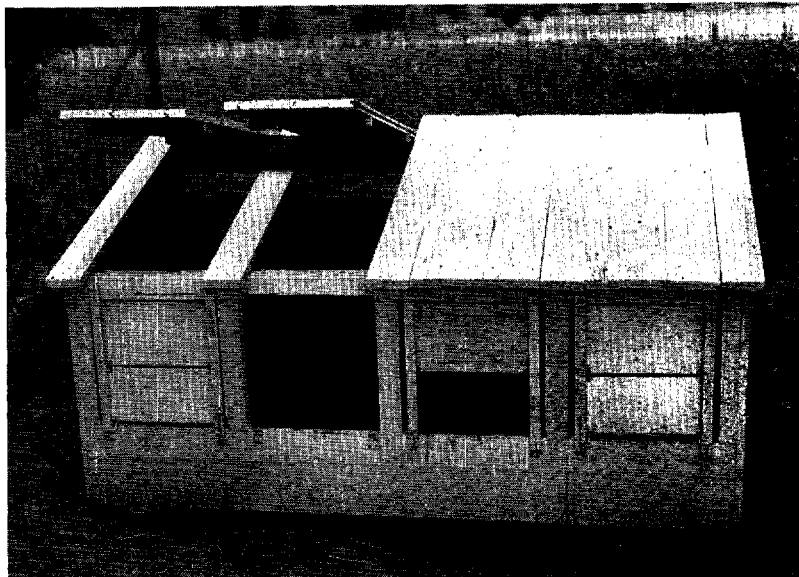


FIG. 5.—A good type of nest which may be used for trapnesting when keeping egg production records.

**BREEDING SEASON**

The normal egg-laying season covers the period March to June. During this period the average production per bird will approach 35 to 40 eggs. The number can be materially increased by using morning lights, starting in December or January. Breeders subjected to December lights can be expected to lay 65 eggs in the season, starting some time in January. There is some evidence to indicate that the males must also be placed under lights at the same time as the females if satisfactory fertility is to be obtained. Some prefer to begin lighting their flocks about January 1 and thus have the birds in full production early in February or about one month before production would normally begin without the use of lights. One 40- to 50-watt electric light is sufficient for each breeding pen of 10 to 15 birds. A good practice is to turn the lights on about 5 a.m. daily until the middle of April, after which they should be discontinued.

**Feeding.**—Breeding stock should have access to scratch grains and a suitable laying mash as well as oyster shell. The scratch grain may be composed of corn, oats, wheat, barley, milo or kafir or any combination of them. The results of a single year's test would indicate that oats possess the ability of reducing feather picking to a minimum when compared with corn. Oats have also been recommended by some growers upon the grounds that they prevent breeders from becoming excessively heavy. Preliminary tests have failed to substantiate this belief.

The chief value of the laying mash lies in its vitamin, protein, and mineral content. The following mash formula provides the above-mentioned nutrients in sufficient quantities to promote good reproductive performances:

**ALL-PURPOSE MASH FORMULA**

	Confined (Pounds)	On range (Pounds)
Ground corn .....	20	20
Ground wheat .....	20	20
Ground oats .....	20	20
Bran .....	11	17
Alfalfa leaf meal* .....	10	5
Meat and bone scraps.....	5	5
Fish meal .....	5	5
Soybean oil meal .....	5	5
Calcium carbonate .....	2	2
Salt .....	1	1
Fish oil .....	1	0
Manganese sulphate† .....	trace	trace
	100	100

\* Too much emphasis cannot be placed upon the grade of alfalfa leaf meal used. A bright, dark green product should be insisted upon, the dehydrated product with 20 percent or more of protein being preferred.

† Manganese sulphate should be added to the above formula at the rate of one-half pound per ton.

## HATCHING

The hatching quality of the egg is primarily determined by the inherent qualities of the breeding stock and secondarily by such factors as the feeding program and incubation conditions. Not infrequently eggs from a given flock will consistently hatch poorly even though good incubation and feeding practices are employed. This is an indication that the fault rests with the breeding stock and can be improved only by careful selection.

**Influence of feeds.**—Of first consideration in the production of good hatching eggs, aside from the inherent qualities of the breeding stock, is the feeding program. Of the many vitamins, three, A, D and G, are known to be of major importance in promoting good hatching results. In the mash formula previously listed, vitamin A is supplied by the alfalfa leaf meal, fish oil and by yellow corn if used. Fish oil is also included in the formula to insure adequate amounts of vitamin D. Normally, breeding stock which is not confined to laying houses receive sufficient vitamin D from the action of the sun's rays on the bird's body. The alfalfa leaf meal is the principal carrier of vitamin G. Milk is also an excellent source of vitamin G. While calcium and phosphorus are essential, with most feeding programs they are not limiting factors. The occasional production of eggs with extremely poor shell texture qualities is encountered. The popular belief, although entirely unfounded, is that these thin-shelled eggs of chalk-like texture and lacking the colored spots so characteristic of the turkey egg are due to inadequate amounts of calcium in the diet. Trap-nest records show, however, that eggs of this type are typical of all eggs laid by these individuals. The majority of the breeders receiving the same feed lay normal eggs. Increasing the calcium content of the ration will not improve the shell qualities of eggs laid by these abnormal females.

Manganese, when present below the optimum level, is capable of reducing hatchability to a low level. Manganese-deficient soils produce feeds low in the mineral. If a deficiency of manganese is suspected, eight ounces of manganese sulphate should be added to each ton of the mash. With manganese deficiency many of the poults dead in shell will be found to possess leg bones that are decidedly shorter than normal.

**Holding eggs.**—When eggs are being held for subsequent setting it is important to have the temperature of the surrounding air near 50° to 55° F. and a humidity of 50 to 60 percent. The use of egg cases permits an occasional turning with a minimum of effort.

**Incubation temperature.**—In the still-air incubator, temperatures should range from 100° to 103° F. when the bulb of the thermometer rests on a level with the top of the eggs. Good results have been obtained using 100°, 101°, 102° and 103°, the first, second, third and fourth weeks, respectively. The optimum incubation temperature is very close to the upper lethal limit and therefore high tem-



peratures must be avoided. In modern incubators of the cabinet type, temperatures between 99° and 100° F. are considered optimum. With the separate hatcher this is reduced to 97° F. from the twenty-fourth day to hatching.

**Humidity.**—Wet bulb readings of 85° F. and 88° F. for the first 24 days and last 4 days, respectively, are recommended for cabinet types of incubators. Small farm incubators with the gravity type of ventilation do not lend themselves to accurate moisture determinations. For these machines it is usually necessary to keep water in the moisture pans from the start and then use sand puddled with water the last four days to increase the amount of moisture in the air while the eggs are hatching.

**Turning.**—Turning the eggs from three to four times each day during the early stages of incubation is necessary for good results. Turning should be discontinued after the twenty-fourth day.

**Dead in shell.**—For the most part embryos die or fail to escape from the shell because of one or more of the following reasons:

1. Inherent qualities of the stock.
2. Feeding of inadequate rations.
3. Improper handling of eggs previous to setting.
4. Faulty incubation practices associated with temperature, humidity, etc.

## BROODING

**Equipment.**—Equipment required for the brooding of poults is identical to that used in chick brooding. The use of makeshift equipment is to be discouraged. It is probably unwise to brood more than 150-200 day-old poults in a unit, nor is it commercially economical to reduce the unit appreciably. The two major articles



FIG. 6.—A colony brooder house with the sanitary runway in place.

of equipment, brooder stove and house, should be purchased or constructed on the basis of the 150-200 unit. A 10' by 12' brooder house will care for 150 poults until six weeks of age. The 12' x 14' house shown in figure 6 will accommodate 200 poults. In case it is necessary because of soil contamination to keep the poults from coming in contact with the ground for the first four to six weeks, the sanitary runway shown in the illustration has much to recommend it. Many coal, air blast oil, and electrical brooders which will give satisfactory performances are available to turkey growers. Air blast oil brooders and electrical brooders appear to be replacing the coal-burning

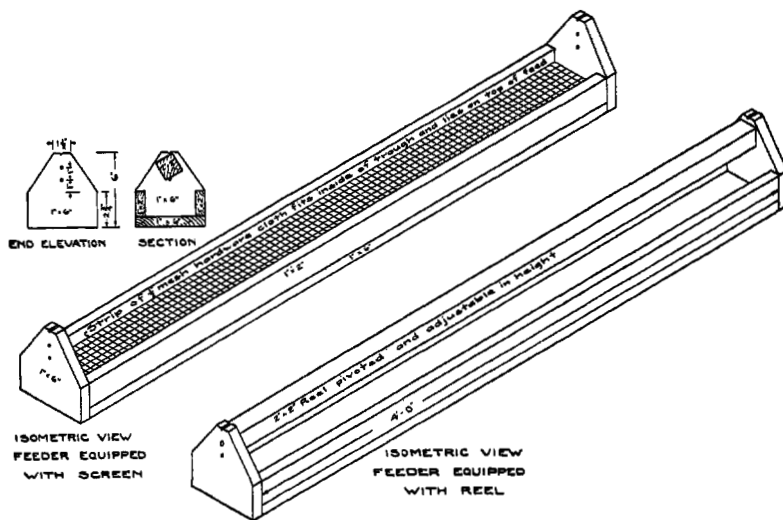


Fig. 7.—Working drawings of a type of mash hopper used for the first six weeks of the brooding period.

types. The new wood-burning stoves may have possibilities for those having an ample supply of this type of fuel.

Shallow feeders similar in design to the one shown in figure 7 may be used for the first four to six weeks. Thereafter, the larger feeders previously illustrated should be employed.

**Brooding temperatures.**—Poults hatched during April and May require heat for approximately six weeks. Seldom will June hatchings require that the brooder stove operate for more than four weeks and frequently the time is much less. Temperatures ranging from 90° to 95° F. at the edge of the canopy or where the bedding-down ring is formed at night are satisfactory for the first week. This may be gradually reduced 5° F. each week until the poults are brooder-weaned.

**Feeding.**—Withholding food from turkeys for stated intervals of time following hatching is to be discouraged. The brooder house should be in condition to receive the poults immediately after hatch-

ing so that the poult may receive its first feeding lesson without delay.

In addition to filling the shallow feeders with a satisfactory mash containing 20 percent protein, mash should also be placed on such flat surfaces as cardboard, new egg flats, wooden blocks, etc., for the first few days. Poults learn to feed slowly unless their attention has been called to the mash. Hard-boiled eggs crumbled in the hand or minced in food choppers in amounts that can be cleaned up in 15 minutes sprinkled over the mash two or three times each day for the first few days will do much to encourage mash consumption. Rolled oats can be used in much the same way for the same purpose.

Growers should appreciate the danger of using coarse, stemmy materials on the brooder-house floor. The consumption of such materials may result in the impaction of the gizzard, with subsequent death. This is particularly true when the poults are placed on the brooder-house floor before feed is placed before them or when starved for an appreciable period of time before feeding. In this connection sand or gravel has much to recommend it for a litter.

### GROWING PERIOD

**Ranges.**—When poults no longer require supplementary heat they may be placed on range. The plot of ground selected for this purpose should not have been frequented or occupied by any other form of poultry for a period of three years, should provide sufficient but not excessive shade and if possible should supply succulent green feed. The scenes of the two alfalfa ranges shown in figures 8 and 9 provide the conditions described. Sudan grass drilled in rows 30 inches apart can be used to provide shade and green feed. Feed

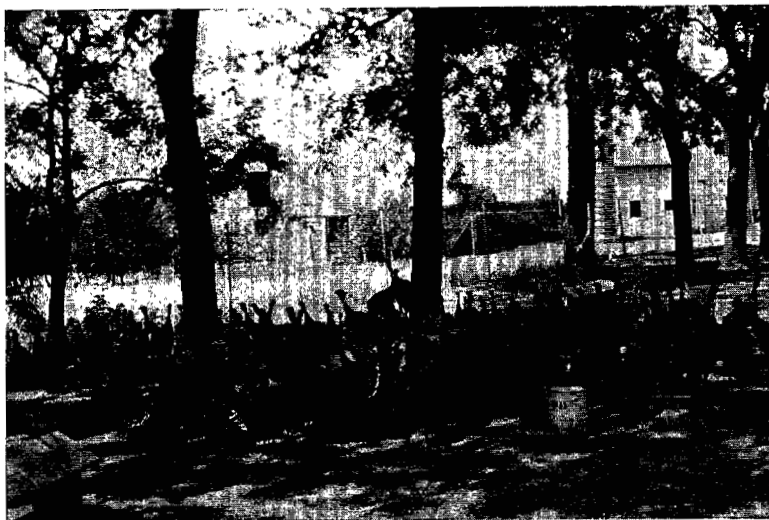


FIG. 8.—Feed hoppers, water containers, and turkeys protected from the rays of the midday sun.

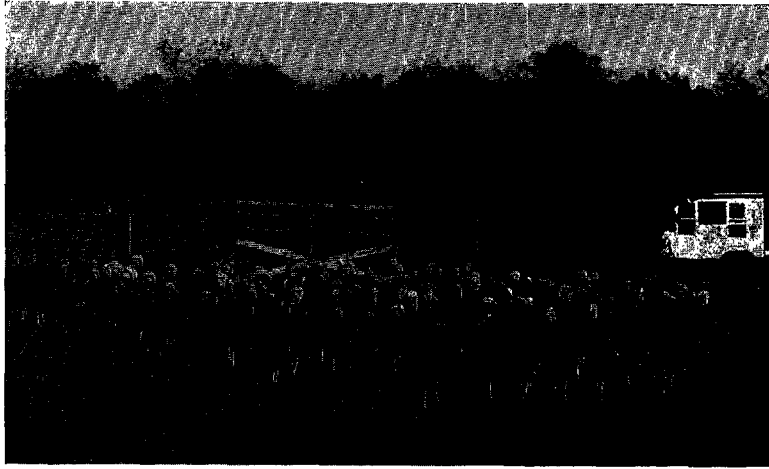


FIG. 9.—Semiconfined turkeys on range at the Kansas Agricultural Experiment Station. Note the dual-purpose outside roost.

hoppers and water containers should be located in the shade where they are readily accessible to the poults at all times if good growth is to be sustained during hot weather and if pendulous crops are to be avoided.

Overhead shelter must be provided for approximately 12 weeks or until the poults are well-feathered to afford protection from drenching rains and the occasional hailstorm. That this piece of equipment need not be elaborate is indicated in figure 10. A shelter of more substantial construction is illustrated in figure 11.

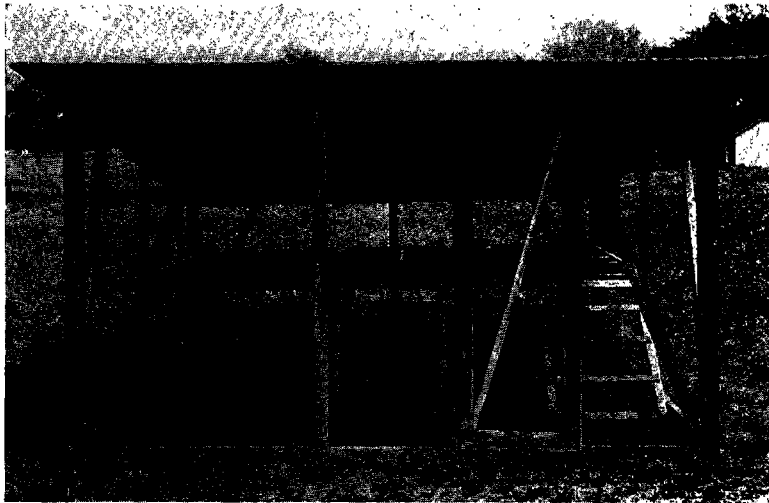


FIG. 10.—A 10- by 12-foot range shelter used from the time the poults are brooder weaned until they are roosting in the open.



FIG. 11.—A more elaborate type of shelter than that illustrated in figure 10.

Outside roosting equipment, not too distantly located from the shelter, may be constructed of 2" x 6" joists and 2" x 4" roosts supported on steel posts or sawhorses as illustrated in figure 12. Round poles probably have less tendency to produce crooked and dented keels than other types of roosts. Poles supported as indicated in "F" figure 13 provide favorable roosting conditions at low cost.

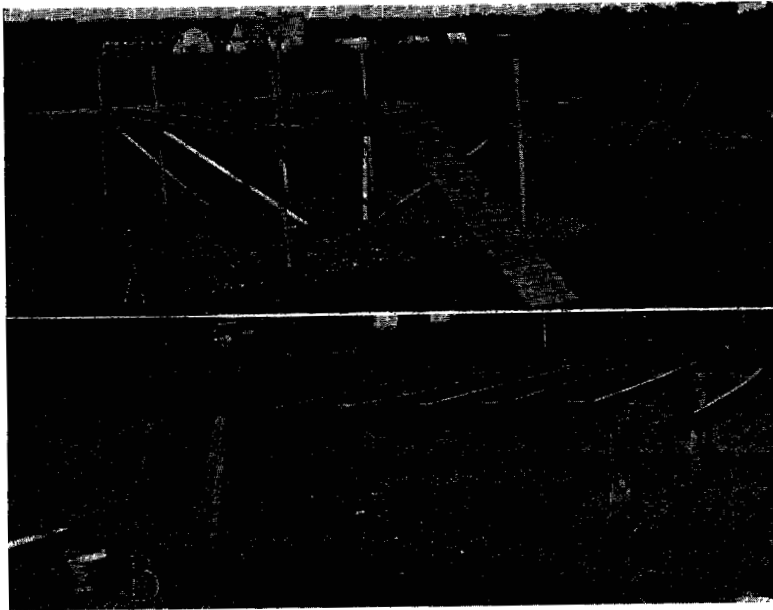


FIG. 12.—Roosting equipment. (A) One type of outside roosts used at the Kansas Agricultural Experiment Station. (B) A second type with the roosts supported by sawhorses.



FIG. 13.—Typical scenes on a large turkey farm in Kansas. (A) A critical inspection. (B) The grasshopper brigade. (C) Home at nightfall to a full dinner pail. (D) On the banks of an irrigation ditch. (E) A permanent type of roosting shed. (F) Inexpensive roosting equipment.

In some instances growers find it desirable to mature turkeys in strict confinement, never permitting the stock to come in contact with the soil. This requires special equipment. A Kansas grower has used the shelter-runway combination shown in figure 14.

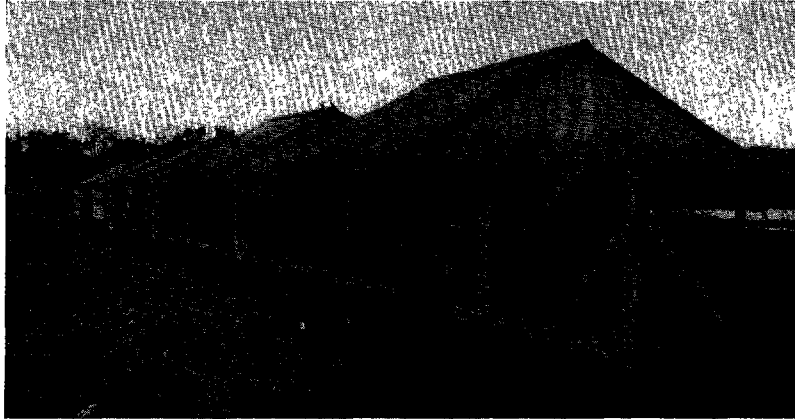


FIG. 14.—A combination shelter and runway used by a Kansas turkey producer who never permits the turkeys to come in contact with the soil.

**Feeding.**—The feeding of mash should continue throughout the growing period. Starting with the eighth to twelfth week, free access to scratch grain is desirable. Suitable grains were suggested in connection with the discussion of the feeding program for breeding stock.

**Fattening.**— Little is to be gained by the feeding of special fattening diets for several weeks before marketing time. Turkeys having had mash and grain during the growing period can well be continued on the same feeding program. If it is desired, turkeys can be fed a milk-moistened mash twice daily for several weeks with very satisfactory results.

### GROWTH AND FEED CONSUMPTION

The data included in table 2 are presented so that one may estimate the amount and value of feed consumed at specific intervals during the growing period. The average Bronze turkey weighing approximately 14 pounds at 24 weeks of age will have consumed about 50 pounds of feed, or 3½ pounds of feed for each pound of gain.

TABLE 2—Growth, feed consumption and pounds of feed required per pound of gain for 198 Bronze turkeys, 1930.

AGE.	Mean weight in pounds.			Feed consumed per bird, in pounds.				Pounds of feed consumed per pound of gain.
	Males.	Females.	Average.	Mash.	Grain.	Shell.	Total.	
1 day.....	0.126	0.123	0.124					
4 weeks.....	.617	.558	.588	1.22		0.014	1.234	2.65
8 weeks.....	2.340	1.940	2.158	3.92		.026	3.946	2.51
12 weeks.....	4.670	3.780	4.302	6.94		.023	6.963	3.24
16 weeks.....	9.530	6.490	7.514	7.91	1.47	.014	9.394	2.92
20 weeks.....	12.060	8.720	10.660	8.58	3.33	.141	12.051	3.83
24 weeks.....	16.110	10.720	14.060	8.32	7.52	.372	16.212	4.76
Totals.....				36.89	12.32	0.590	49.800	3.54



## MARKETING

The marketing of turkeys has been confined largely to the holiday season, which consists of the months of November, December and January. There has been a definite trend during the past few years to extend the marketing of turkeys over a longer period by disposing of them in September and October to take advantage of the extremely favorable prices paid for turkeys in these months. The number of fresh-killed turkeys that can enter trade channels during September and October is extremely small. The increasing volume of fresh-killed turkeys reaching the market during these months



Fig. 15.—Kansas producers entered these dressed turkeys in the first annual dressed turkey show at Manhattan, February 7, 1940.

combined with the withdrawal of storage stocks has had a tendency to flatten out the price quotation curve for September and October.

Turkeys are ready for market when 24 to 28 weeks of age. The time of marketing will obviously be determined by date of hatching, since it is not economical to feed turkeys beyond this period. Reference to table 2 indicates clearly the increasing quantities of feed required to produce a pound of turkey after about 20 weeks of age. The absolute gains in weight during the late stages of growth are large, but in terms of cost these gains are also the most expensive. While neither the Bronze nor Narraganset breeds will be in top condition from the standpoint of feather maturity and degree of fatness at the age of 24 to 28 weeks, the majority of the birds will be in a reasonably good condition.

On the contrary, however, the premature marketing of poorly finished birds, poor of flesh and pinny, should be avoided. The quality of turkey that Kansas is capable of producing is indicated in figures 15 and 16. These photographs were taken at the first annual dressed turkey show held in Manhattan, February 7, 1940.

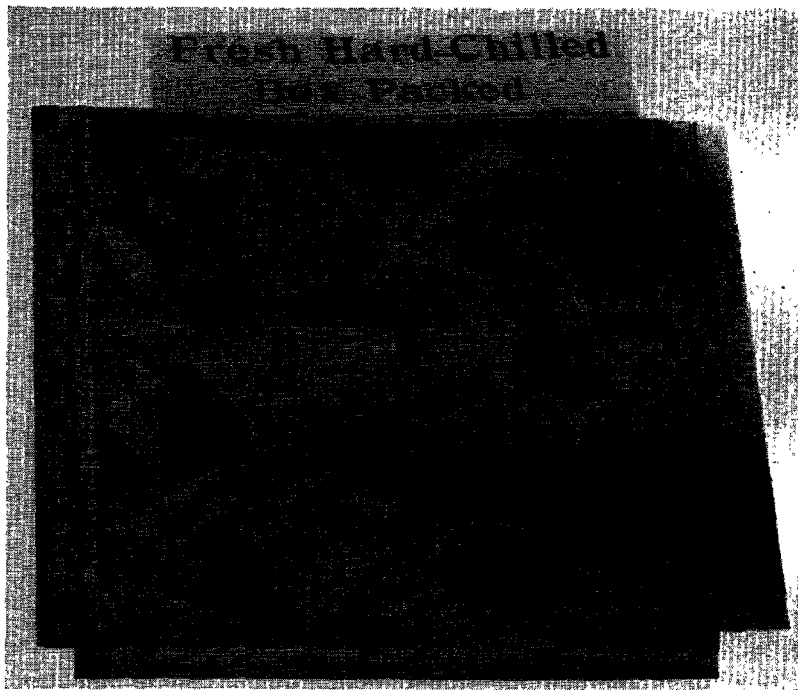


FIG. 16.—The first-prize-winning box of dressed Kansas turkeys at the Kansas dressed turkey show, February 7, 1940.

## BLACKHEAD

A comprehensive discussion of poultry diseases, their prevention and control is presented in Bulletin No. 284, published by this station, a copy of which may be obtained upon request. Since blackhead is probably the most common infectious disease encountered in turkeys, information concerning symptoms and control is presented here.

This disease attacks turkeys of all ages. Young poults 6 to 12 weeks of age may show few symptoms except for an ulcerated blind



FIG. 17.—The posture of this turkey is characteristic of the advanced stages of blackhead.

pouch. Older birds, however, stand with ruffled feathers and drooping wings as indicated in figure 17. Diarrhea is usually present and the color of the feces may vary from bright green to a sulphur-yellow color. If the disease lingers the birds become extremely thin. At autopsy the blind pouches of the intestines will be found to be ulcerated and filled with a cheeselike material. The normal liver tissue is invaded by the organism causing blackhead and in its place will be found round greenish-white areas (figure 18), the surfaces of which are concave. The bird's head does not always become discolored, as the name of the disease might indicate.

Treatment is ineffective and while afflicted birds seldom recover, the occasional one to do so probably recovered in spite of rather than because of treatment. To date no successful method of vaccination has been devised which will afford protection.

Since birds become infected by contact with polluted soil, water or feed, it is apparent that the solution for control must be directed toward these factors.

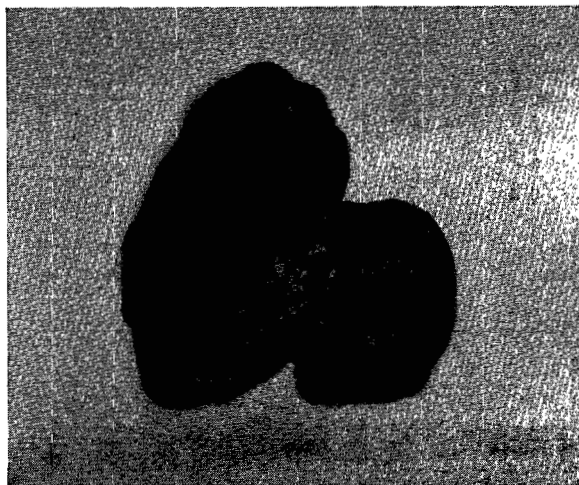


FIG. 18.—The blackhead organism has been responsible for the areas of necrosis that appear in this liver. These whitish necrotic spots are typical lesions of blackhead.

Under certain conditions the organism causing blackhead can survive in the soil for several years. It is for this reason that poults should not be grown on tracts of land which have been frequented by chickens or turkeys during the three previous years. Once infection gains a foothold, feed and water soon become contaminated.

Should an outbreak occur (1) remove and destroy all ailing birds, (2) move flock onto another plot of ground, if at all possible, even though it may only be for a few days, and (3) disinfect all feeding and watering equipment.