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Cereal Grains in Turkey Rations

W. E. Poley

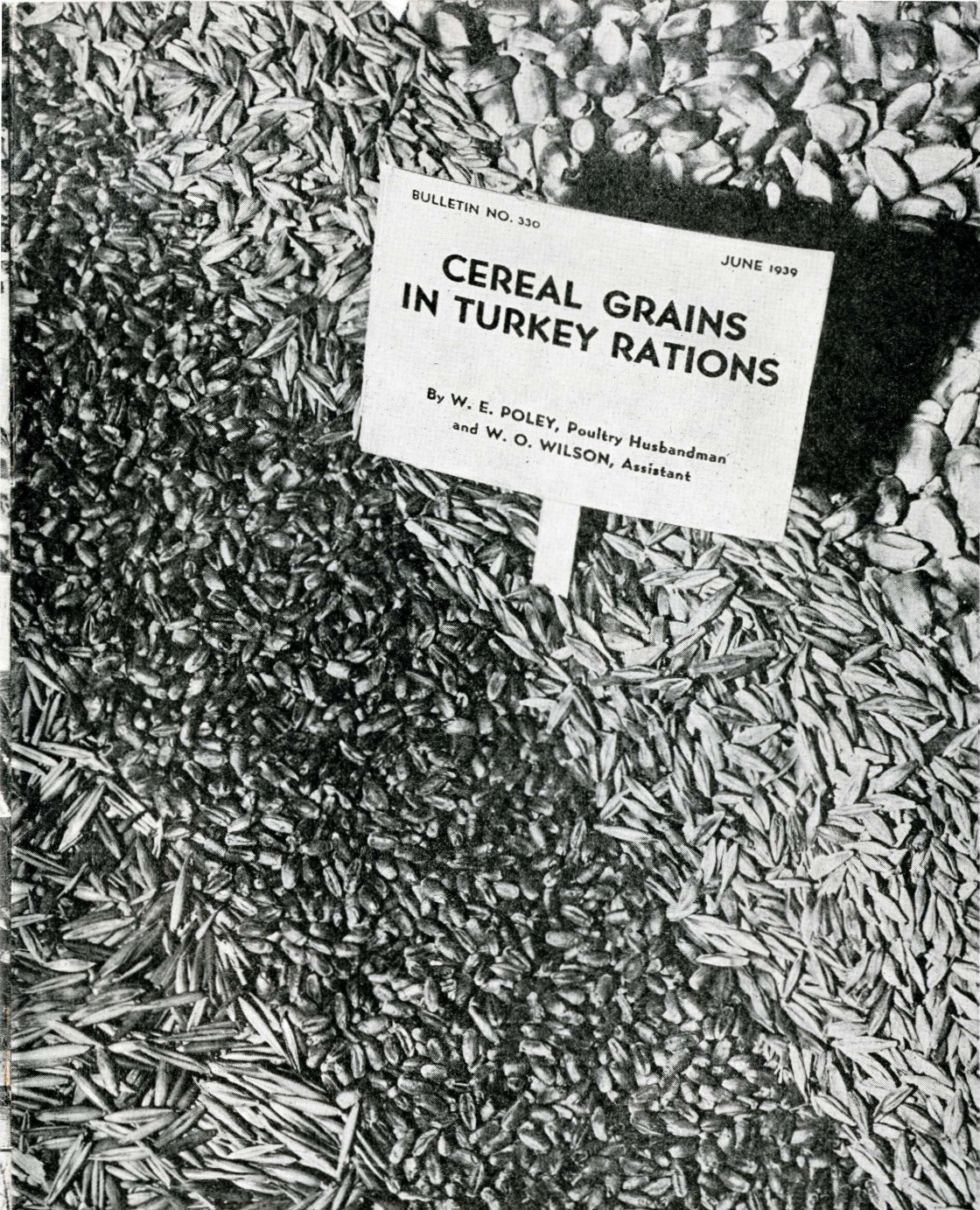
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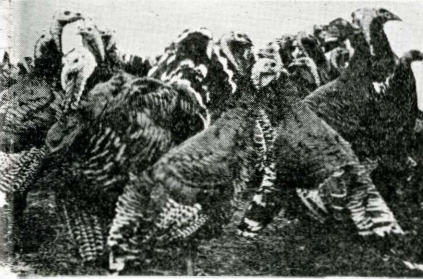


BULLETIN NO. 330

JUNE 1939

CEREAL GRAINS IN TURKEY RATIONS

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Poultry Department
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SUMMARY

1. There were no appreciable differences in the rate of growth when turkeys received either corn, wheat, oats or barley in growing and finishing rations.
2. When judged by the amount of feed required to produce a unit of gain in weight, wheat was practically equal to corn. Compared with yellow corn, wheat had 99.0 percent, barley 98.0 percent, and oats 89.3 percent the feeding value of corn in the growing rations studied. In the finishing rations tested during the last two years, wheat had a value of 101, barley 87.7 and oats 96.2 percent compared with yellow corn with a value of 100.
3. Based upon feed requirements per unit of gain in weight, Table 12 gives the monetary value of wheat, barley and oats per bushel, compared with an equivalent value for yellow corn.
4. Turkeys produced on rations composed principally of either wheat, barley or oats were graded equally as high as those receiving yellow corn. The color of the dressed carcasses of turkeys receiving cereal grains other than yellow corn was more uniform and preferred by the grader.

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Cereal Grains in Turkey Rations

W. E. Poley and W. O. Wilson

Introduction

With virtually ideal conditions for efficient production of top-quality turkeys, South Dakota farmers are becoming increasingly interested in rearing more turkeys as a sure cash income. Few states, if any, are better adapted to the production of turkeys at such low cost than South Dakota, with its dry climate and its cheap land and adaptable soil so essential in keeping down diseases. In addition, turkey production fits in well with farming practice, and the cool fall weather aids materially in producing a high quality turkey, while marketing costs are comparatively low.

Perhaps even more significant than any of the advantages mentioned above is the fact that South Dakota normally produces an abundance of cheap cereal grains, which appreciably reduces the cost of production.

The purpose of this bulletin is to report experiments which show how large quantities of yellow corn, wheat, oats and barley can be utilized in starting, growing and finishing turkeys. A review of the literature reveals that few tests have ever been made on the utilization of large quantities of cereal grains in various types of turkey rations. Experiments were reported at the University of Manitoba, Winnipeg, Canada, whereby it was indicated that wheat, oats and barley were satisfactory for fattening rations when compared with yellow corn.

Significance of the Feeding Problem

These experiments are especially important because of the fact that frequently corn or other grains may be relatively high priced, and it may be considerably more economical to use cheaper grains. Usually, after the harvest season, small grains are a cheap source of feed. An example of this was in 1937, when, because of the drought the previous year, all grains were high in price. Yellow corn remained relatively high until it was harvested, which was too late to appreciably reduce feed costs of the turkeys fed the corn ration that year. On the other hand, wheat, oats and barley became considerably cheaper in July and August after the harvest, making it possible to reduce feed costs considerably.

AMOUNT OF GRAIN CONSUMED. The growing and finishing mash mixtures included from 53 to 76 percent of the cereal grains. When this is considered, together with the fact that each grain under study was kept in hoppers before the birds, a large percentage of the total ration

consumed consisted of one grain. For example, the total grain consumed during the growing periods of 1937 and 1938 amounted to from 78 to 84 percent of the total feed consumed, with an average of 81 percent for all lots. For the finishing period in 1937-38, the total grain consumed amounted to 81 to 94 percent of the total feed consumed. This was an average consumption of 87.5 percent cereal grain.

Procedure

These experiments were started in the spring of 1935 and were continued for four years. In general, the tests were conducted in three different periods of growth, which may be classified as the starting, growing and finishing periods.

Trial numbers are used to distinguish between the different tests conducted in comparing two or more rations. Lot numbers and ration numbers correspond, and are used to differentiate between groups or pens receiving the different rations under study in each trial.

STARTING PERIOD FIRST EIGHT WEEKS. From 27 to 76 apparently healthy poultts were carefully selected, banded and uniformly distributed as to weight in the different pens. All poultts were started in electrically

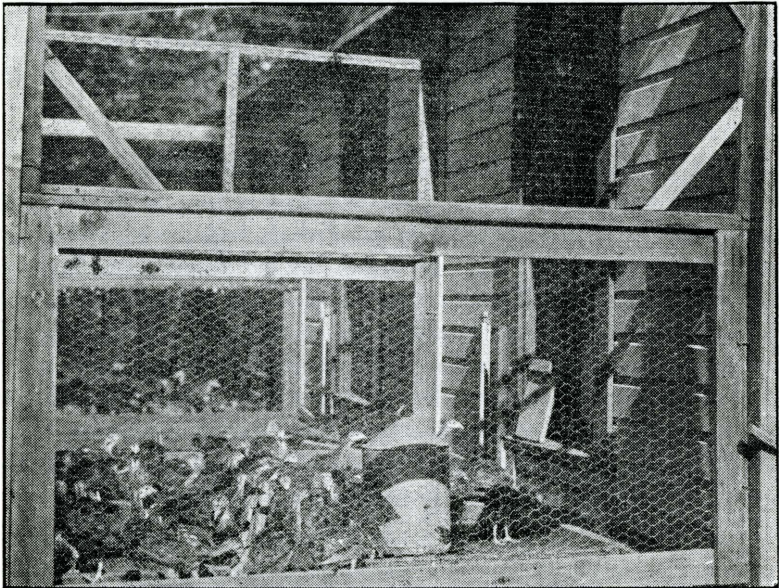


FIG. 1. *Frame brooder house with sunporches, used in experiments.*

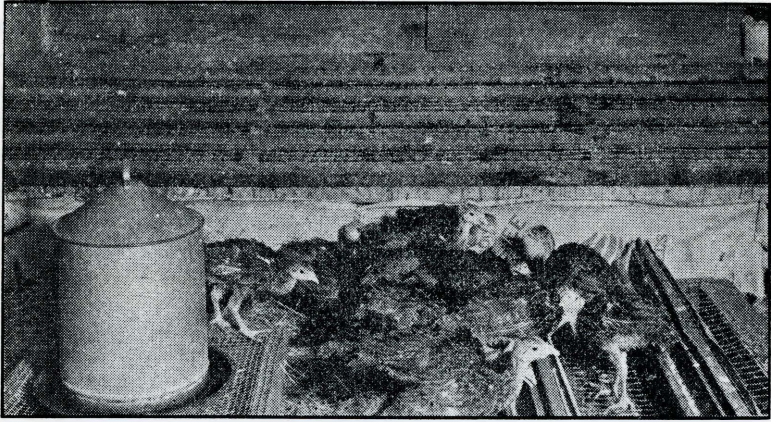


FIG. 2. Interior view of brooder house with equipment used. Feed and water containers which were kept on wire frames helped to prevent disease.

heated battery brooders under uniform conditions and kept in these batteries for the first four weeks, when they were transferred to a brooder house (Figure 1) sufficiently large to accommodate all test lots at one time. A coal-burning brooder stove was used in each pen. The poults had access to outside wire platforms and were weighed at four, six, and eight weeks of age. The all-mash rations used during the first eight weeks are listed in the appendix, Table 1, while the average weights of the turkeys are given in Table 3.

GROWING PERIOD USUALLY 8 TO 20 WEEKS. From 68 to 93 poults were included in each of the different lots receiving the test rations (Table 10). The mash mixture contained 46 to 53 percent of the cereal grain under study, in combination with either 30 percent bran and middlings or ground oats or ground wheat, as indicated in Table 2. The same grain as used as the principal grain in the mash was kept in hoppers before the birds at all times. The yellow corn was cracked until the turkeys were 16 weeks of age, after which this was fed whole. The other grains were fed whole during the entire growing period. Oyster shells and water were kept constantly before the birds.

Each lot of turkeys had access to a one-quarter acre plot of good alfalfa range during the growing period. There had been no turkeys on this land during the previous year. Summer shelters open on the south and east sides were used in each yard (Figure 3).

FINISHING PERIOD USUALLY 20 WEEKS UNTIL MARKETED. From 54 to 89 turkeys were included in each of the different lots that received finishing rations (Table 10). The same mash was used during the finishing period as was used during the growing period, except that alfalfa leaf meal was added to the mash at the expense of the cereal grain because of the shortage of green range. The amounts of alfalfa used are included under Table 2. The same yards as used during the growing period were also used for the finishing test. Practically no difficulty

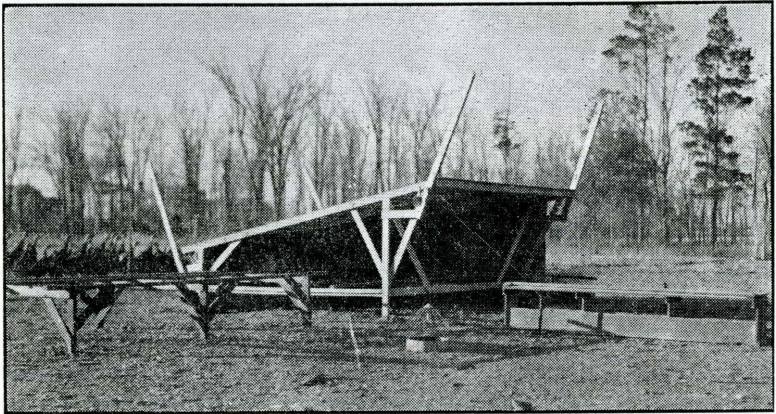


FIG. 3. Types of shelter, roosts, sanitary feeders and waterers used for growing and finishing turkeys. Note the wire around top of shelter to prevent birds from roosting on the top.

with blackhead was experienced with this system. The fact that there had been no turkeys or chickens on this land during the previous year and the usually dry weather experienced in South Dakota probably explain the lack of disease even though intensive methods of production were followed and the turkeys were not moved to new ground during the entire growing and finishing periods.

The same principal grain as used in the mash was kept before the birds in hoppers except in Lots 13, 14, 18 and 21, where equal parts of barley, oats and Red Proso millet were used (Table 2). Oyster shells and water were also available at all times.

FEEDS USED. All of the feeds were purchased from local elevators. The cereal grains were of good quality, but not the very best so far as test weight per bushel was concerned. The current crops of oats, barley

and wheat were used, thus making it possible to take advantage of the low prices of these grains immediately following the harvest in July and August when the turkeys' requirements for these grains were increasing. The yellow corn was also used immediately after the harvest, but this was not usually available until the turkeys were practically ready for market. Consequently, it was necessary to use the corn which was produced the year before. All grains were practically free from diseases or molds.

The qualities of the feeds used, based upon crude protein value, and the test weight per bushel of cereal grains were as follows:

| | <i>Percent Crude Protein Range</i> | | <i>Percent Crude Protein* Range</i> | <i>Test Weight Per Bu. (lbs.) Range</i> |
|--------------------------|--|-------------|---|---|
| Pure wheat bran | 16-17 | Yellow corn | 9.5-11.9 | 53-56 |
| Standard wheat middlings | 17-18 | Oats | 13.9-15.8 | 28-34 |
| Meat and bone scraps | 50-55 | Barley | 12.0-14.2 | 40-48 |
| Tuna fish meal | 60-63 | Wheat | 15.8-18.3 | 52-60 |
| Dried buttermilk | 34-35 | Millet | 13.5-14.7 | 50-55 |
| Alfalfa leaf meal | 20-21 | | | |
| Linseed oil meal | 37-39 | | | |
| Salt (fine) not iodized | | | | |

* Grains produced in South Dakota during the past few years were somewhat higher in protein content than grains produced in many other sections of the country. This may be partly due to dry weather conditions experienced.

The cod liver oil concentrate used was guaranteed to contain at least 400 U. S. P. vitamin D units, and 3,000 U. S. P. vitamin A units per gram. The cod liver oil stearine was guaranteed to contain at least 175 U. S. P. vitamin D units and 1,800 U. S. P. vitamin A units per gram.

PROTEIN CONTENT OF RATIONS USED. There were considerable differences in the crude protein content of the rations used. This was due to the fact that the different cereal grains varied widely in protein value and also because they made up such a large percentage of the ration. For example, 46 percent of corn in the growing mash would yield about 5 pounds of protein, whereas the same amount of wheat used instead of corn would include nearly 8 pounds of protein. The protein content of the different mashes varied as follows:

| | <i>Percentage Protein</i> | | | |
|--------|--|------------------|--|------------------|
| | <i>1935-1936 Growing mash mixtures</i> | <i>1937-1938</i> | <i>1935-1936 Finishing mash mixtures</i> | <i>1937-1938</i> |
| Corn | 18.8 | 21.0 | 19.5 | 22.0 |
| Wheat | 22.2 | 23.3 | 22.4 | 23.6 |
| Oats | 20.9 | 22.8 | 21.2 | 22.8 |
| Barley | 20.1 | 22.1 | 20.5 | 23.4 |

Probably the animal protein content which was kept uniform for the different grains in the rations studied was more significant in determining the value of the mash mixtures used than the total protein content. The relatively low protein content of the yellow corn used may, however, provide one explanation for the fact that a higher percentage of corn mash than grain was consumed when compared with the other cereal grains of higher protein value.

DIFFERENCES BETWEEN STARTING, GROWING AND FINISHING RATIONS. It will be noted that the essential differences between the starting and growing mash mixtures lie in the fact that the percentage of animal protein (meat, fish and milk) was greater in the starting than in the growing mash. The starting mash included larger amounts of dried buttermilk which carries vitamins so essential in the growth of turkeys. No grain was used with the starting mash during the first eight weeks. With the growing mash, grains were kept before the birds, and as they grew older the proportion of grain to mash consumed increased. This lowered the percentage of animal proteins ingested during the growing period. The same was true to a greater extent during the finishing period. Consequently, the costs of the feed consumed decreased as the birds grew older and consumed a larger proportion of cheaper grains than mash.

The same growing mash was given during the finishing period except that alfalfa leaf meal was added at the expense of the grain under study because of the shortage of green range.

Results and Discussion

STARTING TESTS. Lots 1 through 15, which were fed starting rations in 1935, were included for preliminary studies. In 1937, various combinations of the cereal grains were used, as will be noted in Table 3. In each case, the combinations of the ground whole cereal grains gave better growth than when corn was used with wheat bran and wheat middlings as the control ration. The one objection to the use of any of these mash mixtures was the fact that they contained large amounts of animal protein concentrates, which included excessive quantities of minerals. The use of vegetable protein concentrates, such as soybean oil meal, aids in reducing excessive mineral supplies. Excessive minerals are likely to cause slipped tendons even though manganese sulphate is used. However, in these particular experiments, there were very few cases of slipped tendons¹. At present, efforts are being made to reduce the amount of min-

1. This is a condition characterized by the tendons slipping to the outside or inside of the hock joints, giving a bow-legged or knock-kneed appearance.

erals in turkey starting rations without sacrificing growth-promoting efficiency. The rations submitted here may be used satisfactorily, at least until more efficient turkey starting rations utilizing readily available protein concentrates are formulated and tested. Experiments now in progress are being conducted with these objectives in mind.

RATE OF GROWTH WITH GROWING RATIONS. In each of the four years, 1935-38 inclusive, the rate of growth of turkeys fed principally either wheat, barley or oats was compared with turkeys fed a ration composed chiefly of corn. From Table 4, it is evident that the rate of gains in weights were slightly greater with the corn-fed turkeys than with the barley-fed lots. This was true in all except Lot 18. At 18 or 20 weeks of age, for the four years, all lots considered, the corn-fed turkeys were only 0.3 pounds heavier than those fed barley rations.

Comparing the rate of growth of the turkeys fed oats, it was evident that, in half of the lots, the birds receiving oats were heavier at 20 weeks than those receiving corn. It thus appears that the oats ration is equally as effective as the corn ration in promoting growth.

Wheat gave more rapid growth than corn in four groups of turkeys, and was equal to corn in two groups, with the corn-fed turkeys heavier at 20 weeks in only two groups. The wheat-fed turkeys, all groups considered, were only 0.2 pounds heavier than the corn-fed groups.

FEED REQUIREMENTS FOR GROWING RATIONS. The average feed consumption per bird was less with the corn-fed lots in 1935-36 when compared with either wheat, barley, or oats. However, the differences in favor of corn were not so great in 1937-38, with the higher animal protein mash mixture.

It will be noted from Table 6 that the total feed consumption per bird in practically all corn-fed lots was lower than for the lots receiving the other cereal grains. It was also generally true that the corn-fed groups consumed a greater percentage of mash than grain, compared with the turkeys receiving the other grains.

In the experiments conducted in 1935 and 1936, it required an average of 3.78 pounds of the corn ration and 5.04 pounds of the barley ration to produce one pound of gain. With three percent higher animal protein levels used in 1937-38, it required 3.67 pounds of the corn ration and only 3.75 pounds of the barley ration to produce one pound of gain in live weight.

With the 1935-36 experiments comparing oats with corn (Table 8) it required 4.68 pounds of the oats ration and 3.68 pounds of the corn

ration to produce one pound of gain in weight, while with the rations used in 1937-38 it required only 4.41 pounds of the oats ration and 3.67 pounds of the corn ration to produce a pound of gain in weight.

A comparison of the growth obtained with corn and wheat rations used in 1935-36 showed that it required an average of 4.49 and 5.37 pounds of the corn and wheat rations respectively for one pound of weight increment. With the higher animal protein rations used in 1937-38, it required 3.69 and 3.67 pounds of the wheat and corn rations respectively to produce one pound of gain in live weight. Table 8 shows the feed consumption as well as the calculated nutritive values of wheat, barley and oats compared with corn.

RATE OF GAIN IN WEIGHT ON FINISHING RATIONS. From Table 5, it is evident that corn was superior to either oats or barley in finishing rations during the first two years of experiments when lower animal protein mash mixtures were used. The corn-fed turkeys were about 1.5 pounds heavier at marketing time than either the oats- or barley-fed groups. Attention is called to the fact that in Trials 3 and 4 (Table 5) there were practically no gains in weight after 24 weeks of age. This was probably due to the extremely cold weather prevailing in January. With the types of mash mixtures used the first two years, the birds did not reach market maturity at 26 weeks of age, which is in contrast to the results secured in the last two years.

With the rations tested in 1937 and 1938, with 6 percent higher meat and bone scraps levels, the oats- and barley-fed lots were equal in average weights to the corn-fed lots at marketing time. Comparing corn and wheat, the corn-fed groups were 1.5 pounds heavier with the rations used in 1935-36, while with the mash mixtures used during the last two years, the wheat-fed groups were 0.6 pounds heavier than the corn-fed groups at marketing time.

FEED REQUIREMENTS WITH FINISHING RATIONS. With the lower protein rations, it required less feed per bird when corn was used than any of the other cereal grains. With the rations used during the last two years, it required practically the same amount of corn and wheat per bird for the finishing period. Somewhat more of the barley ration was consumed and consistently more of the oats ration was consumed per bird during the finishing period compared with corn (Table 6).

In the 1935-36 experiments, an average of 10.4 pounds of corn and 14.7 pounds of barley were required to produce a pound of gain, while, in 1937 and 1938, 7.2 and 8.0 pounds of corn and barley rations respectively

produced one pound of gain in weight. In the first two years of experiments, 13.9 pounds of corn and 18.7 pounds of wheat were required for each pound of gain in weight, while the rations used in 1937-38, 6.6 pounds of corn and 6.5 pounds of wheat produced one pound of gain during the finishing period, thus showing corn and wheat to be practically equal in finishing rations.

Emphasis must be placed upon the fact that in Trials 3 and 4 the turkeys were not marketed until January 18 and 23 respectively. At this time they were 28 weeks of age. The turkeys did not gain appreciably in weight during the last four weeks, yet their feed consumption continued at the rate of from 13.85 to 19.29 pounds required to produce one pound of gain in weight (Table 9). During this period in January, the temperature was below 0 degrees Fahrenheit most of the time, and many of the turkeys actually lost weight. In Trials 1 and 2, only about half of these amounts of feed were required per pound of gain, probably because the turkeys were younger when marketed and the tests were completed before extremely cold weather prevailed.

In the 1935-36 experiments, 10.3 pounds of the corn ration and 14.3 pounds of the oats ration were required for each pound of gain in weight, while with the mash mixtures used in 1937-38, 7.9 pounds of the corn ration and 8.2 pounds of the oats ration produced one pound of gain in weight. The nutritive values of wheat, barley and oats compared with corn, as calculated on this basis, are given under Table 8.

TOTAL FEED REQUIREMENTS FOR GROWING AND FINISHING RATIONS. It is evident from Table 7 that there is considerable variation in the amount of feed required per bird for the growing and finishing periods. In nearly every instance, relatively more mash than grain was consumed. The birds showed a tendency to consume a relatively higher percentage of the corn mash than those fed mashes containing the other cereal grains. In other words, a higher percentage of either wheat, barley or oats was consumed as grain when compared with corn. With colder weather, the birds' appetites for corn increased markedly.

PROTEIN CONTENT OF THE TOTAL RATION CONSUMED. The percentage of crude protein provided in the ration and the percentage of crude protein actually consumed were widely different. Obviously, with the cereal grains of lower protein value than the mash, the more grain that was consumed in proportion to mash, the lower was the protein intake. There were considerable differences in the percentage of protein consumed by the different lots. This was due largely to the variation in protein

values for the different grains and the ratios of mash to grain consumed by the different lots. The following includes the average percentage of protein in the mash and grain consumed during the different periods:

| | Percentage protein | | | |
|--------|-----------------------------------|-----------------------------------|-------------------------------------|-------------------------------------|
| | 1935-36 <i>Growing periods</i> | 1937-38 <i>Growing periods</i> | 1935-36 <i>Finishing periods</i> | 1937-38 <i>Finishing periods</i> |
| Corn | 17.2 | 19.3 | 14.5 | 15.9 |
| Wheat | 20.8 | 21.8 | 18.7 | 19.8 |
| Oats | 20.2 | 20.6 | 16.8 | 17.5 |
| Barley | 18.2 | 19.9 | 15.5 | 17.3 |

The average amount of protein consumed in the growing periods for all lots, amounted to 19.1 percent and 20.4 percent in the experiments conducted in 1935-36 and 1937-38 respectively. During the finishing periods in 1935-36, the average protein intake for all lots was 16.4 percent while in 1937-38 the protein consumed amounted to 17.6 percent of the total feed ingested. The corn-fed lots, as will be noted, consumed somewhat less total protein than the average for all lots.

Mussehl and Ackerson² recently reported that turkeys that consumed a finishing ration which included either 14.5 or 16.2 percent protein were as profitable as those consuming higher protein levels (18.5 and 21.0 percent).

A report from the Utah Experiment Station³ indicated that barley was equal in every way to yellow corn when used in starting, growing and finishing rations.

It has been the observation at this Station that the cold weather stimulates the consumption of corn and other grains. This would have the effect of reducing the protein intake, especially if yellow corn or other low protein cereals were used.

MORTALITY. Although the mortality was excessive with some of the starting rations, this may be attributed to crowding and not to the rations used. Table 10 gives the mortality during the growing and finishing period together with the explanations for this mortality. For all the tests conducted during the growing period, the average was 6.1 percent loss, and for the finishing period 1.9 percent. The total mortality for both periods was about 8 percent.

2. Mussehl, F. E. and C. W. Ackerson, "Protein Requirements for Finishing Turkeys," Bulletin 298, April 1936. University of Nebraska, College of Agriculture, Experiment Station, Lincoln, Nebraska. Page 1.

3. Biennial Report of the Director, "Feeding Turkeys" Bulletin 282, Oct. 1938. A Resume' of the First Half-Century of Research at the Utah Agricultural Experiment Station. Page 58.

WHAT CAN WE AFFORD TO PAY FOR WHEAT, OATS, AND BARLEY? Table 12 gives the computed values of wheat, barley and oats equivalent to corn. This table is based upon the growing and finishing rations tested in 1937 and 1938, which are considered more adequate in the supply of protein than the rations tested in 1935 and 1936. These figures are based upon the amounts of mash and grain required to produce a pound of gain in weight for both hens and toms during the growing and finishing periods. It should be emphasized that this table of values is applicable only when the grains are used in rations quite similar to those tested. Moreover, these values will not apply when such grains as wheat, oats and barley are used after December.

TIME OF HATCH AND LENGTH OF GROWING PERIOD AFFECTS PROFITS. On examination of Table 10, which gives the mortality and dates poults were started and finished, and from Table 5, which gives the average weights, it will be noted that Trials 3 and 4 were not completed until January. Even though 28 weeks of age, the average weights of these birds were considerably below those of the other trials at the same age. The cold January weather made it virtually impossible to produce economic gains in weight. From Trial 4, it appears that yellow corn was a better cold weather grain than either wheat, oats or barley. In cold weather, little mash was consumed, consequently, when such grains as wheat, oats or barley are used, there is a possibility of a deficiency in Vitamin A, as birds may not eat enough mash to meet their requirements for this vitamin. In view of the foregoing, it is advisable to have turkeys ready for market early in December, and provide for at least 10 percent of alfalfa leaf meal

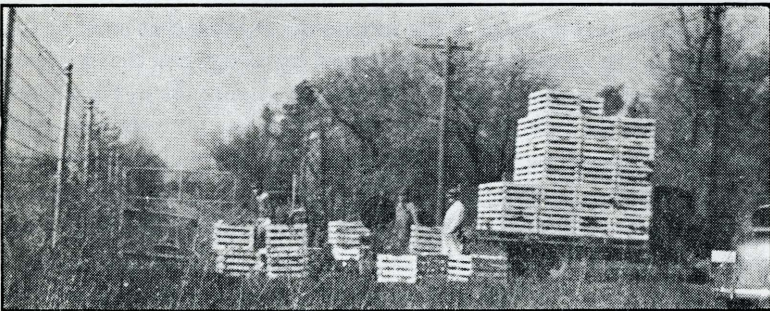


FIG. 4. At the completion of each trial, the birds from all lots were sold to the highest bidder. Care was exercised to avoid bruising when the turkeys were placed in the crates. The birds were taken to a nearby dressing plant for dressing and grading.

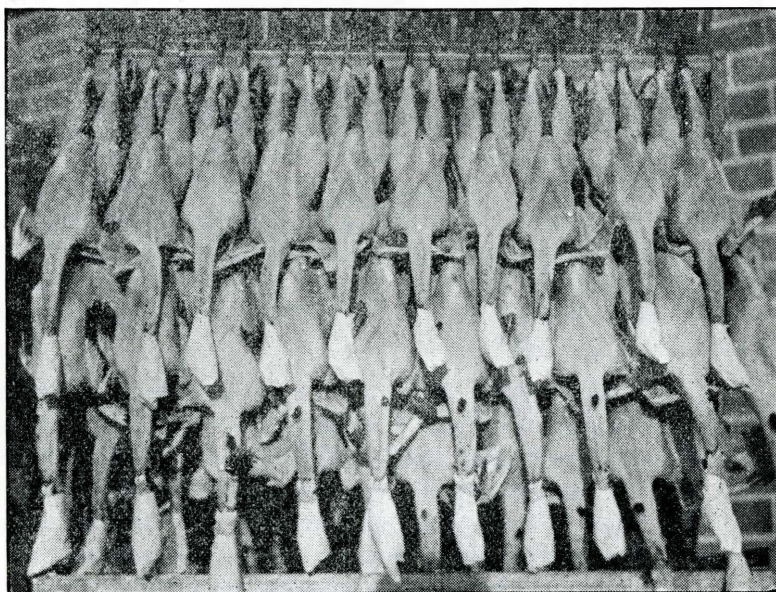


FIG. 5. Uniformly high grade turkeys were produced with any of the cereal grains used. Above is the group finished on wheat. Other cereal grains produced equally good results.

in the mash mixture during the finishing period if a large percentage of yellow corn is not used.

WHEN SHOULD TURKEYS BE MARKETED? This depends on the amount of protein used in the growing and finishing mixtures, as well as weather conditions, strain of turkeys, and management. Most economical gains in weight can be made if the turkeys are marketed as soon as they have reached top market quality. It should be recognized that a greater amount of feed is required per pound of gain during the last few weeks than earlier in the finishing period. If feed prices are relatively high, profits will disappear rapidly if turkeys are not marketed promptly after they reach market maturity. Hens will probably be ready to market at least one or two weeks earlier than the toms. Hens frequently do not make any practical gains after 24 weeks of age (Table 5). With the strains of Bronze turkeys used at this Experiment Station, market maturity was reached at 26 weeks of age for the toms receiving the higher protein levels tested in 1937 and 1938. It thus appears that turkeys should not be hatched after June 3 to 10 if they are to reach market maturity in time to

be placed on the Christmas market. It was noted, however, that the later hatched turkeys were better feathered and somewhat better finished than the earlier turkeys fed the same rations. This was presumably due to the effects of cooler fall weather, which stimulated feather growth and the consumption of grains. In Trial 9, for example, both hens and toms were marketed December 1, at 25 weeks, and were of good market quality.

MARKET GRADES OF DRESSED TURKEYS. In 1935, the turkeys were not dressed and graded as most of them were kept for breeders. The average weights give a good indication of their grades, with the yellow corn-fed turkeys somewhat better than those receiving either oats or barley, and the wheat-fed birds practically equal with those receiving corn.

Table 11 gives the dressed grades of the turkeys produced during the last three years. All birds from the different lots in each trial were sold to the highest bidder and marketed at the same time. They were carefully graded after being dressed, and the market grades summarized for each group. In 1936, because of the cold January weather, it was necessary to market the birds before they were adequately finished. The corn-fed birds were graded significantly higher than those receiving either wheat or barley. In the experiments conducted in 1937 and 1938, when the birds received higher protein levels and were marketed at more nearly normal times, it was evident that the barley-, wheat- and oats-fed turkeys were graded equally as high as those receiving yellow corn. There was a striking variation in the skin color of the turkeys produced on yellow corn. The grader showed considerably more preference to the uniformly white skin color of the wheat-, barley- and oats-fed turkeys. The corn-fed turkeys had a much yellower skin, but there was not much difference in the amount of fleshing between any of the lots. It should be emphasized that there was some difference in the judgement as to market grades shown by the different local graders. For instance, all of the turkeys in Trial 6 were graded comparatively low. It was later stated that these birds were graded higher by the graders on the eastern market. However, all lots in each trial were graded by the same grader, so that all turkeys were judged on the same basis.

AVERAGE RETURNS OVER FEED COSTS. Table 13 gives the average costs of feeds used in 1937 and 1938, while Table 14 gives the average returns over feed costs for hens and toms produced in the same period, which, after all, is the best measure of feed value. It is evident that there

is considerable variation in the cost per 100 pounds of the different rations used, and that this has an appreciable effect upon the feed costs per bird during the starting, growing and finishing periods. For example, the growing and finishing mash mixtures used in 1937 cost from \$1.97 to \$2.33 per 100 pounds, while in 1938 the cost ranged from \$1.23 to \$1.54. The grains used in 1937 varied in price from \$1.46 to \$2.07, while in 1938 the grains cost only 54 to 93 cents per 100 pounds. All of the grains and other ingredients for the mash mixture were purchased according to the lowest bid from the local elevators. The grains were ground and mixed at the College Poultry Farm.

Cereal grains amounted to about 57 percent of the total cost of all the growing rations and 70 percent of the cost of the finishing rations used in 1937 and 1938. From this, it is evident that even though cereal grains are very low in cost they are important in determining the total costs of the rations used.

The average return per bird over feed costs in 1937 ranged from \$1.21 for the corn-fed turkeys to \$1.54 for those receiving wheat, while in 1938 the average returns were \$1.74 to \$2.11 per bird. While these differences in cost of feed per bird may not seem so great, they become increasingly significant as the number of turkeys produced increases.

It should be constantly kept in mind that turkeys should be marketed as soon as they are ready, as it takes considerable feed to maintain a turkey. It is unwise to speculate on a rising market, as a small increase in price per pound received for turkeys is usually more than offset by the increase in feed costs due to holding, and there are also dangers of mortality and losses from other causes.

Practical Recommendations

1. Turkey growers can well afford to use a large percentage of either corn, wheat, oats or barley, any of which will produce turkeys of high market value.

2. Since 80 to 90 percent of the total feed consumed during the growing and finishing periods consists of cereal grains, it is good economy to select grains on the basis of prevailing prices. Table 13 will be of considerable assistance in making this selection. Based upon the experiments conducted the following rations may be used with good results :

ALL-MASH STARTING RATION FIRST 8 WEEKS

MIXTURE A

15 lbs. of fish meal
 10 lbs. of meat and bone scraps
 12 lbs. of dried buttermilk
 6 lbs. of alfalfa leaf meal
 0.5 lbs. cod liver oil concentrate
 1.0 lbs. salt
 0.025 lbs. of manganese sulphate

44.525 lbs.

To MIXTURE A should be added 55.5 lbs. of any one of the following combinations (18.5 lbs. of each grain) :

1. Corn, wheat, barley
2. Wheat, barley, millet
3. Wheat, oats, millet

GROWING AND FINISHING RATIIONS. KEEP BEFORE BIRDS FROM 8 WEEKS OF AGE UNTIL MARKETED

MASH MIXTURES

No. 1

230 lbs. of either ground barley or oats
 150 lbs. of ground wheat
 90 lbs. of meat and bone scraps
 25 lbs. of dried buttermilk
 5 lbs. of salt

500 lbs.

No. 2

230 lbs. of either ground corn or wheat
 150 lbs. of ground oats or barley
 90 lbs. of meat and bone scraps
 25 lbs. of dried buttermilk
 5 lbs. of salt

500 lbs.

GRAIN MIXTURE : Either corn, wheat, oats or barley may be fed alone or in any combination. Oyster shells should be provided.

FEEDING PRACTICES. (1.) To provide vitamin A, especially when oats, barley and wheat are used instead of yellow corn, it is essential to include 10 percent of alfalfa leaf meal in the finishing mash mixture. This is especially desirable from September until the birds are marketed, as green range is usually poor at this time.

(2.) A good grade of cod liver oil with a guaranteed vitamin D potency should be used during the first 8 weeks, and longer if the birds are not outside. Either one-half percent of cod liver oil concentrate with a potency of 400 vitamin D units, or 2 percent of cod liver or other fish liver oils with 85 to 100 vitamin D units per gram should be used.

(3.) Whole wheat or Red Proso millet may be used with the starting mash after the first two weeks.

(4.) Red Proso millet may be used in the grain or growing mash mixtures to replace wheat. Millet may also be used in the grain mixture.

MARKETING. Turkeys should be marketed as soon as they have stopped making profitable gains and are free of pin feathers. This depends upon the strain of bird, time of hatching, weather conditions, and to some extent the feed used.

Appendix of Tables

TABLE 1.—ALL-MASH STARTING RATIONS USED DURING FIRST 8 WEEKS IN 1935 AND 1937 (IN POUNDS)

| Lot No. | Trial 1 | | | Trial 2 | | Trial 3 | | | Trial 4 | | | Trial 5 | | Trial 6 | | Trial 7 | | | | |
|------------------------|-------------------------------|-----|-----|---------|-----|---------|-----|-----|---------|-----|-----|---------|-----|---------|-----|---------|-----|-----|-----|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | |
| Gr. red proso millet | | | | | | | | | | | | | | | | | | | 18 | 18 |
| Gr. yellow corn | 29 | | | 29 | | 27 | 25 | 24 | 34 | 24 | 29 | 32 | | 22 | 32 | 24 | 18 | | | |
| Gr. wheat | | | | | | | | | | | | | 32 | | | | 18 | 18 | 18 | |
| Gr. oats | | | | | 29 | | | | | | | | | | | 10 | | | | 18 |
| Gr. barley | | 29 | 26 | | | | | | | | | | | | | | 18 | 18 | | |
| W. bran | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 10 | | | | |
| W. middlings | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 20 | 20 | 10 | | | | |
| Meat & bone scraps | 25 | 25 | 25 | 25 | 25 | 25 | 18 | 12 | 25 | 25 | 25 | 20 | 20 | 25 | 15 | 10 | 10 | 10 | 10 | |
| Fish meal | | | | | | | | | | | | | | | | 15 | 15 | 15 | 15 | |
| Dried buttermilk | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 12 | 12 | 12 | 12 | |
| Alfalfa leaf meal | 5 | 5 | 8 | 5 | 5 | 7 | 7 | 7 | | 10 | 5 | 7 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | |
| Manganese sulphate | ¼ lb. per ton in Trial 7 only | | | | | | | | | | | | | | | | | | | |
| Linseed oil meal | | | | | | | | 9 | 16 | | | | | | | | | | | |
| Salt | | | | | | | | | | | | | | | | 1 | 1 | 1 | 1 | |
| Cod liver oil conc. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| Cod liver oil stearine | | | | | | | | | | | | | | | | 2 | 2 | 2 | 2 | |
| Total pounds | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Date started | 5-19-35 | | | 5-22-35 | | 6-20-35 | | | 6-28-35 | | | 7-6-35 | | 7-15-35 | | 5-10-37 | | | | |
| Date finished | 7-13-35 | | | 7-17-35 | | 8-15-35 | | | 8-24-35 | | | 8-31-35 | | 9-9-35 | | 7-2-37 | | | | |

TABLE 2.—MASH AND GRAIN IN GROWING AND FINISHING RATIIONS USED DURING 1935 TO 1938 (IN POUNDS)

| Feeding period (age) | 1935 | | 1936 | | 1937 | | 1938 | | 1938 | | 1938 | | 1938 | | | | | | | | | | | | | |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----|----|----|----|----|----|----|----|----|----|----|----|
| | Trial 1 | Trial 2 | Trial 3 | Trial 4 | Trial 5 | Trial 6 | Trial 7 | Trial 8 | Trial 8 | Trial 8 | Trial 9 | Trial 9 | Trial 9 | Trial 9 | | | | | | | | | | | | |
| | 8-28 | 8-26 | 8-28 | 8-28 | 8-26 | 10-26 | 20-26 | 20-26 | 20-26 | 20-26 | H-20-25 | T-20-27 | H-20-25 | T-20-27 | | | | | | | | | | | | |
| | wks. | wks. | wks. | wks. | wks. | wks. | wks. | wks. | wks. | wks. | wks. | wks. | wks. | wks. | | | | | | | | | | | | |
| Lot No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| Gr. yellow corn | 53 | | 53 | | 55 | | 53 | | | | 46 | | | | 46 | | | | 36 | | | 36 | | | 36 | |
| Gr. oats | | | 53 | | | | 53 | | | | 30 | | 46 | | | 30 | 30 | 46 | | 36 | 36 | | 30 | | | 36 |
| Gr. wheat | | | | | 55 | | | | 53 | | 46 | 30 | 30 | | 46 | | 30 | | 30 | 30 | | | | | 30 | 30 |
| Gr. barley | | 53 | | | | | | | | 53 | | | 46 | | | 46 | | | | | | | 36 | | | 36 |
| W. bran | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | | | | 15 | | | | 15 | | | 15 | | | 15 | |
| W. middlings | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | | | | 15 | | | | 15 | | | 15 | | | 15 | |
| Meat & bone scraps | 12 | 12 | 12 | 12 | 10 | 10 | 12 | 12 | 12 | 12 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| Dried buttermilk | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Alfalfa leaf meal* | | | | | | | | | | | | | | | | | | | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Salt | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Total (100 pounds) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| The following grains kept before birds at all times as indicated: | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Whole yellow corn (C)† | C | | C | | C | | C | | | | C | | | | C | | | | C | | | C | | | C | |
| Whole barley (B) | | B | | | | | | | | B | | | B† | | | B | | | | | | B | | | | B |
| Whole oats (O) | | | O | | | | O | | | | | | O‡ | | | | | | O | | | | | | O | |
| Whole wheat (W) | | | | | W | | | | W | | | W | | | | W | | | | | | | | | | |
| Equal parts of oats, barley, red proso. (M) | | | | | | | | | | | | | | | | | | | M | | | M | | | | |

* Trial 1.—8-14 wks. no alfalfa, then a 7% level. Trial 2.—2½% alfalfa 8-15 wks. then a 7% level. Trial 3.—3% to 16 wks. then alfalfa increased to 7%. Trial 4.—No alfalfa used. Trial 5.—No alfalfa used. Trial 6.—10% alfalfa added when poults were 16 weeks of age.

† Yellow corn cracked until birds were 16 weeks of age, then fed whole.

‡ Whole grain to 20 weeks. Equal parts barley, oats and red proso from 20 weeks until birds were marketed. Lot 18 received 46% of barley in the mash instead of oats after 20 weeks. Trials 7, 8, and 9 included studies only during the finishing period.

TABLE 3.—AVERAGE WEIGHTS OF TURKEYS FED ALL-MASH STARTING RATIONS (IN POUNDS)

| Year and Trial No. | Lot No. | Ration Variable Percent | Age in Weeks | | | | | | Av. feed Consumed Per Bird 0-8 wks. | | |
|-----------------------|------------|---|--------------|-----|------|------|------|------|--|------|-----|
| | | | 0 | | 4 | | 6 | 8 | | | |
| 1935 Trial 1 | 1 | Yellow corn 29, alfalfa 5 | (47)* | .12 | (39) | .61 | (38) | 1.23 | (33) | 1.75 | |
| | 2 | Barley 29, alfalfa 5 | (49) | .12 | (33) | .70 | (32) | 1.51 | (31) | 1.93 | |
| | 3 | Barley 26, alfalfa 8 | (49) | .12 | (45) | .60 | (45) | 1.22 | (43) | 1.48 | |
| 1935 Trial 2† | 4 | Yellow corn 29 | (70) | .23 | (70) | 1.21 | (69) | 1.73 | (69) | 2.78 | |
| | 5 | Oats 29 | (76) | .23 | (76) | 1.28 | (76) | 1.88 | (76) | 2.93 | |
| 1935 Trial 3 | 6 | No linseed oil meal | (35) | .13 | (34) | .75 | (32) | 1.34 | (27) | 2.11 | |
| | 7 | Linseed oil meal 9 | (35) | .12 | (30) | .86 | (30) | 1.25 | (28) | 1.96 | |
| | 8 | Linseed oil meal 16 | (35) | .13 | (23) | .55 | (23) | 1.03 | (22) | 1.70 | |
| 1935 Trial 4 | 9 | No alfalfa | (27) | .12 | (24) | .58 | (24) | 1.24 | (24) | 1.90 | |
| | 10 | Alfalfa 10 | (28) | .12 | (23) | .52 | (23) | 1.11 | (22) | 1.91 | |
| | 11 | Alfalfa 5 | (27) | .12 | (24) | .56 | (23) | 1.22 | (23) | 1.92 | |
| 1935 Trial 5 | 12 | Yellow corn 32 | (55) | .13 | (51) | .68 | (50) | 1.33 | (50) | 2.14 | |
| | 13 | Wheat 32 | (56) | .13 | (56) | .67 | (49) | 1.37 | (46) | 2.37 | |
| 1935 Trial 6 | 14 | Meat and bone meal 25 | (29) | .13 | (26) | .69 | (24) | 1.32 | (24) | 2.22 | |
| | 15 | Meat and bone meal | (28) | .13 | (25) | .66 | (25) | 1.24 | (20) | 2.10 | |
| 1937 Trial 7 | 16 | Yellow corn 24, W. bran 10, W. midds. 10, oats 10 | (62) | .16 | (60) | .78 | (58) | 1.50 | (57) | 2.37 | 6.0 |
| | 17 | Yellow corn 18, Gr. barley 18, Gr. wheat 18 | (62) | .17 | (58) | .92 | (57) | 1.71 | (54) | 2.66 | 6.8 |
| | 18 | Gr. wheat 18, Gr. barley 18, Gr. red proso millet | (62) | .17 | (56) | .93 | (56) | 1.72 | (54) | 2.81 | 6.6 |
| | 19 | Gr. wheat 18, Gr. barley 18, Gr. red proso millet 18 | (61) | .17 | (55) | .93 | (53) | 1.75 | (50) | 2.78 | 7.3 |

* Number in parenthesis represents the number of turkeys surviving at each weighing.

† Trial 2 started at the age of 1 week.

TABLE 4.—AVERAGE WEIGHTS OF HENS (H) AND TOMS (T) DURING GROWING PERIOD (IN POUNDS)*

| Year and Trial No. | Lot No. | Mash Ration Variable (Percent) | Scratch Grain | 8 weeks | | 10 weeks | | 12 weeks | | 16 weeks | | 20 weeks | |
|-----------------------|------------|---|------------------|---------|-----|----------|-----|----------|------|----------|-------|----------|------|
| | | | | H | T | H | T | H | T | H | T | H | T |
| 1935 Trial 1 | 1 | Yellow corn 46, bran 15, midds. 15 Barley 46, | Yellow corn | 1.6 | 1.8 | | | 3.3 | 4.1 | 6.3 | 7.7 | 8.8 | 11.6 |
| | 2 | bran 15, midds. 15 | Barley | 1.4 | 1.9 | | | 3.2 | 4.5 | 5.9 | 8.3 | 8.1 | 11.5 |
| 1935 Trial 2 | 3 | Yellow corn 46, bran 15, midds. 15 Oats 46, | Yellow corn | 1.6 | 1.8 | 2.5 | 3.0 | 5.1 | 6.2† | 7.9 | 10.4† | | |
| | 4 | bran 15, midds. 15 | Oats | 1.7 | 2.1 | 2.5 | 3.3 | 5.2 | 6.7† | 7.6 | 12.0† | | |
| 1935 Trial 3 | 5 | Yellow corn 52 bran 15, midds. 15 Wheat 52, | Yellow corn | 1.3 | 1.4 | 2.0 | 2.3 | 3.8 | 4.3 | 6.3 | 7.5 | 8.2 | 10.8 |
| | 6 | bran 15, midds. 15 | Wheat | 1.4 | 1.6 | 2.2 | 2.5 | 4.1 | 4.9 | 6.7 | 8.1 | 8.9 | 11.5 |
| 1936 Trial 4 | 7 | Yellow corn 53, bran 15, midds. 15 Oats 53, | Yellow corn | 1.7 | 1.8 | | | 4.0 | 4.6 | 6.7 | 8.4 | 8.9 | 12.2 |
| | 8 | bran 15, midds. 15 | Oats | 1.8 | 1.9 | | | 3.5 | 4.4 | 6.0 | 7.8 | 7.8 | 10.6 |
| | 9 | Wheat 53, bran 15, midds. 15 | Wheat | 1.6 | 1.6 | | | 3.7 | 3.9 | 6.8 | 7.7 | 8.9 | 11.2 |
| | 10 | Barley 53, bran 15, midds. 15 | Barley | 1.6 | 1.9 | | | 3.8 | 4.9 | 6.4 | 8.3 | 8.6 | 11.4 |
| 1937 Trial 5 | 11 | Yellow corn 46, bran 15, midds. 15 | Yellow corn | 2.3 | 2.7 | | | 4.7 | 5.8 | 7.3 | 9.4 | 9.4 | 12.6 |
| | 12 | Wheat 46, oats 30 | Wheat | 2.4 | 2.7 | | | 4.8 | 5.7 | 7.1 | 9.4 | 9.3 | 13.4 |
| | 13 | Barley 46, wheat 30 | Barley | 2.4 | 2.8 | | | 5.8 | 5.6 | 7.7 | 9.7 | 9.0 | 12.2 |
| | 14 | Oats 46, wheat 30 | Oats | 2.5 | 2.8 | | | 4.9 | 5.7 | 7.2 | 9.4 | 9.5 | 13.2 |
| 1938 Trial 6 | 15 | Yellow corn 46, bran 15, midds. 15 | Yellow corn | | | 3.1 | 3.1 | 5.6 | 6.6† | 8.2 | 10.4† | 10.4 | 10.7 |
| | 16 | Wheat 46, oats 30 | Wheat | | | 2.8 | 3.3 | 5.6 | 6.8† | 8.1 | 10.7† | 9.0 | 12.7 |
| | 17 | Barley 46, oats 30 | Barley | | | 2.8 | 3.2 | 5.6 | 6.7† | 7.9 | 10.2† | 9.0 | 12.4 |
| | 18 | Oats 46, wheat 30 | Oats | | | 2.8 | 3.2 | 5.5 | 6.8† | 7.9 | 10.4† | 9.1 | 12.4 |

* The number of birds in each lot will be found in Table 10.

† These represent 14- and 18-week weights of males and females.

TABLE 5.—AVERAGE WEIGHT OF HENS (H) AND TOMS (T) DURING FINISHING PERIOD (IN POUNDS)*

| Year and Lot Trial No. No. | Mash Ration Variable (Percent) | Scratch Grain | 20 weeks | | 24 weeks | | 26 weeks | | 28 weeks | |
|-------------------------------|-------------------------------------|-------------------------|----------|------|----------|-------|----------|-------|----------|-------|
| | | | H | T | H | T | H | T | H | T |
| 1935 Trial 1 | 1 Yel. corn 46, bran 15, midds. 15 | Yellow corn | 8.8 | 11.6 | 10.8 | 15.4 | | | 12.8 | 19.6 |
| | 2 Barley 46, bran 15, midds. 15 | Barley | 8.1 | 11.5 | 9.9 | 14.9 | | | 11.4 | 18.5 |
| 1935 Trial 2 | 3 Yel. corn 46, bran 15, midds. 15 | Yellow corn | 7.9 | 10.4 | 10.0† | 13.9† | 11.8 | 17.4 | | |
| | 4 Oats 46, bran 15, midds. 15 | Oats | 7.6 | 12.0 | 9.4† | 14.0† | 10.8 | 17.0 | | |
| 1935 Trial 3 | 5 Yel. corn 48, bran 15, midds. 15 | Yellow corn | 8.2 | 10.8 | 10.1 | 14.3 | | | 10.5 | 15.0 |
| | 6 Wheat 48, bran 15, midds. 15 | Wheat | 8.9 | 11.5 | 10.4 | 14.1 | | | 10.6 | 14.8 |
| 1936 Trial 4 | 7 Yel. corn 45, bran 15, midds. 15 | Yellow corn | 8.9 | 12.2 | 10.3 | 15.2 | | | 10.6 | 16.5 |
| | 8 Oats 45, bran 15, midds. 15 | Oats | 7.8 | 10.6 | 9.1 | 13.1 | | | 9.3 | 13.5 |
| | 9 Wheat 45, bran 15, midds. 15 | Wheat | 8.9 | 11.2 | 10.2 | 13.8 | | | 9.6 | 13.2 |
| | 10 Barley 45, bran 15, midds. 15 | Barley | 8.6 | 11.4 | 10.0 | 13.9 | | | 9.7 | 13.9 |
| 1937 Trial 5 | 11 Yel. corn 36, bran 15, midds. 15 | Yellow corn | 9.4 | 12.6 | 11.6 | 17.0 | 12.2 | 18.5 | | |
| | 12 Wheat 36, oats 30 | Wheat | 9.3 | 13.4 | 11.3 | 17.4 | 11.9 | 18.7 | | |
| | 13 Barley 36, wheat 30 | Barley, oats, red proso | 9.0 | 12.2 | 11.9 | 17.8 | 12.2 | 18.7 | | |
| | 14 Oats 36, wheat 30 | Barley, oats, red proso | 9.5 | 13.2 | 11.7 | 17.4 | 12.1 | 18.7 | | |
| 1938 Trial 6 | 15 Yel. corn 36, bran 15, midds. 15 | Yellow corn | 9.2 | 12.3 | 11.4 | 16.8 | 12.2 | 18.6 | | |
| | 16 Wheat 36, oats 30 | Wheat | 9.0 | 12.7 | 11.4 | 17.4 | 12.3 | 19.5 | | |
| | 17 Barley 36, oats 30 | Barley | 9.1 | 12.4 | 11.6 | 17.2 | 12.2 | 18.4 | | |
| | 18 Barley 36, oats 30 | Barley, oats, red proso | 9.1 | 12.4 | 11.7 | 17.4 | 12.1 | 18.3 | | |
| 1938 Trial 7 | 19 Yel. corn 36, bran 15, midds. 15 | Yellow corn | 9.8 | 13.8 | 12.2 | 18.1 | 12.3 | 19.0 | | |
| | 20 Oats 36, wheat 30 | Oats | 10.2 | 13.2 | 12.7 | 17.2 | 12.8 | 18.8 | | |
| | 21 Oats 36, wheat 30 | Barley, oats, red proso | 9.8 | 13.5 | 11.9 | 17.7 | 12.8 | 19.0 | | |
| 1938 Trial 8 | 22 Yel. corn 36, bran 15, midds. 15 | Yel. corn | 9.7 | 12.9 | | | 12.8‡ | 18.9‡ | | 20.8‡ |
| | 23 Barley 36, oats 30 | Barley | 9.8 | 13.1 | | | 12.3‡ | 18.7‡ | | 19.4‡ |
| 1938 Trial 9 | 24 Yel. corn 36, bran 15, midds. 15 | Yel. corn | 9.8 | 13.7 | 12.0 | 18.7 | 11.9‡ | 18.5‡ | | |
| | 25 Oats 36, wheat 30 | Oats | 10.0 | 13.7 | 12.4 | 18.8 | 12.4‡ | 19.1‡ | | |
| | 26 Barley 36, wheat 30 | Barley | 10.0 | 13.7 | 12.2 | 18.2 | 12.2‡ | 18.9‡ | | |

* The number of birds in each lot will be found in Table 10.

† In Trial 2, these were 22-week-weights. Weights for Lots 3 and 4 were not taken at 24 weeks.

‡ In Trials 8 and 9, these were 25-week-weights. Weights for Lots 22-26 were not taken at 26 weeks. All birds were marketed at 25 weeks except males in Trial 8, which were marketed at 27 weeks and the weights included in the 28-week-column.

TABLE 6.—AVERAGE FEED CONSUMPTION PER BIRD (HENS & TOMS)

| Year and Trial No. | Feeding | | | Feed Consumed (in pounds) | | | Percentage | |
|-------------------------|------------|----------------------|-----------------|---------------------------|-------|-------|-----------------------|-------|
| | Lot No. | Period (age wks.) | Ration Variable | Mash | Grain | Total | Of Total Feed Mash | Grain |
| <i>Growing Period</i> | | | | | | | | |
| 1935 | 1 | 8-20 | Corn | 28.47 | 4.64 | 33.11 | 86.0 | 14.0 |
| Trial 1 | 2 | | Barley | 29.96 | 9.98 | 39.94 | 75.0 | 25.0 |
| 1935 | 3 | 8-22 | Corn | 22.69 | 4.08 | 26.77 | 84.8 | 15.2 |
| Trial 2 | 4 | | Oats | 19.92 | 8.29* | 28.21 | 70.6 | 29.4 |
| 1935 | 5 | 8-20 | Corn | 32.45 | 9.97 | 42.42 | 76.5 | 23.5 |
| Trial 3 | 6 | | Wheat | 32.18 | 18.62 | 50.80 | 63.3 | 36.7 |
| | 7 | | Corn | 27.25 | 4.86 | 32.11 | 84.9 | 15.1 |
| 1936 | 8 | 8-20 | Oats | 27.18 | 12.60 | 39.78 | 68.3 | 31.7 |
| Trial 4 | 9 | | Wheat | 27.70 | 13.61 | 41.31 | 67.1 | 32.9 |
| | 10 | | Barley | 30.49 | 12.50 | 42.99 | 70.9 | 29.1 |
| | 11 | | Corn | 26.45 | 5.67 | 32.12 | 82.3 | 17.7 |
| 1937 | 12 | 8-20 | Wheat | 26.08 | 6.09 | 32.17 | 81.1 | 18.9 |
| Trial 5 | 13 | | Barley | 24.58 | 5.02 | 29.60 | 83.0 | 17.0 |
| | 14 | | Oats | 27.62 | 6.71 | 34.33 | 80.5 | 19.5 |
| | 15 | | Corn | 23.14 | 4.49 | 27.63 | 83.7 | 16.3 |
| 1938 | 16 | 10-20 | Wheat | 22.71 | 6.32 | 29.03 | 78.2 | 21.8 |
| Trial 6 | 17 | | Barley | 19.39 | 8.84 | 28.23 | 68.7 | 31.3 |
| | 18 | | Oats | 20.75 | 11.50 | 32.25 | 64.3 | 35.7 |
| <i>Finishing Period</i> | | | | | | | | |
| 1935 | 1 | 20-28 | Corn | 19.9 | 23.3 | 43.2 | 46.1 | 53.9 |
| Trial 1 | 2 | | Barley | 22.4 | 30.5 | 52.9 | 42.3 | 57.7 |
| 1935 | 3 | 18-26 | Corn | 22.8 | 14.7 | 37.5 | 60.8 | 39.2 |
| Trial 2 | 4 | | Oats | 14.0 | 24.9 | 38.9 | 36.0 | 64.0 |
| 1935 | 5 | 20-28 | Corn | 17.9 | 28.3 | 46.2 | 38.7 | 61.3 |
| Trial 3 | 6 | | Wheat | 11.2 | 26.8 | 38.0 | 29.5 | 70.5 |
| 1936 | 7 | | Corn | 9.2 | 26.6 | 35.8 | 25.7 | 74.3 |
| Trial 4 | 8 | 20-28 | Oats | 10.9 | 25.8 | 36.7 | 29.7 | 70.3 |
| | 9 | | Wheat | 11.4 | 25.9 | 37.3 | 30.6 | 69.4 |
| | 10 | | Barley | 6.8 | 23.3 | 30.1 | 22.6 | 77.4 |
| | 11 | | Corn | 18.2 | 14.2 | 32.4 | 56.2 | 43.8 |
| 1937 | 12 | 20-26 | Wheat | 10.7 | 16.3 | 27.0 | 39.6 | 60.4 |
| Trial 5 | 13 | | Barley† | 18.9 | 15.4 | 34.3 | 55.1 | 44.9 |
| | 14 | | Oats† | 18.8 | 15.8 | 34.6 | 54.3 | 45.7 |
| | 15 | | Corn | 15.1 | 13.1 | 28.2 | 53.6 | 46.4 |
| 1938 | 16 | 20-26 | Wheat | 12.9 | 17.9 | 30.8 | 41.8 | 58.2 |
| Trial 6 | 17 | | Barley | 15.8 | 17.7 | 33.5 | 47.1 | 52.9 |
| | 18 | | Barley† | 12.7 | 19.6 | 32.3 | 39.2 | 60.8 |
| 1938 | 19 | 20-26 | Corn | 15.7 | 15.5 | 31.2 | 50.3 | 49.7 |
| Trial 7 | 20 | | Oats | 14.8 | 19.4 | 34.3 | 43.3 | 56.7 |
| | 21 | | Oats† | 11.7 | 22.0 | 33.7 | 34.6 | 65.4 |
| 1938 | 22 | 20-27 | Corn | 18.2 | 27.4 | 45.6‡ | 39.8 | 60.2 |
| Trial 8 | 23 | | Barley | 19.4 | 26.4 | 45.8‡ | 42.2 | 57.7 |
| 1938 | 24 | 20-25 | Corn | 8.4 | 20.4 | 28.8 | 29.1 | 70.9 |
| Trial 9 | 25 | | Oats | 7.7 | 25.2 | 32.9 | 23.5 | 76.5 |
| | 26 | | Barley | 10.1 | 23.2 | 33.4 | 30.4 | 69.6 |

* Of this, 2.92 lbs. was cracked yellow corn used instead of oats in the scratch grain 8-14 weeks.

† Equal parts of barley, oats and millet were used in the scratch mixture.

‡ Hens marketed at 25 weeks. Included in the figure 45.6 are 5.46 and 11.9 pounds of mash and grain respectively for the corn-fed toms. Included with the 45.8 pounds of barley feed consumed are 10.5 and 8.0 pounds of mash and grain. These are the amounts consumed by the toms for the 25- to 27-weeks-period, at the end of which they were marketed.

TABLE 7.—AVERAGE FEED CONSUMPTION PER BIRD (HENS AND TOMS) FOR GROWING AND FINISHING PERIODS COMBINED

| Year and Trial No. | Lot No. | Feeding Period (age wks.) | Ration Variable | Feed Consumed (in pounds) | | | Percentage Of Total Feed | |
|-----------------------|------------|---------------------------------|-----------------|---------------------------|-------|-------|-----------------------------|-------|
| | | | | Mash | Grain | Total | Mash | Grain |
| 1935 | 1 | 8-28 | Corn | 48.4 | 27.9 | 76.3 | 63.4 | 36.6 |
| Trial 1 | 2 | | Barley | 52.4 | 40.5 | 92.8 | 56.4 | 43.6 |
| 1935 | 3 | 8-26 | Corn | 45.5 | 18.8 | 64.3 | 70.8 | 29.2 |
| Trial 2 | 4 | | Oats | 33.9 | 33.2 | 67.1 | 50.5 | 49.5 |
| 1935 | 5 | 8-28 | Corn | 50.4 | 38.3 | 88.6 | 56.8 | 43.2 |
| Trial 3 | 6 | | Wheat | 43.4 | 45.4 | 88.8 | 48.9 | 51.1 |
| 1936 | 7 | 8-28 | Corn | 36.5 | 31.5 | 67.9 | 53.7 | 46.3 |
| Trial 4 | 8 | | Oats | 38.1 | 38.4 | 76.5 | 49.8 | 50.2 |
| | 9 | | Wheat | 39.1 | 39.5 | 78.6 | 49.7 | 50.3 |
| | 10 | | Barley | 37.3 | 35.8 | 73.1 | 51.0 | 49.0 |
| 1937 | 11 | 8-26 | Corn | 44.7 | 19.9 | 64.5 | 69.2 | 30.8 |
| Trial 5 | 12 | | Wheat | 36.8 | 22.4 | 59.2 | 62.2 | 37.8 |
| | 13 | | Barley | 43.5 | 20.4 | 63.9 | 68.0 | 32.0 |
| | 14 | | Oats | 46.4 | 22.5 | 68.9 | 67.3 | 32.7 |
| 1938* | 15 | 10-26 | Corn | 38.3 | 17.6 | 55.8 | 68.5 | 31.5 |
| Trial 6 | 16 | | Wheat | 35.6 | 24.3 | 59.9 | 59.5 | 40.5 |
| | 17 | | Barley | 35.2 | 26.6 | 61.8 | 57.0 | 43.0 |
| | 18 | | Oats | 33.4 | 31.1 | 64.5 | 51.8 | 48.2 |

* Trials 7 to 9 included a study of only finishing rations.

TABLE 8.—POUNDS OF FEED PER POUND OF GAIN IN WEIGHT FOR HENS AND TOMS DURING GROWING PERIOD

| Age in wks. | Lot No. | Corn | | | Wheat | | | Barley | | | Oats | | |
|-------------|------------|------|-------|-------|-------|-------|-------|--------|-------|-------|------|-------|-------|
| | | Mash | Grain | Total | Mash | Grain | Total | Mash | Grain | Total | Mash | Grain | Total |
| Trial 1 | 1 | 3.22 | 0.52 | 3.74 | | | | | | | | | |
| 8-20 wks. | 2 | | | | | | | 3.61 | 1.20 | 4.81 | | | |
| Trial 2 | 3 | 2.99 | 0.54 | 3.53 | | | | | | | | | |
| 8-22 wks. | 4 | | | | | | | | | | 2.47 | 1.03 | 3.50 |
| Trial 3 | 5 | 3.94 | 1.21 | 5.15 | | | | | | | | | |
| 8-20 wks. | 6 | | | | 3.71 | 2.15 | 5.86 | | | | | | |
| | 7 | 3.25 | 0.58 | 3.83 | | | | | | | | | |
| Trial 4 | 8 | | | | | | | | | | 4.01 | 1.86 | 5.87 |
| 8-20-wks. | 9 | | | | 3.28 | 1.61 | 4.89 | | | | | | |
| | 10 | | | | | | | 3.74 | 1.53 | 5.27 | | | |
| | 11 | 2.99 | 0.64 | 3.63 | | | | | | | | | |
| Trial 5 | 12 | | | | 2.97 | 0.69 | 3.66 | | | | | | |
| 8-20 wks. | 13 | | | | | | | 3.18 | 0.65 | 3.83 | | | |
| | 14 | | | | | | | | | | 3.28 | 0.80 | 4.08 |
| | 15 | 3.11 | 0.60 | 3.71 | | | | | | | | | |
| Trial 6 | 16 | | | | 2.92 | 0.81 | 3.73 | | | | | | |
| 10-20 wks. | 17 | | | | | | | 2.52 | 1.15 | 3.67 | | | |
| | 18 | | | | | | | | | | 2.70 | 1.50 | 4.20 |

Nutritive values compared with corn for growth*—1935-36 experiments: Pounds equal to one pound of corn—wheat 1.21, barley 1.33, oats 1.26. Feeding value compared with corn (percent)—wheat 82.6, barley 75.2, oats 79.4. 1937-38 experiments: Pounds equal to one pound of corn—wheat 1.01, barley 1.02, oats 1.12. Feeding value compared with corn (percent)—wheat 99.0, barley 98.0, oats 89.3.

* Only comparisons were made where corn was fed at the same time and under similar conditions as the other grains.

TABLE 9.—POUNDS OF FEED PER POUND OF GAIN IN WEIGHT FOR HENS & TOMS DURING FINISHING PERIOD

| Year and Age in Wks. | Lot No. | Corn | | | Wheat | | | Barley | | | Oats | | |
|-------------------------------|------------|-------|-------|-------|-------|-------|-------|--------|-------|-------|------|-------|-------|
| | | Mash | Grain | Total | Mash | Grain | Total | Mash | Grain | Total | Mash | Grain | Total |
| 1935-36 Trial 1 20-28 wks. | 1 | 3.16 | 3.71 | 6.87 | | | | | | | | | |
| | 2 | | | | | | | 4.26 | 5.82 | 10.08 | | | |
| 1935-36 Trial 2 18-26 wks. | 3 | 4.08 | 2.62 | 6.70 | | | | | | | | | |
| | 4 | | | | | | | | | | 3.32 | 5.92 | 9.24 |
| 1935-36 Trial 3 20-28 wks. | 5 | 5.43 | 8.53 | 13.96 | | | | | | | | | |
| | 6 | | | | 4.56 | 10.87 | 15.43 | | | | | | |
| 1935-36 Trial 4 20-28 wks. | 7 | 10.36 | 3.49 | 13.85 | | | | | | | | | |
| | 8 | | | | | | | | | | 5.68 | 13.61 | 19.29 |
| | 9 | | | | 4.95 | 17.01 | 21.96 | | | | | | |
| | 10 | | | | | | | 5.92 | 13.36 | 19.28 | | | |
| 1937-38 Trial 5 20-26 wks. | 11 | 3.84 | 2.99 | 6.83 | | | | | | | | | |
| | 12 | | | | 2.72 | 4.16 | 6.88 | | | | | | |
| | 13 | | | | | | | 4.03 | 3.30 | 7.33* | | | |
| | 14 | | | | | | | | | | 4.95 | 4.16 | 9.11* |
| 1937-38 Trial 6 20-26 wks. | 15 | 3.36 | 2.91 | 6.27 | | | | | | | | | |
| | 16 | | | | 2.56 | 3.57 | 6.13 | | | | | | |
| | 17 | | | | | | | 3.49 | 3.91 | 7.40 | | | |
| | 18 | | | | | | | 2.84 | 4.41 | 7.25* | | | |
| 1937-38 Trial 7 20-26 wks. | 19 | 3.91 | 3.86 | 7.77 | | | | | | | | | |
| | 20 | | | | | | | | | | 3.51 | 4.59 | 8.10 |
| 1937-38 Trial 8 20-27 wks. | 21 | | | | | | | | | | 2.66 | 5.03 | 7.69* |
| | 22 | 2.85 | 3.49 | 6.34 | | | | | | | | | |
| 1937-38 Trial 9 20-25 wks. | 23 | | | | | | | 2.31 | 4.75 | 7.06 | | | |
| | 24 | 2.33 | 5.66 | 7.99 | | | | | | | | | |
| 1937-38 Trial 9 20-25 wks. | 25 | | | | | | | | | | 1.95 | 6.36 | 8.31 |
| | 26 | | | | | | | 2.72 | 6.23 | 8.95 | | | |

Nutritive values compared with corn for finishing, 1935-36 experiments: Pounds equal to one pound of corn—wheat 1.35, barley 1.43, oats 1.39. Feeding value compared with corn (percent)—wheat 74.1, barley 69.9, oats 71.9. 1937-38 experiments: Pounds equal to one pound of corn—wheat 0.99, barley 1.14, oats 1.04. Feeding value compared with corn (percent)—wheat 101.1, barley 87.7, oats 96.2.

* In comparing nutritive values, Lots 13, 14, 18 and 21 were not included because a combination of barley, oats and millet was used in the grain mixture instead of the single grain.

TABLE 10.—NUMBERS OF BIRDS AND AGES DURING GROWING AND FINISHING PERIODS

| Trial No. | Lot No. | Ration Variable | Growing Tests | | | | Finishing Tests | | | | | | | | | |
|-----------|---------|-----------------|---------------|----------|--------------|----------|-----------------|----------|----------|----------|--------------|----------|---------------|----------|----|----|
| | | | Dates | | Age in Weeks | | Number Poults | | Dates | | Age in Weeks | | Number Poults | | | |
| | | | Started | Finished | Started | Finished | Started | Finished | Started | Finished | Started | Finished | Started | Finished | | |
| 1 | 1 | Corn | 7-13-35 | 10-5-35 | 8 | 20 | 68 | 29 | 39 | 10-5-35 | 12-2-35 | 20 | 28 | 68 | 27 | 39 |
| | 2 | Barley | | | | | 68 | 30 | 33 | | | | | 65 | 30 | 33 |
| 2 | 3 | Corn | 7-2-35 | 9-10-35 | 8 | 18 | 69 | 31 | 37 | 9-11-35 | 12-3-35 | 18 | 26 | 68 | 31 | 37 |
| | 4 | Oats | | | | | 77 | 34 | 40 | | | | | 74 | 34 | 40 |
| 3 | 5 | Corn | 8-31-35 | 11-23-35 | 8 | 20 | 74 | 31 | 37 | 11-23-35 | 1-18-36 | 20 | 28 | 72 | 30 | 33 |
| | 6 | Wheat | | | | | 68 | 32 | 32 | | | | | 65 | 31 | 27 |
| 4 | 7 | Corn | 9-4-36 | 11-28-36 | 8 | 20 | 72 | 43 | 25 | 11-28-36 | 1-23-37 | 20 | 28 | 68 | 43 | 24 |
| | 8 | Oats | | | | | 72 | 47 | 19 | | | | | 66 | 39 | 16 |
| | 9 | Wheat | | | | | 72 | 31 | 33 | | | | | 64 | 29 | 31 |
| | 10 | Barley | | | | | 71 | 35 | 30 | | | | | 65 | 34 | 28 |
| 5 | 11 | Corn | 7-2-37 | 9-24-37 | 8 | 20 | 72 | 26 | 43 | 9-24-37 | 11-5-37 | 20 | 26 | 69 | 26 | 43 |
| | 12 | Wheat | | | | | 71 | 36 | 34 | | | | | 70 | 35 | 34 |
| | 13 | Barley | | | | | 72 | 38 | 31 | | | | | 69 | 38 | 31 |
| | 14 | Oats | | | | | 72 | 38 | 27 | | | | | 65 | 38 | 27 |
| 6 | 15 | Corn | 7-5-38 | 9-13-38 | 10 | 20 | 93 | 48 | 41 | 9-14-38 | 10-26-38 | 20 | 26 | 89 | 48 | 40 |
| | 16 | Wheat | | | | | 91 | 40 | 39 | | | | | 79 | 40 | 39 |
| | 17 | Barley | | | | | 92 | 44 | 44 | | | | | 86 | 43 | 42 |
| | 18 | Oats | | | | | 92 | 45 | 41 | | | | | 86 | 42 | 42 |
| 7 | 19 | Corn | | | | | | | 9-29-38 | 11-10-38 | 20 | 26 | 60 | 26 | 33 | |
| | 20 | Oats | | | | | | | | | | | 60 | 26 | 31 | |
| | 21 | Oats | | | | | | | | | | | 60 | 26 | 32 | |
| 8 | 22 | Corn | | | | | | | 10-12-38 | 11-16-38 | 20 | 25* | 77 | 40 | 35 | |
| | 23 | Barley | | | | | | | | 11-30-38 | | 27* | 77 | 42 | 33 | |
| 9 | 24 | Corn | | | | | | | 10-27-38 | 12-1-38 | 20 | 25 | 54 | 23 | 29 | |
| | 25 | Oats | | | | | | | | | | | 54 | 26 | 28 | |
| | 26 | Barley | | | | | | | | | | | 54 | 26 | 27 | |

* In Trial 3 during the last period, three turkeys were found frozen to death in Lot 6, and five turkeys were missing from lot 5. In Trial 4, there were four turkeys missing from Lot 9 during the growing period and three during the finishing period, while there were two birds missing from Lot 10. In each case, it is believed the missing turkeys had been stolen. Causes of mortality were due chiefly to accidents and crowding.

TABLE 11.—DRESSED GRADES OF TURKEYS PRODUCED FROM
1936 TO 1938

| Year and Trial No. | Lot No. | Principal Constituent Of Mash | U. S. Grades and Number Of Males and Females | | | Remarks | |
|--------------------------|------------|-------------------------------------|---|--------------|-----------------|---------|--|
| | | | Grain | Prime Choice | Commer- cial | | |
| 1936 | 7 | Yel. corn | Yel. corn | 56 | 8 | 3 | |
| Trial 4 | 8 | Oats | Oats | 42 | 6 | 8 | |
| | 9 | Wheat | Wheat | 21 | 23 | 6 | |
| | 10 | Barley | Barley | 37 | 15 | 10 | |
| 1937 | 11 | Yel. corn | Yel. corn | 54 | 7 | 8 | More pin feathers—more variation in color |
| Trial 5 | 12 | Wheat | Wheat | 59 | 7 | 3 | |
| | 13 | Barley | B O M* | 62 | 3 | 4 | |
| | 14 | Oats | B O M | 54 | 4 | 7 | Very white in color |
| 1938 | 15 | Yel. corn | Yel. corn | 62 | 26 | 0 | Less dented breast bones More variation in color |
| Trial 6 | 16 | Wheat | Wheat | 59 | 20 | 0 | Uniformly well-fleshed |
| | 17 | Barley | Barley | 70 | 13 | 2 | Very good appearance and well fleshed |
| | 18 | Barley | B O M | 75 | 9 | 0 | Appeared better fleshed than any of other 3 lots |
| 1938 | 19 | Yel. corn | Yel. corn | 52 | 4 | 3 | More variation in color, but appeared slightly bet- ter-finished than lot 20 |
| Trial 7 | 20 | Oats | Oats | 55 | 2 | 0 | |
| | 21 | Oats | B O M | 53 | 4 | 1 | No variation in color Finish equal to corn group |
| 1938 | 22 | Yel. corn | Yel. corn | 69 | 6 | 0 | |
| Trial 8 | 23 | Barley | Barley | 66 | 9 | 0 | |
| 1938 | 24 | Yel. corn | Yel. corn | 43 | 3 | 0 | |
| Trial 9 | 25 | Oats | Oats | 53 | 1 | 0 | |
| | 26 | Barley | Barley | 51 | 2 | 0 | |

* Scratch mixture of equal parts of barley, oats and red proso miller.

TABLE 12.—CALCULATED EQUIVALENT VALUES PER BUSHEL OF CEREAL GRAINS TESTED IN 1937 AND 1938

| <i>When Corn Costs cents</i> | <i>Growing Rations</i> | | | <i>Finishing Rations</i> | | |
|--------------------------------------|-------------------------------------|--------------------------------------|-------------------------------------|-------------------------------------|--------------------------------------|-------------------------------------|
| | <i>Wheat Is Worth cents</i> | <i>Barley Is Worth cents</i> | <i>Oats Are Worth cents</i> | <i>Wheat Is Worth cents</i> | <i>Barley Is Worth cents</i> | <i>Oats Are Worth cents</i> |
| 26 | 27.6 | 21.8 | 13.3 | 28.1 | 19.5 | 14.3 |
| 28 | 29.7 | 23.5 | 14.3 | 30.3 | 21.1 | 15.4 |
| 30 | 31.8 | 25.2 | 15.3 | 32.3 | 22.6 | 16.5 |
| 32 | 33.9 | 26.9 | 16.3 | 34.6 | 24.1 | 17.6 |
| 34 | 36.1 | 28.6 | 17.3 | 36.8 | 25.6 | 18.7 |
| 36 | 38.2 | 30.2 | 18.4 | 39.0 | 27.1 | 19.8 |
| 38 | 40.3 | 31.9 | 19.4 | 41.1 | 28.6 | 20.9 |
| 40 | 42.4 | 33.6 | 20.4 | 43.3 | 30.1 | 22.0 |
| 42 | 44.6 | 35.3 | 21.4 | 45.5 | 31.6 | 23.1 |
| 44 | 46.7 | 37.0 | 22.5 | 47.6 | 33.1 | 24.2 |
| 46 | 48.8 | 38.6 | 23.5 | 49.8 | 34.6 | 25.3 |
| 48 | 50.9 | 40.3 | 24.5 | 51.9 | 36.1 | 26.4 |
| 50 | 53.0 | 42.0 | 25.5 | 54.1 | 37.6 | 27.5 |
| 52 | 55.2 | 43.7 | 26.5 | 56.3 | 39.1 | 28.6 |
| 54 | 57.3 | 45.4 | 27.6 | 58.4 | 40.6 | 29.7 |
| 56 | 59.4 | 47.0 | 28.6 | 60.6 | 42.1 | 30.8 |
| 58 | 61.5 | 48.7 | 29.6 | 62.8 | 43.6 | 31.9 |
| 60 | 63.6 | 50.4 | 30.6 | 64.9 | 45.1 | 33.0 |
| 62 | 65.8 | 52.1 | 31.6 | 67.1 | 46.6 | 34.1 |
| 64 | 67.9 | 53.8 | 32.7 | 69.3 | 48.1 | 35.2 |
| 66 | 70.0 | 55.4 | 33.7 | 71.4 | 49.6 | 36.3 |
| 68 | 72.1 | 57.1 | 34.7 | 73.6 | 51.1 | 37.4 |
| 70 | 74.3 | 58.8 | 35.7 | 75.8 | 52.6 | 38.5 |
| 72 | 76.4 | 60.5 | 36.7 | 77.9 | 54.1 | 39.6 |
| 74 | 78.5 | 62.2 | 37.8 | 80.1 | 55.6 | 40.7 |
| 76 | 80.6 | 63.8 | 38.8 | 82.2 | 57.1 | 41.8 |
| 78 | 82.7 | 65.5 | 39.8 | 84.4 | 58.6 | 42.9 |
| 80 | 84.9 | 67.2 | 40.8 | 86.6 | 60.1 | 44.0 |
| 82 | 87.0 | 68.9 | 41.8 | 88.7 | 61.6 | 45.1 |
| 84 | 89.1 | 70.6 | 42.9 | 90.9 | 63.1 | 46.2 |
| 86 | 91.2 | 72.2 | 43.9 | 93.1 | 64.6 | 47.3 |
| 88 | 93.3 | 73.9 | 44.9 | 95.2 | 66.2 | 48.4 |
| 90 | 95.5 | 75.6 | 45.9 | 97.4 | 67.6 | 49.5 |
| 92 | 97.6 | 77.3 | 46.9 | 99.6 | 69.2 | 50.6 |
| 94 | 99.7 | 79.0 | 48.0 | 101.7 | 70.7 | 51.7 |
| 96 | 101.8 | 80.6 | 49.0 | 103.9 | 72.2 | 52.8 |
| 98 | 104.0 | 82.3 | 50.0 | 106.1 | 73.7 | 53.9 |
| 100 | 106.1 | 84.0 | 51.0 | 108.2 | 75.2 | 55.0 |

TABLE 13.—AVERAGE COSTS OF FEEDS USED IN 1937 AND 1938

| | Starting Period | | Growing Period | | | | Finishing Period | | | |
|----------------------------|-----------------|----------|----------------|----------|----------|----------|------------------|----------|----------|----------|
| | All-Mash | | Mash | | Grain | | Mash | | Grain | |
| | Per Cwt. | Per Bird | Per Cwt. | Per Bird | Per Cwt. | Per Bird | Per Cwt. | Per Bird | Per Cwt. | Per Bird |
| <i>From Table 1 (1937)</i> | <i>cents</i> | | | | | | | | | |
| Lot 16 | \$2.78 | 17.0* | | | | | | | | |
| Lot 17 | 2.65 | 18.0 | | | | | | | | |
| Lot 18 | 2.64 | 17.0 | | | | | | | | |
| Lot 19 | 2.63 | 18.0 | | | | | | | | |
| <i>From Table 2</i> | | | | | | | | | | |
| Lot 11 corn | | | \$2.33 | 61.6 | \$2.07 | 11.7 | \$2.33 | 42.4 | \$2.07 | 29.4 |
| Lot 12 wheat | | | 2.00 | 52.0 | 1.67 | 10.2 | 2.00 | 21.4 | 1.67 | 27.2 |
| Lot 13 barley | | | 2.03 | 49.9 | 1.63 | 8.2 | 2.03 | 38.4 | 1.46† | 22.5 |
| Lot 14 oats | | | 1.97 | 54.4 | 1.50 | 10.1 | 1.97 | 37.0 | 1.46† | 23.1 |
| Lot 15 corn | 2.18 | 20.0* | 1.54 | 35.6 | 0.82 | 3.7 | 1.34 | 20.3 | 0.75 | 9.8 |
| Lot 16 wheat | | | 1.40 | 31.8 | 0.93 | 5.9 | 1.29 | 16.6 | 0.75 | 13.5 |
| Lot 17 barley | | | 1.29 | 25.0 | 0.60 | 5.3 | 1.23 | 19.4 | 0.61 | 10.8 |
| Lot 18 oats§ | | | 1.38 | 28.6 | 0.60 | 6.9 | 1.23 | 15.6 | 0.87† | 17.1 |
| Non-experimental† | 2.18 | 14.2 | 1.28 | 33.3 | 0.60 | 3.9 | | | | |
| Lot 19 corn | | | | | | | 1.34 | 21.0 | 0.66 | 10.2 |
| Lot 20 oats | | | | | | | 1.28 | 19.0 | 0.75 | 14.6 |
| Lot 21 oats | | | | | | | 1.28 | 14.9 | 0.68† | 15.0 |
| Lot 22 corn | | | | | | | 1.34 | 24.3 | 0.66 | 18.1 |
| Lot 23 barley | | | | | | | 1.23 | 27.6 | 0.60 | 14.0 |
| Lot 24 corn | | | | | | | 1.34 | 11.3 | 0.66 | 13.5 |
| Lot 25 oats | | | | | | | 1.28 | 9.9 | 0.54 | 13.6 |
| Lot 26 barley | | | | | | | 1.28 | 13.0 | 0.59 | 13.7 |

* Represents mash costs for first 8 weeks in 1937 and the first 10 weeks in 1938. Only one starting mash mixture was used for all the lots in 1938.

† Lots 19 to 26 all received the oats growing ration on the college farm consisting of 46 pounds of pulverized oats, 30 ground wheat, 18 meat and bone scraps, 5 dried buttermilk, and 1 pound of salt in the mash, with whole oats, oyster shells, and water available at all times.

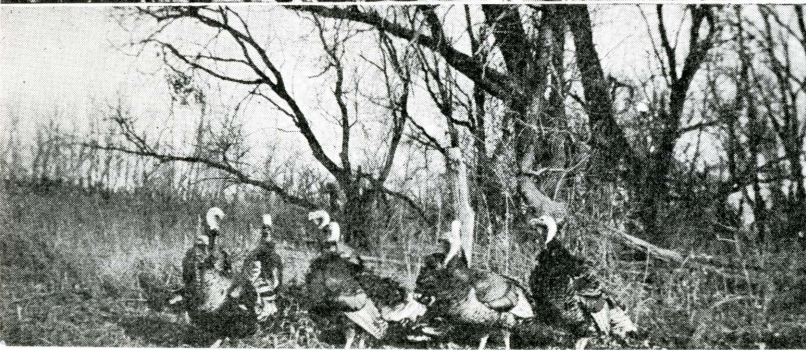
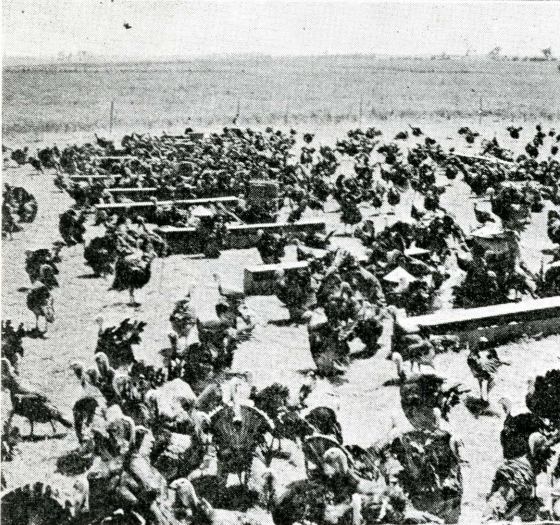
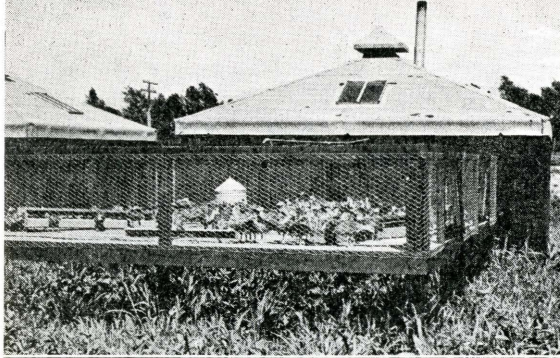
‡ Equal parts barley, oats and millet in scratch grain.

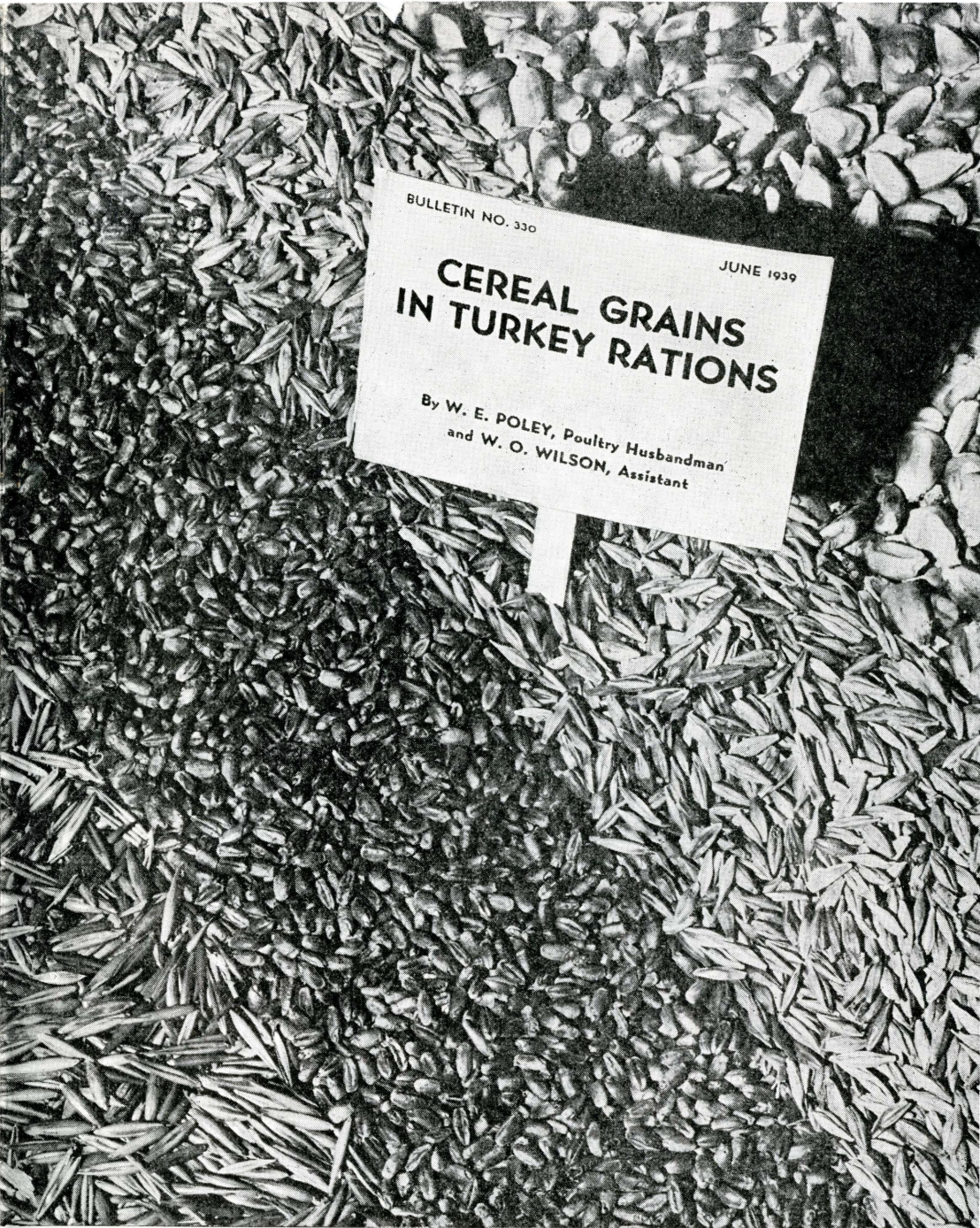
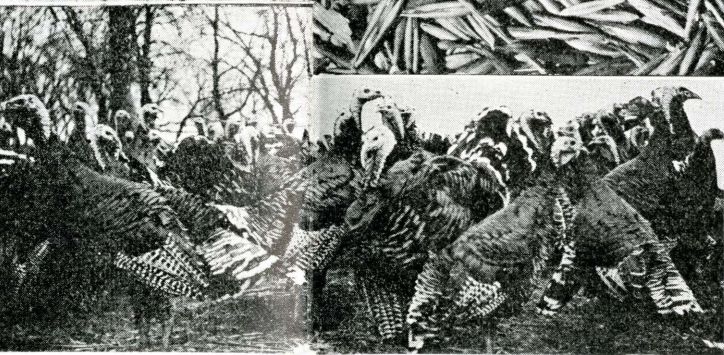
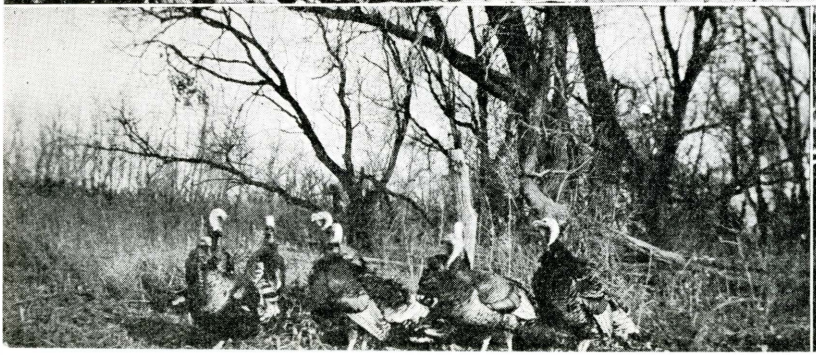
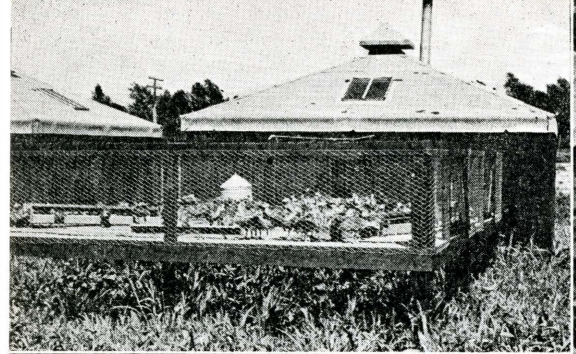
§ Barley replaced oats at beginning of finishing period.

TABLE 14.—AVERAGE RETURNS OVER FEED COSTS FOR HENS AND TOMS FROM HATCHING TIME UNTIL MARKETED

| Year and Trial No. | Lot No. | Ration | Total Return Per Bird | Feed Cost Per Bird | Return Over Feed Costs |
|--------------------|---------|---------|-----------------------|--------------------|------------------------|
| 1937 | 11 | Corn | \$2.83 | \$1.62 | \$1.21 |
| Trial 5 | 12 | Wheat | 2.82 | 1.28 | 1.54 |
| | 13 | Barley* | 2.85 | 1.36 | 1.49 |
| | 14 | Oats* | 2.84 | 1.42 | 1.42 |
| 1938 | 15 | Corn | 2.66 | 0.89 | 1.77 |
| Trial 6 | 16 | Wheat | 2.74 | 0.88 | 1.86 |
| | 17 | Barley | 2.63 | 0.80 | 1.83 |
| | 18 | Barley* | 2.62 | 0.88 | 1.74 |
| 1938 | 19 | Corn | 2.90 | 0.85 | 2.05 |
| Trial 7 | 20 | Oats | 2.90 | 0.85 | 2.05 |
| | 21 | Oats* | 2.92 | 0.81 | 2.11 |
| Trial 8 | 22 | Corn | 2.97 | 0.94 | 2.03 |
| | 23 | Barley | 2.76 | 0.93 | 1.83 |
| Trial 9 | 24 | Corn | 2.78 | 0.76 | 2.02 |
| | 25 | Oats | 2.85 | 0.75 | 2.10 |
| | 26 | Barley | 2.80 | 0.78 | 2.02 |

* Equal parts of barley, oats and millet fed in the scratch grain during finishing period.





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CEREAL GRAINS IN TURKEY RATIONS

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