

# Confinement, Rotation of Toms and Artificial Insemination as Related to Reproduction in Turkeys

By

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**T**HE investigations described herein were conducted to determine the influence of certain phases of management on the reproductive efficiency of Broad Breasted Bronze turkeys. Information was desired as to whether turkey breeders should be confined to the house during the breeding season or allowed access to outside yards or range, and as to whether rotation of toms and artificial insemination would result in higher fertility than that observed in mating with stationary toms.

The outline for the major part of the experiment is shown in the left hand column of Table 1. The experiments were conducted during the 1945 and the 1946 breeding seasons. All birds were hatched the previous spring. Those used in the 1945 trials were obtained as poults on May 16 and were from eggs produced by a North Dakota breeder. These poults were from a flock mating and were not pedigreed. The 1946 breeders were hatched the first of May and were from the most productive dams in the 1945 experimental flock.

The turkeys were housed in a 16' x 32' uninsulated double-boarded house which was divided into four 8'x16' pens. Each year eleven hens and one tom were placed in each pen on January 3 and were exposed to morning and evening artificial lighting to provide 14 hours of total light per day. These toms had been exposed to artificial lights for two weeks before they were put in the pens with the hens. In two pens of eight hens each all birds were artificially inseminated. These two lots, pens 5 and 6 were housed in 10' x 14' uninsulated brooder houses and lighted in a similar manner to pens 1, 2, 3 and 4

(See Tables 1, and 2). All pens were trapnesteed.

A mash and grain ration was fed. The mash was compounded from the following ingredients:

Ground yellow corn.....	20	lbs.
Wheat bran .....	20	lbs.
Wheat middlings .....	20	lbs.
Ground oats .....	10	lbs.
Meat and bone meal .....	14	lbs.
Soybean meal .....	10	lbs.
Alfalfa leaf meal* .....	10	lbs.
Salt mixture** .....	1	lb.
Delsterol .....	0.12	lb.

The mash was available in hoppers at all times. A grain mixture of equal parts by weight of yellow corn and heavy oats was fed once each day on top of the

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\* Dehydrated alfalfa leaf meal preferred.

\*\* 10 grams manganous sulfate added to one pound of iodized salt.

mash. The amount of grain was restricted to about 4 ounces per bird daily. Granite grit and oyster shells were available at all times.

The toms in Pens 1 and 2 were stationary whereas those in Pens 3 and 4 were switched or rotated weekly. The birds in pens 1 and 4 were confined to their inside pens from January 3 to the end of the experiments on May 31, whereas the birds in pens 2 and 3 had access to outside yards. The above experimental arrangement made it possible to compare **confinement** against **access to yards**, and **stationary toms** against **rotated toms** as far as their influence on reproduction in single-male pens was concerned.

To provide a comparison of artificial insemination with natural mating the hens in the two 8-hen pens (Pens 5 and 6) were inseminated with .05 cc. of undiluted mixed semen from six toms at two-week intervals. The hens in Pen 5 were inseminated in the morning between 7 and 8 A.M. and those in Pen 6 were inseminated in the evening between 4 and 5 P.M. This phase of the project was conducted during the 1945 season only.

All normal uncracked eggs were kept for incubation. The eggs were set in a forced-draft incubator on the first and the middle of each month. Prior to incubation the eggs were stored in a basement egg room where the temperature was practically always between 55 and 65 degrees Fahrenheit. The eggs were candled on the 12th or 13th day and candled again and transferred into pedigree baskets on the 24th or 25th day. All eggs candled out as infertile

were broken out in the laboratory and examined for any trace of embryonic development. Many of the eggs candled out as "infertile" were subsequently found to be eggs that were fertile but the embryos had died in the early stages of development.

## RESULTS

### Influence of Confinement on Egg Production

Egg production from the hens in the two confined pens was higher than from the hens in the two pens with access to the outside yards (Table 1). This was true for both years. The average number of eggs per hen of the confined hens for the two years exceeded that of the other pens by 13 eggs. This is an appreciable difference and indicates that in this climate the confinement of turkey breeding stock is to be recommended as far as egg production is concerned.

The average egg production per hen for all pens increased from an average of 62 eggs in 1945 to 81 eggs during 1946 (Table 1). Part of this increase of 19 eggs may have been due to the fact that the 1946 breeders were progeny of the better hens in the 1945 flock. Also it should be pointed out that more intense lights were used in 1946 than were used in 1945. The fact that egg laying commenced sooner in 1946 indicates that this increased lighting had a favorable effect on egg production.

### Influence of Confinement on Fertility and Hatchability

The data in Table 1 show that the differences between the four pens in the percentages of fertile eggs were small and not consist-

1.—Relation of confinement and rotation of toms to reproduction of Broad Breasted Bronze turkeys.

Method of mating	Management	Eggs laid per hen (number)			Fertility of eggs set		
		1945	1946	Avg.	1945 %	1946 %	Avg. %
stationary	Confined	66.1	85.6	79.0	90.2	88.4	89.3
	Outside yard	53.3	74.9	64.1	93.4	90.4	91.6
rotated	Outside yard	55.9	77.0	66.5	83.9	93.8	89.6
	Confined	66.5	87.3	77.4	83.8	90.0	88.1
All pens		61.9	81.2	71.7	87.8	90.6	89.4

Method of mating	Management	Hatchability of fertile eggs			Poults per hen (number)		
		1945 %	1946 %	Avg. %	1945	1946	Avg.
stationary	Confined	75.3	68.3	71.5	44.9	47.9	46.4
	Outside yard	80.3	68.5	73.4	36.4	43.8	40.1
rotated	Outside yard	84.7	76.7	79.9	37.6	51.9	44.8
	Confined	78.0	83.0	81.0	40.8	61.2	51.5
All pens		79.2	74.3	76.4	39.9	51.2	45.6

2.—Fertility in Broad Breasted Bronze turkeys as affected by artificial insemination and natural mating.

Method of mating	Percent fertile of eggs set	
	Pens	Groups
Natural mating	Stationary tom	90.2
	Rotated tom	83.8
Artificial insemination	AM	88.2
	PM	90.3

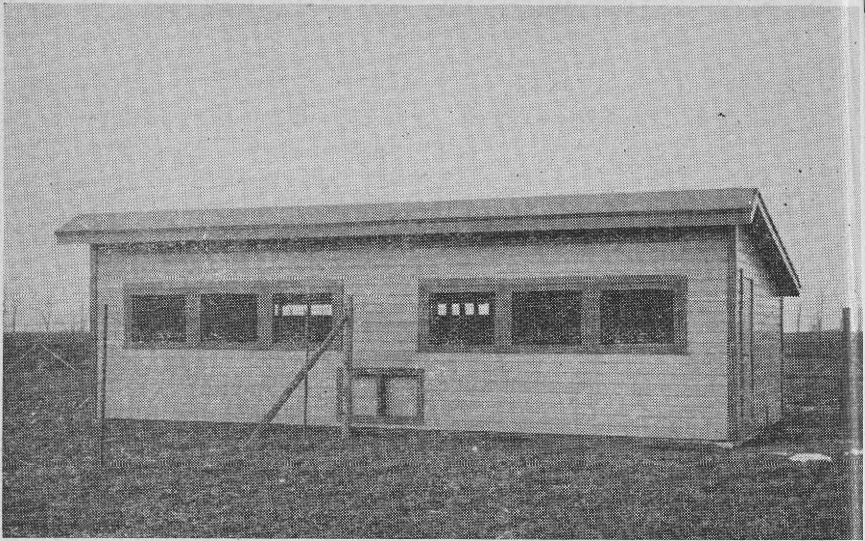
ent. Confinement, therefore, did not seem to influence fertility one way or the other.

The average hatchability of fertile eggs for the two pens of confined birds for the two years was 76.0 percent and that for the birds with access to the outside yards was 76.7 percent, which shows that keeping turkey breeders in confinement does not necessarily result in a decrease in the hatchability of their eggs. However, the im-

portance of a balanced diet for confined breeders cannot be overemphasized.

The hens confined in pens produced more poults than those hens with access to yards. This is a result of the greater egg production of the confined breeders. The average number of poults per hen per season was 48.9 in the confined pens and 42.4 in the pens with outside yards.

The results of these experiments show that a greater num-



House used for turkey breeding stock.

**ber of hatching eggs and poults can be produced under North Dakota conditions if the breeders are confined to the house than if the breeders are permitted access to outside yards throughout the breeding season.**

#### **The Effect of Rotating Toms on Fertility and Hatchability**

During the 1945 breeding season fertility of eggs was higher in the pens provided with stationary toms than in the two pens between which the toms were switched or rotated; however, during 1946 the average percentage fertility was a little higher in the pens with rotated toms (Table 1). The difference in the two-year average percentages of fertility indicates that switching or rotating toms did not increase the fertility of the eggs produced by their mates.

Hatchability of fertile eggs was higher for the two seasons in the pens of breeders with the rotated toms. In the 1945 ex-

periments each of the two rotated-tom pens had hatchability percentages that were a little higher than the corresponding pen with the stationary tom. In the 1946 experiments hatchability was appreciably higher in the pens with rotated toms. At present no definite explanation for these differences in hatchability is offered.

The confined pen with rotated toms produced an average of 5 more poults per hen per season than the confined pen with the stationary tom. Likewise in the pens with outside yards the rotated-tom pen averaged about 5 more poults per season than stationary-tom pen. The greater numbers of poults produced by the hens in the pens with rotated toms are largely a result of the higher hatchability of fertile eggs from these pens since the management of the toms had little or no influence on the number of eggs laid or their fertility (Table 1).

### Artificial Insemination as Compared with Natural Mating

As the two pens of turkey hens that were artificially inseminated were confined, they were compared with Pens 1 and 4 of the naturally mated hens in regard to the percentage of fertile eggs laid. Table 2 shows that the percentage fertility of the eggs from artificially inseminated hens was as good as that of eggs from hens in Pen 1 and better than that of eggs from hens in Pen 4. Thus, the percentage fertility of eggs from hens in the two pens of inseminated hens was a little higher than that of eggs from the hens that were mated with toms. The difference in fertility of eggs from the hens artificially inseminated in the morning and those from hens inseminated in the afternoon is too small to be of importance.

#### Summary

Results of experiments conducted over a two-year period with Broad Breasted Bronze turkeys showed that breeders that were confined in the house throughout the breeding season,

January 3 to May 31, laid 13 more eggs per hen per season than birds that were managed in the same way but had access to outside yards. Confinement had no influence on the fertility of eggs laid or on the hatchability of fertile eggs. Because of the higher egg production, the hens that were confined produced an average of 6.5 more poults per season than the hens in the pens with yards.

Rotating or switching the toms at weekly intervals in single-tom matings did not increase the percentage of fertility of eggs laid by their mates. Hatchability of fertile eggs and the number of poults per hen were greater in the pens with the rotated toms.

Eggs from two pens of hens artificially inseminated at two-week intervals with .05 cc. undiluted mixed semen were 89.4 percent fertile for the season. This was only slightly above the percentage of fertility of eggs from the two pens of hens mated to toms. Also there was very little difference in fertility of eggs from groups of hens artificially inseminated in the morning and groups of hens inseminated in the afternoon.

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Potato growers interested in the identification of varieties of potatoes will find circular No. 741, "Descriptions of and Key to American Potato Varieties", by C. F. Clark and P. M. Lombard of interest. It was published by the United States Department of Agriculture in 1946 and can be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. for ten cents. It is splendidly illustrated with color plates of potato flowers, of potato sprouts developed in darkness, of potato sprouts developed in diffuse light, and is provided with a key to 39 American varieties based on plant, flower, and tuber characteristics. (H. L. W.)