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Artificial Insemination of Turkeys

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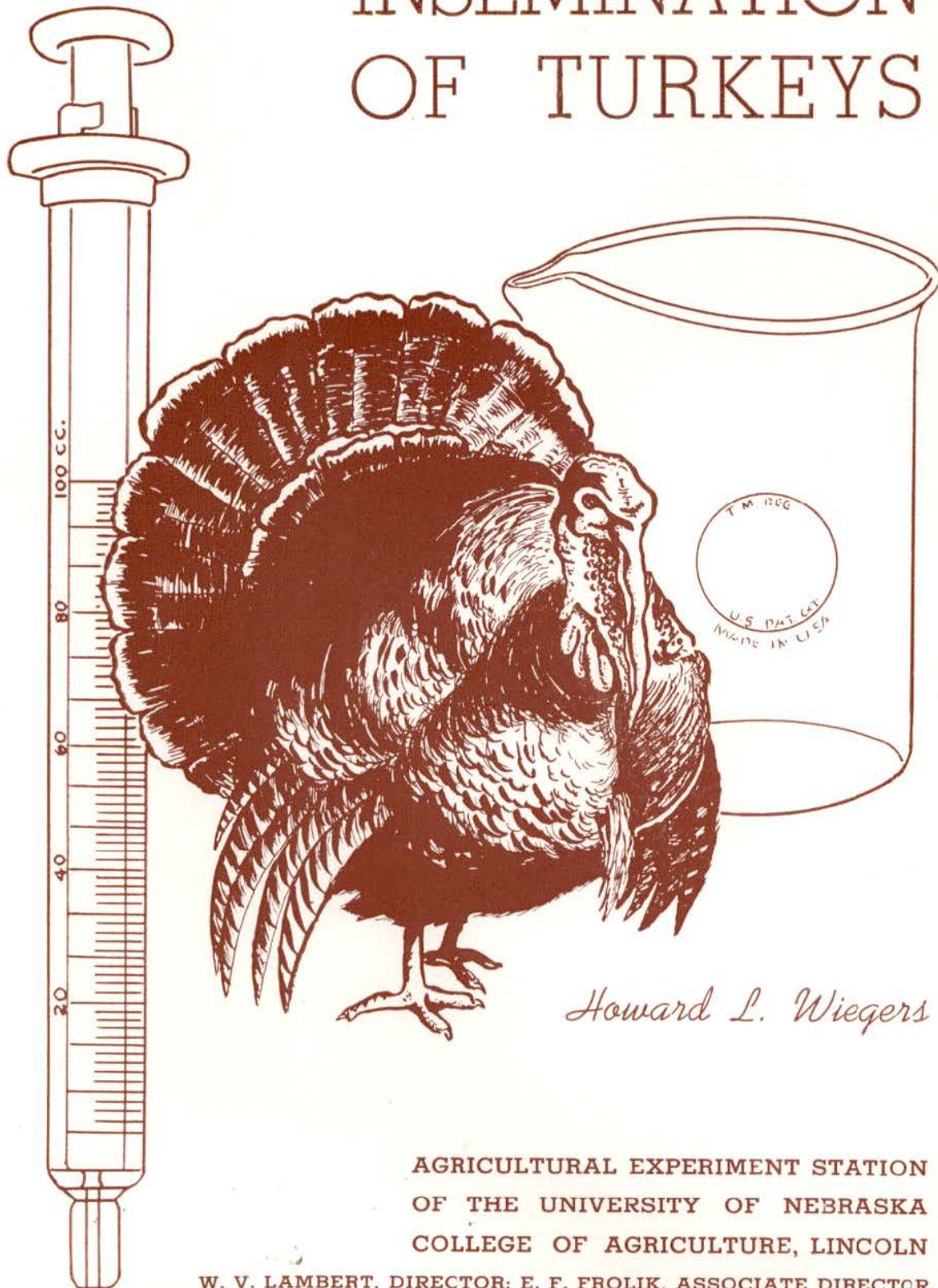


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Artificial

INSEMINATION OF TURKEYS



Howard L. Wiegert

AGRICULTURAL EXPERIMENT STATION
OF THE UNIVERSITY OF NEBRASKA
COLLEGE OF AGRICULTURE, LINCOLN

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Help in learning the skills necessary for performing artificial insemination of turkeys can be obtained from the Agricultural Extension Service, College of Agriculture, University of Nebraska, Lincoln.

Artificial

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HOWARD L. WIEGERS¹

INTRODUCTION

ARTIFICIAL insemination should be used for turkeys when results from natural matings are unsatisfactory. There is no hard and fast fertility rule to follow and each breeder will have his own basis of appraisal for the different varieties of turkeys. But one can say that when fertility drops below 65 per cent it is time to take action.

If the flock is healthy the chances of increased fertility by artificial insemination are good. In some cases even unthrifty flocks have responded. On the other hand, there are flocks which for some unexplainable reason have failed to respond. Therefore, artificial insemination should not be considered a panacea, but rather a tool of management which may produce excellent results in improving fertility.

Who Should Perform Artificial Insemination?

Only persons who have the "know-how" should attempt to artificially inseminate turkeys. The techniques are acquired only by practice, and the unskilled operator should not attempt the job until he has learned the principles involved and has become confident of his ability to perform the task properly.

Equipment

Other than the equipment required for corralling and catching the flock, the equipment needs are few. There are, however, two essential items: a receptacle in which to catch the semen, and an instrument for placing it in the oviduct. Several types of receptacles can be used to catch the semen, such as small, plugged glass funnels and small beakers. Small, shortened glass test tubes have proved most successful at the Nebraska Experiment Station. These and similar receptacles are shown in figure 1. The instrument used most often

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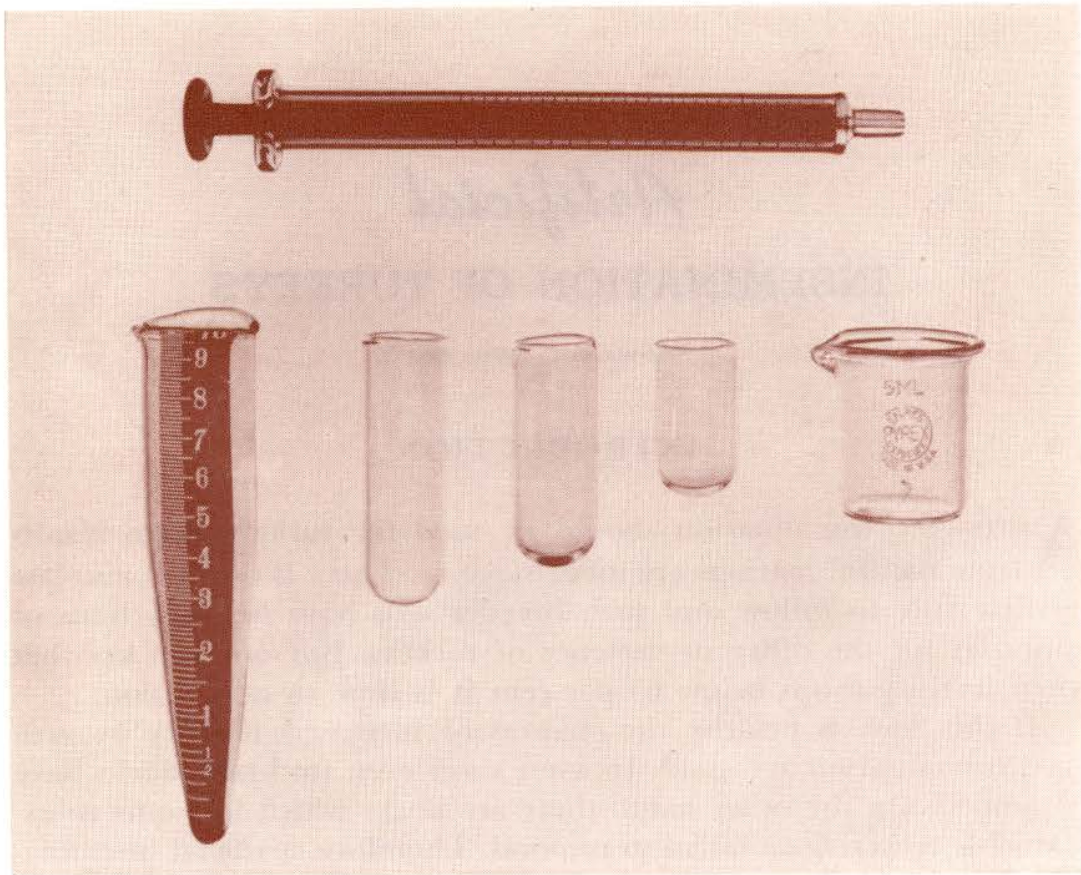


Figure 1.—Equipment used for inseminating turkeys artificially. Various receptacles for semen collection are shown in bottom row. At top is tuberculin syringe used for insemination.

for depositing the semen in the oviduct is a 1 cc. tuberculin syringe, also shown in figure 1. Disposable absorbent paper tissues help obtain relatively clean semen samples. They are used to clean the cloacal area of fecal material.

It is suggested that heavy duty, split-legged aprons be worn to avoid damage to clothing from the turkeys' feet.

Injury to Birds

The only injuries that are inflicted upon the birds when they are artificially inseminated result from either carelessness or ignorance on the part of the inseminating crew. It is possible to exert too much pressure on both the male and female, but this happens as an exception rather than the rule. It is also possible to puncture the oviduct with the inseminating syringe, but this too is unlikely. Injuries associated with insemination are more commonly those that happen while catching and handling the birds.

COLLECTION OF SEMEN FROM THE MALE TURKEY

The technique used at the Nebraska Station is a modification of the method proposed by Burrows and Quinn at the Research Center of the USDA at Beltsville, Maryland. In the modified method, one person sits on some object slightly lower than chair height, and holds the bird on his lap (figure 2). This is less fatiguing than to hold the



Figure 2.—A suggested position for holding toms while collecting semen.

bird while standing up. An assistant holds the legs of the bird and also the receptacle in which the semen will be collected. In this manner, the person supporting the bird is able to use both hands for massaging and forcing semen from the tom. This is accomplished by applying forward pressure on the tail with the palm of the left hand, while the thumb and index finger are used to exert a massaging action on the rudimentary penis by gently squeezing the opposite sides of the cloaca. At the same time, the right hand is used to exert another gentle squeezing action in the soft part of the abdomen. The thumb and fingers are spread to permit them to be extended as far forward in the abdominal region as possible.

As the stimulus is being applied by the hands, the rudimentary penis will become plainly visible, and may be described as short and fleshy, terminating in two round, large pea-sized objects. These areas will often show considerable black pigment in the Broad Breasted Bronze. The color has no apparent significance. As the bird is stimulated, the penis becomes gorged with blood, and extends outward. The cloaca loses most of its identity due to the extension of the penis, which is normally within the cloaca, except during sexual excitement.

When the tom has been stimulated to this condition, semen can be forced from him. This is accomplished by applying pressure on the semen storage areas, which lie inside the bird adjacent to the penis. The two storage areas are enlargements of the *vasa deferentia*, which are tubes that conduct the semen from the testicles to the penis. Each opens to the outside at the base of the penis; they are not visible externally. Therefore, when semen is forced from them, and flows down the valley formed by the two rounded ends of the penis, one cannot see where it originates.

The pressure used to force the semen from the storage ducts is applied with the hands by bringing a simultaneous, three-way pressure on the storage ducts as shown in figure 3. The thumb and index finger of the left hand are used to squeeze slightly above the penis, and the index finger of the right hand is forced up and then outward in the region below the penis. When this action is properly executed and repeated four or five times, all the semen a tom is capable of yielding at one time should be forced from him.

As the semen appears, the assistant should channel it into a vial. In some instances, a scooping motion with the vial will facilitate the collection. During the entire collecting process, one should be ready to remove any fecal material from the cloaca. This is done easily with disposable, absorbent paper tissues. Since bacterial contamination of the semen should be avoided as much as possible, it is necessary to be vigilant and careful to remove contaminants as soon as they appear.



Figure 3.—Semen is forced from the tom by applying pressure with the thumb and index finger of the left hand, and the index finger of the right hand. Note that the legs of the tom are being held by the same person who is catching the semen.

There is considerable variation in the quantity of fecal material which appears between collections from the same tom. The beginner should realize this, and expect to handle a few toms which may keep the collecting area of the cloaca so filled with contaminants that it

is impossible to obtain a reasonably clean collection of semen. When such a situation arises, free the tom and try another.

The beginner should not expect to learn the technique in one attempt, especially if he does not have the guidance of an experienced teacher. Since it is a matter of dexterity and coordination, considerable practice is required before proficiency is obtained.

Skill and knowledge as to the correct amount of pressure to apply, and how to prevent contamination can only come from persistent practice. Finally, by way of encouragement, a few folks have been known to perform the task efficiently after handling only a few toms.

Quantity of Semen and Number of Sperms

The quantity of semen which can be collected at one time is relatively small. It will range from 0 up to 1.0 milliliter. For unexplained reasons, an occasional bird will not produce any collectible quantity of semen, while others produce large quantities at regular intervals. The average for birds which produce collectible quantities is about 0.3 milliliter. The largest single collection ever made from a tom at the Nebraska Station was 1.15 milliliters.

The concentration of spermatozoa from an average tom ranges from seven to nine billion in each milliliter of semen. Since the average male yields approximately 0.3 milliliter per collection, the number of sperms should exceed two billion for each collection. In general, the toms with the greatest volume of semen and highest sperm concentrations have the best fertilizing records.

Frequency of Collection

During the peak of the breeding season, semen can be collected from male turkeys each day. It should be pointed out, however, that the quantity will be less than when collections are made on an every-other-day basis. The nature of the fertilizing potentialities or potency of the semen collected under these two circumstances is not known. Until more is learned about the fertilizing abilities of semen, it is suggested for convenience sake alone that insemination be planned on an every-other-day basis to obtain larger quantities of semen each time.

Storage of Semen

There are some indications that in the future it may be possible to store turkey semen, but the recommendation at the present time is to use it within 30 minutes after collection.

When research workers have found a way to store turkey semen for long periods, more efficient use of the males will be possible.

Age of Tom and Semen Production

Under ordinary range conditions, males begin producing semen when seven to seven and one-half months of age. If the days are long, the toms are stimulated by the light, and remain in production until the days shorten in the fall. As the days shorten, toms gradually go out of production.

Results of research at Washington State College of Agriculture indicate that by regulating light and temperature, it is possible to influence semen production. When toms were placed in heated houses and subjected to artificial lighting, they were brought into and held in semen production.

The semen from old toms is apparently capable of fertilizing. The influence of age on the degree of fertility is not known, but it is known that three-year-old toms can be used with fair to good results. This observation was made at the Nebraska Station while another problem was being studied, but unfortunately, comparable data for younger toms are not available.

Diluent for Semen

There is no diluent now available that can be recommended for general use. Several diluents have shown some promise, with Earle's solution showing the most. (Earle's solution is used in tissue culture research.)

INSEMINATION OF HENS

The hens are inseminated by depositing semen in the oviduct. The oviduct must be everted (turned outward) by force to facilitate entrance of the inseminating syringe. Eversion is brought about by bringing pressure to bear on the posterior portion of the body cavity. When hens are in good production, the task is easy, but at other times it may be difficult.

The person holding the bird may either sit down or stand up. To perform the operation while standing has proved very successful, though it is physically tiring. The bird is held by the feet with the right hand, and the head and neck thrust high in the crotch between the legs of the person doing the everting. When in this position, the hen should be on her side, and with her neck clamped between the legs of the operator. The operator then places the palm of his left hand flat upon the underside of the tail of the hen. Almost simultaneously, he frees the legs, and places the other hand over the soft portion of the abdomen. During the peak of production, eversion may be accomplished by pressure of the left hand only. When this is possible, the legs are not freed by the right hand.

Everson is then accomplished by pressure of the hands directed toward the head of the bird. This pressure forces the hen solidly against the thighs of the operator, and makes it possible to apply adequate force.

Some experimentation will be necessary before the correct application of pressure will be learned. It will also be necessary to learn how to apply pressure on hens not in good laying condition.

When the proper technique is used, the cloaca will actually be turned "wrong-side out," exposing the opening to the large intestine and the rosette-like entrance to the oviduct. This is the signal for the person with the syringe to insert it 1 to 1½ inches into the oviduct and inject the semen. Care should be exercised when the syringe is inserted that it follow the direction in which the oviduct lies. If sharp angles are avoided, no difficulties should be encountered. It is also important to exercise some caution when removing the syringe from the oviduct. It has been observed that if the syringe is removed rapidly, it often acts as a suction pump, and draws some of the deposited semen with it. This does not happen when the withdrawal is made slowly. It is suggested that the beginner try removing the syringe both rapidly and slowly in order to appreciate what must be done.

Following the removal of the syringe, the hen should be released and taken from the area of operation. To speed up this procedure, she may be given a little shove through the legs of the operator.

When the eversion operation is accomplished while seated, considerable back stress is eliminated. The bird is held head-down, instead of on her side. Otherwise, the same techniques are used as when the operation is performed while standing.

No matter which method is used, the results should be comparable.

It should be emphasized that learning the technique of eversion of the oviduct is much easier under the direction of a skilled teacher than by one's self.

Quantity of Semen and Number of Sperms per Insemination

In theory, only one sperm should be necessary to fertilize an egg. But some preliminary investigations in this field made at the Nebraska Experiment Station have shown that in practice the number of sperms required to produce fertility is quite large. The exact number is not known, but hens inseminated with about 3.8 million sperms did not compare favorably with those that had received as many as 228 million.

When hens inseminated with 0.0005, 0.001, 0.002, 0.01 and 0.03 milliliter of semen at three-week intervals were observed at the Nebraska Station, it was found that the group which had received 0.03 milliliter of semen showed the best fertility.

From this and other experiments, it is recommended that at least 0.025 milliliter and not more than 0.05 milliliter be used for each hen per insemination. The use of larger quantities will ordinarily result in a waste of semen.

Results from experiments at the University of Nebraska and other experiment stations indicate that an insemination every 21 days is most practical. Inseminating more often has not improved fertility. It was observed that intervals of 28 days sometimes provided as satisfactory results as the 21-day interval. This indicates that turkey spermatozoa are able to cause fertility over long periods after insemination. In fact, one poult was produced at the Nebraska College of Agriculture from an egg laid 56 days after the hen had been inseminated.

Time of Day for Insemination

Inseminations should be made in the afternoon rather than in the morning. While there may be little or no difference in the resulting fertility from morning inseminations compared to afternoons, there is less danger of disturbing the hens during the time of day when most of them lay. The recommendation of inseminating in the afternoon, therefore, is more a matter of egg conservation than a requirement for producing fertility.

How Soon After Insemination Should Results Be Apparent?

Fertility resulting from artificial insemination seldom shows in 24 hours, but should be apparent within 48 hours. Because of the length of time sperms are potent in some hens there is no sure method of determining which insemination is responsible for fertility except when different colored birds are crossed, and the eggs are incubated.

Hatchability of Eggs from Artificially Inseminated Hens

Increase in fertility does not insure increase in hatchability of the eggs. Eggs fertilized as the result of artificial insemination may not hatch as well as those from natural matings. The reason for this is not known. However, the number of artificially inseminated eggs often increases to such an extent that the loss in hatchability is more than offset.

Should Females Be Inseminated Before They Begin Production?

It is not possible to answer this question with a direct yes or no, as there is no experimental evidence upon which to base a conclusion. The advisability of inseminating before the hens have started to lay a few eggs is questionable. The physical and physiological make-up of the pullet is the reason for caution. Usually, sometime before starting

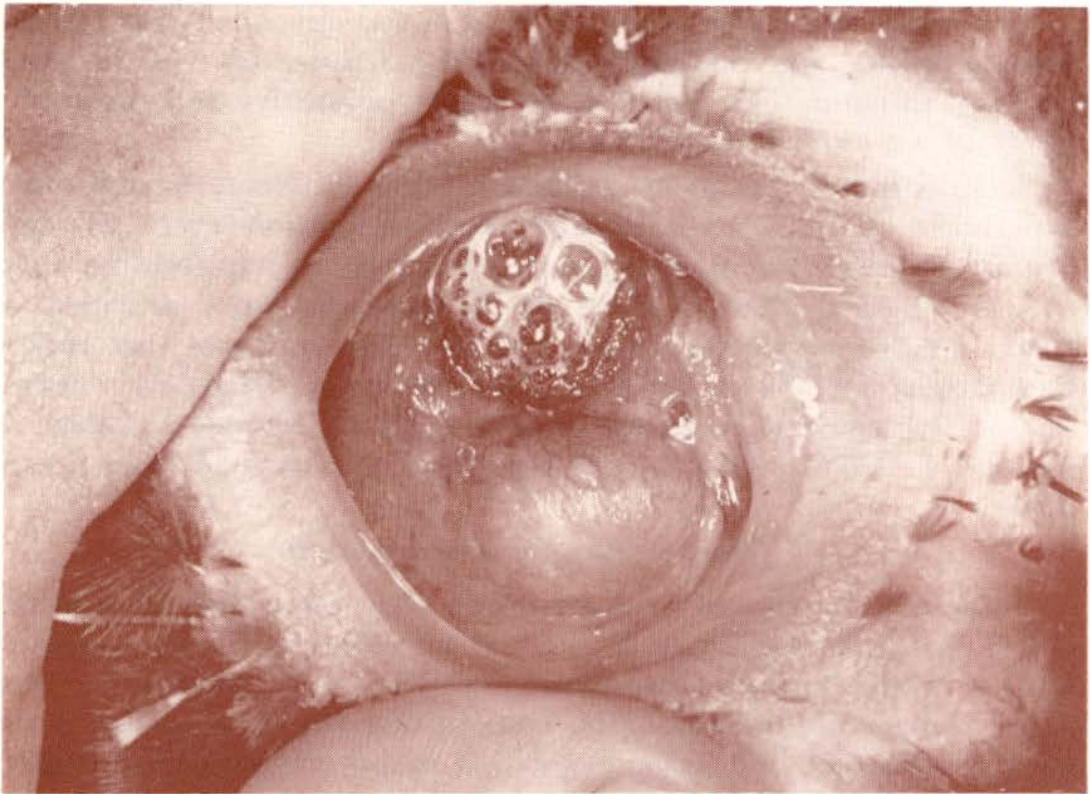


Figure 4.—The posterior end of the oviduct is covered by a blister or occluding plate. The opening on the right is to the large intestine.

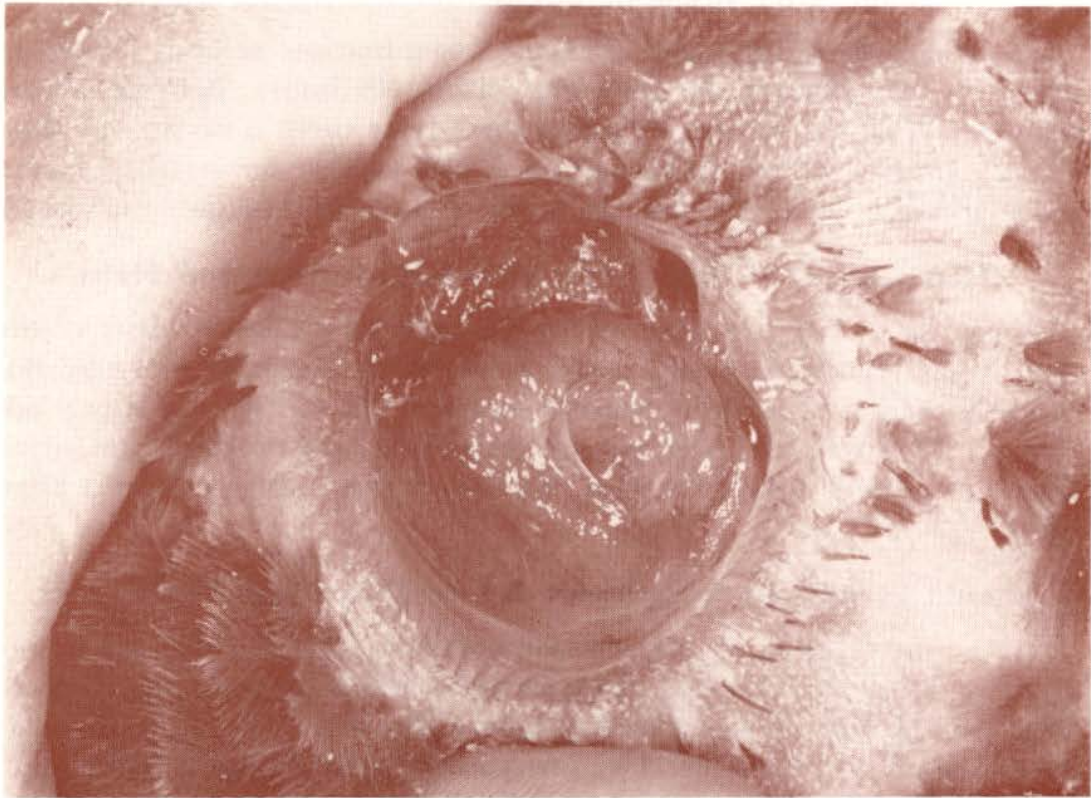


Figure 5.—The oviduct partially covered by an occluding plate

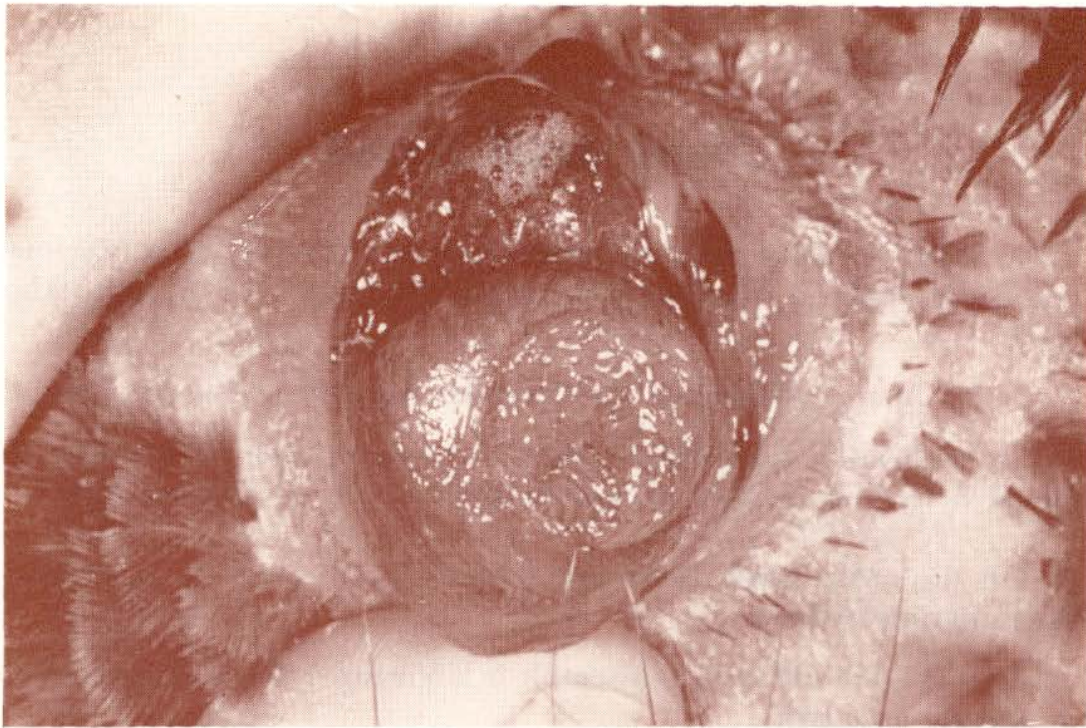


Figure 6.—Opening to the oviduct of a turkey hen in egg production.

to lay, pullets possess a covering over the end of the oviduct. It is referred to as an occluding plate, and appears as a large blister (figure 4). The plate either disappears before the first egg is laid, or is ruptured during the process. In order to inseminate pullets that have the plate intact, it is necessary to rupture it to gain entrance to the oviduct. Premature rupturing may be detrimental to the bird. Since the plate disappears naturally, it seems wiser not to interfere with it, at least until the physiological mechanisms of the pullet are better known. In figure 5 an oviduct is shown partially covered by the plate, and figure 6 shows the oviduct after the plate has disappeared.

Effect of Artificial Insemination on Broodiness

There is no evidence that artificial insemination has any influence on broodiness. If it has any effect, it must be too small and insignificant to become apparent.

Can All Hens Be Inseminated?

It is improbable that all hens in a flock will lend themselves readily to artificial insemination, and usually some of them can not be inseminated. The difficulty arises from the inability to evert or expose the opening to the oviduct of these hens. Those giving trouble are likely to be broody or out of condition and should be observed carefully for their laying condition, as it may be desirable to dispose of them if they show no indications of egg production.

Pros and Cons

1. When fertility resulting from natural matings is unsatisfactory, the use of artificial insemination will usually raise it to an acceptable level.

2. Frequent handling of the breeding flock will facilitate culling.

3. Artificially inseminated hens depreciate less than naturally mated hens because they do not become as bruised and crippled.

On the other hand, there are several disadvantages in artificially inseminating turkeys:

1. It is often difficult to assemble a labor force that is large enough to operate efficiently.

2. Artificial insemination cannot be accomplished without previous instruction and experience.

3. The tasks involved in the operation are physically strenuous and dirty.