Artificial Breeding of Turkeys

artificial insemination of turkeys requires exacting procedures but does offer specific advantages

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Artificial insemination of breeding turkeys seems to offer three specific advantages over natural mating: *1*, elimination of the need for saddles and thus of damage to the hens by the toms, *2*, fewer males needed, and *3*, increased fertility.

The number of toms needed depends on the volume of semen produced and the volume required for fertility. Maximum fertility in a flock can be maintained with inseminations of 1/40 ml—milliliter—of undiluted semen repeated every three weeks. The largest volume obtained from a single tom at one time is approximately .5 ml but the average of a flock is closer to .2 ml. Although semen may be obtained every day, or—in smaller volumes—even more often, turkeys do not respond well to such frequent handling. As a regular procedure stripping on alternate days appears to give best results. This would probably reduce to three times a week for convenient flock management, making the average tom capable of maintaining fertility in 72 hens.

However, spare birds are necessary as a safety factor. Also the figure of 72 hens per tom is based on mid-season performance; the .2 ml average volume per ejaculate is obtained—or exceeded—only between the middle of February and the middle of June. More toms are required for insemination before or after that period.

Even so, the number of males can be reduced to some 20% to 25% of those necessary for natural mating if the breeder is willing to observe a rather exacting procedure:

1. The males should be handled prior to the breeding season and only good semen producers chosen.

2. The flock of hens should be subdivided into nine separate pens and kept there for the entire breeding season. Since the hens in the last pen will not be inseminated until three weeks after the hens in the first pen the hens should be graded according to stage of maturity when the separation is made; the most advanced hens should go into the first pens and the slow hens into the last.

3. The males may be handled three times each week during the entire breeding season and each day's collection used to inseminate the hens in one pen.

A two-week interval between inseminations is more usual—as a safety factor—than a three-week interval. This program requires only six instead of nine pens of hens but a correspondingly larger number of toms.

Good results are not to be expected unless separate pens are maintained so that the groups of hens may be inseminated in a regular rotation, and unless the toms are used three times every week during the breeding season.

Fertility in the University flock averaged over 90% but such high values have not been observed in the field.

In University research an egg is reported as fertile if any development can be observed with the naked eye or low-powered microscope after breakout. In the field, early dead embryos—before the blood-ring stage—are usually reported as infertile. Field data are thus difficult to compare with experimental results. Higher fertility in inseminated than in naturally mated control pens has usually been observed.

The techniques of artificial insemination influence the success of the operation.

Cleanliness is important as many foreign materials are poisonous to sperm. Contaminated semen must be rejected.

Chilling the semen should be avoided as temperatures of 40° F or below destroy the fertilizing capacity of the sperm. The glassware should be warmed slightly before use, and the semen protected from cold during the several minutes that may elapse before it is used.

Fertilizing capacity is lost rapidly after the sperm are shed, even under optimum holding conditions so far as now known. Attempts have been made to transport semen from one ranch to another nearby, but maintaining adequate freshness is difficult and this procedure should be considered risky.

Even with all precautions some infertile eggs may be expected. There is variability in fertility due to the individual hen. In late season sperm production declines also and an increasing number of males will fail to produce altogether. After the first of June any tom not producing might as well be culled as few such toms will produce any more semen until the next spring.

The technique of artificial insemination is not limited to an exclusive program. A single round of insemination to an otherwise naturally mated flock is useful as an emergency measure, where—through some accident or fault of management—fertility is lower than it should be. In such instances a supplementary program of a single artificial insemination has resulted in a striking increase. From 7% to 35% more live embryos—at the time of first test—have been obtained by this means, where live-embryo percentages varied from 45 to 82 in eggs laid immediately prior to the insemination.

The toms should be separated from the hens a day or two before supplementary insemination—so that they will produce the maximum quantities of semen—and returned to the hens immediately after handling. Where this is done the increased level of fertility may be quite persistant.

A more intensive supplementary program involves a combination of artificial insemination and natural mating. Preselection of the males is an important part of this program, especially if the breeder produces his own replacement stock. The rate of sexual maturity of male turkeys is inherited; the practice should thus benefit fertility in future generations as well as in the current season.

The full usual number of toms must be run with the hens, and the hens must be saddled. The program is carried out in the following steps:

1. Males are tested when seven to eight months old for semen production and good producers only are saved.

2. Natural mating is allowed until four days prior to saving the first eggs for hatching.

3. Males are isolated for two days, then all hens are inseminated.

4. Males are returned to the breeding flock immediately after ejaculation.

5. The rapid fertility test is applied to each setting and the insemination is repeated as soon as fertility declines appreciably.

A rapid fertility test may be performed with a powerful candling lamp employing a light blue filter. On the second day of incubation the eggs are placed on their sides for two or three hours, and then candled without turning them over. Fertility is shown by the presence of

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RESEARCH

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introduction of closely related species which there is reason for believing may have resistance to the root-rot organism. While several of these species have succeeded thus for as grafts on the avocado, it remains to demonstrate their suitability as rootstocks. Plans have been made to materially expand this line of work in the immediate future.

Propagation

Incidental to or in connection with the rootstock studies, the investigations of the division have contributed materially to the knowledge concerning propagation problems and methods and to the practices employed by nurserymen.

The desirability of seed selection has been emphasized and the value of seed storage under certain conditions shown. Striking benefits in earliness and uniformity of germination, associated with removal or peeling of the seed coats or clipping or other mutilation of the cotyledons, has been demonstrated. A method for rooting cuttings from old clones has recently been developed, though it is considered still in the experimental stage.

Storage Problems

With financial co-operation from the industry, studies of the physiology of the avocado fruit were initiated with a view to developing the facts necessary to the understanding and solution of the problems of fruit handling and storage. As a result, a very considerable body of knowledge is now available which may lead to better handling and storage practices and results.

Important facts concerning the nature of the softening process and its relations to temperature and respiration have been developed. It has been shown that the avocado fruit gives off ethylene gas during respiration and that the softening process is closely associated with the climacteric in respiration; also that both processes are markedly affected by the temperature of storage. Decided benefits have been found to occur from reduction in the oxygen content of the storage atmosphere. Striking effects of the carbon dioxide content of the storage atmosphere have been demonstrated in slowing down respiration and delaying softening, even at storage temperatures considerably higher than those currently in use.

The possibility of prolonging the storage life of the fruit toward the end of the shipping season and thus extending the marketing period with fruit of excellent quality and appearance is clearly indicated from these studies.

Mexicola avocado seedlings of the same age: 4 and 6, seedcoats left on; 5, seedcoats peeled.

Horticultural Botany

Incident to or associated with the research summarized above, a very considerable amount of study has been given to morphological and physiological problems, among which may be listed the following: time of fruit bud differentation; morphology of the inflorescence; ontogeny, floral anatomy and embryology; chromosome number; flower behavior; pollination; parthenocarpy; fruit anatomy; bearing behavior; fruit respiration and enzymatic systems; chemical composition of the fruit; and nitrogen economy and storage reserves in the tree.

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BRUCELLOSIS

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determination and that year 1,148 calves had been vaccinated with Strain 19. In the following year only 2,455 cattle were serologically tested while 8,539 calves in nine co-operating counties were vaccinated with Strain 19. By 1942 only 699 cattle were bled for brucellosis determination while 18,490 calves in 20 co-operating counties were vaccinated with Strain 19.

By 1945, conservatively estimated, over 65,000 calves had been vaccinated. In that year Modoc County reported 70% of all heifer calves were immunized with Strain 19, and the calf crops in certain herds increased from 65% to 90%. Tehama County reported one half to three fourths of all calves received the vaccine. In many counties—including Siskiyou, Colusa, Kern, San Luis Obispo, Imperial, San Joaquin, Santa Barbara, Tulare and Monterey—vaccination with Strain 19 had become a regular practice.

At the same time the voluntary acceptance of calfhood vaccination in beef cattle was becoming more general. Surveys in 1932 had indicated that 8½% of beef cattle in California were affected by brucellosis, causing premature birth, sterility and loss of beef production.

The year 1947 witnessed the culmination of 18 years of field application of research findings in the control of bovine brucellosis. Thus an act to provide for the control of brucellosis in dairy cattle became a law of California on January 2, 1948.

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TURKEYS

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a small dark spot on the surface of the yolk. This test, as described, is intended only to estimate trends in fertility, not to segregate infertile eggs; a few fertile eggs will be missed. It should be performed only on the last days' eggs laid before the setting.

Whenever this test indicates a drop in fertility the males should be isolated at once for a day or two before being used to inseminate the entire flock artificially.

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