

Scientists Find Parthenogenesis Caused Partly by 'Activating Agent'

Continued studies of parthenogenesis — the spontaneous development of embryonic tissue in infertile eggs — reveal that increased occurrence of this phenomenon in the eggs of non-mated turkeys and chickens may be due in part to an "activating agent," the U. S. Department of Agriculture says.

Incubation tests conducted for the past three years at USDA's Agricultural Research Center, Beltsville, Md., by poultry scientist M. W. Olsen have shown a greater incidence of parthenogenetic cell development in eggs produced by turkeys and chickens after the birds were vaccinated for fowl pox than in eggs produced by the same birds before vaccination.

It is not yet clear whether the "activating agent" is the vaccine itself or a contaminant it may contain. Dr. Olsen is convinced, however, that a combination of strains of birds genetically susceptible to parthenogenesis and the presence of an unknown activating agent results not only in a greater incidence of parthenogenesis, but also in a more highly organized development of the condition in eggs from non-mated hens.

Dr. Olsen's studies indicate the tendency toward parthenogenesis in poultry can be increased or decreased by selective breeding. Certain families of chickens and turkeys receiving the same vaccination treatment in his tests differed widely in their ability to produce eggs that develop parthenogenetically. The same is

true of individual birds. During the past few years Dr. Olsen has tested more than 28,000 turkey eggs and about 20,000 chicken eggs for parthenogenesis. In several cases, turkey eggs that developed parthenogenetically produced poults that hatched from the egg and lived a few hours, days, or weeks. One poult survived for 22 days and another for 18 days after hatching in March 1956. In the spring of 1957, 17 parthenogenetic poults were hatched. All but two died before reaching seven days of age. One of the remaining birds lived 41 days, and the other was still surviving at 194 days.

These studies of parthenogenesis are providing new basic information in two important fields of research: (1) on the problems of poultry fertility and hatchability, which are often critical for turkey producers, and (2) on the fundamentals of cell development providing knowledge that is essential for better understanding of poultry physiology and may also have significant implications for research on cell growth in all forms of life.

First indications that a virus might be involved in triggering parthenogenesis came in a 1955 test of eggs produced by virgin Dark Cornish pullets. Incubation tests made since that time have confirmed the earlier results.

More than three times as much parthenogenetic development was encountered in the 1955 incubation tests of eggs produced by Dark Cornish pullets after vaccination for fowl pox than was

found in eggs laid by the same birds before vaccination. Vaccination for pigeon pox, involving a milder virus, also resulted in an increased incidence of parthenogenesis, but it was not nearly so great as the increase noted after fowl-pox vaccination. Similar tests in 1956 revealed much the same effect — a greater incidence of parthenogenetic cell development in the eggs after the birds were vaccinated for fowl pox.

Tests of turkey eggs for parthenogenesis in 1956 involved 3,110 eggs laid by two different groups of virgin turkey hens. One group was composed of 16 non-vaccinated birds. The second group included a total of 49 females that had been vaccinated for fowl pox at seven weeks of age and again at 30 weeks. Full sisters were represented in each group to provide genetic uniformity, thus helping to make the tests more conclusive.

Of the 738 eggs produced by non-vaccinated turkeys, 180 or 24.4 per cent showed parthenogenetic development following 9 to 10 days of incubation. The 49 vaccinated turkeys produced 2,362 eggs, of which 750 or almost 32 per cent showed parthenogenetic development.

Of these 750 eggs from vaccinated birds, 102 contained well formed embryos, 100 contained blood as well as membranes, and 548 showed membranes only. In the eggs from non-vaccinated turkeys, only 19 developed well-formed embryos, while 47 showed blood as well as membranes, and 144 showed membranes only. Thus, eggs from vaccinated turkeys developed a higher ratio of well-formed embryos than did those from non-vaccinated birds, indicating induction of a greater degree of organization by the activating agent, whatever its nature.

The results of similar tests just concluded for 1957 add further support to the theory that a virus may be involved in parthenogenesis. Two groups of turkeys, of which 130 were vaccinated and 42 were not, laid a total of 8,558 eggs during the spring of 1957. The vaccinated birds produced 6,547 eggs of which 2,466 or 37.7 per cent showed parthenogenetic development. The 42 non-vaccinated birds, full sisters or half sisters of the larger group, laid 1,767 eggs, of which 559 or 31.5 per cent showed parthenogenetic development in the incubator.

It was also noted that the vaccination history of the mothers was correlated with the performance of their non-vaccinated daughters. Non-vaccinated turkeys coming from mothers which had been vaccinated only once produced fewer eggs that developed parthenogenetically than did other non-vaccinated females from mothers that had been vaccinated three times during their lives. Nearly 5 times as many embryos and more than twice the number of eggs showing blood formation were found in eggs from non-vaccinated birds from three vaccinated mothers.

There are some indications that the activating factor, whatever its nature, is being passed from mother to daughter through the egg. This is shown by the fact that some parthenogenesis is encountered even though the hens being tested are not vaccinated but are the offspring of vaccinated stock. To further test this indication, daughters of non-vaccinated parents are being raised this year.

Dr. Olsen's work has shown that parthenogenesis is far less marked in chickens than in turkeys. However, the microscope, used as a means of cross-checking incubation experiments, reveals that easily 50 per cent of new laid Dark Cornish eggs contain parthenogenetic cells. In most cases however, cells of this type die before the eggs are laid. In a few cases, such cells in eggs from Dark Cornish hens may revive in the incubator and produce some embryonic membranes.

Parthenogenetic development beyond this stage is rare in chicken eggs. Thus far no chickens known to be parthenogenetic have hatched, and only two parthenogenetic embryos have been discovered in the thousands of chicken eggs examined. One of these embryos reached a size equivalent

Farm Programs No Answer, Farm Dealers Told

More than five hundred Pennsylvania farm equipment dealers were told at their annual convention at Harrisburg last week that government programs often create more problems than they solve.

The farm implement men were addressed by Dr. H. M. Love, head of the department of agricultural economics at Virginia Polytechnic Institute, who presented a capsule course in what happens when controls are applied to farm production and prices.

J. A. Connell of West Grove, Chester County, was elected president of the group. He succeeds Wayne A. Hindman of Butler. Gerald Warner, Troy, and M. C. Arnold, Lewisburg, were elected vice presidents.

Other speakers at the convention included Sam Black, rural sales manager of the Smith-Gates Corp., who reminded the group of the real help they can be to farmers in bringing them quality products and service as well as sound advice, and Sterling W. Mudge, of the Socony Mobil Oil Co. of New York.

The Arthur S. Young Memorial Scholarship, donated by the dealer Association to an outstanding student in a Penn State short course in farm equipment service and sales, was presented to John Thomas Asbury of Peach Bottom by Everett Young, son of the man for whom the scholarship is named. Other students in the course were guests at the convention.

Directors named at the convention

lent to that of a six-day normal chick embryo and the other developed to the size of an eight-day embryo before death occurred within the shell.

tion include Louis Garrone, Washington, Gerald Nicolls, Meadville, Verne Graff, Knox; M. S. Kenfelte, Biglerville; Joseph Walters, Honesdale, Galen Wineland, Martinsburg, Elmer Plasterer, Lebanon, and Don Cooper, Turbotville.

More than 700 dealers in farm, garden, and light industrial equipment from across the state are members of the Pennsylvania Farm Equipment Dealers' Assn., of which Robert Hartford, Phoenixville, is executive director.



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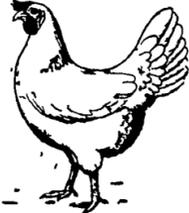
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