

Blood-Spotting in Eggs

controlled by breeding in a ten-generation selection experiment with Single Comb White Leghorns

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Blood-spotting in chicken eggs can be controlled by breeding. Heredity is the most important known factor responsible for the tendency of birds to produce blood-spotted eggs. To study the influence of genetic differences between birds with respect to this common defect, a selection experiment was undertaken.

Ten generations of breeding a line of Single Comb White Leghorns for blood-spots resulted in a 38-fold increase in the percentage of eggs showing blood in the albumen.

The eggs of the original flock in 1938 showed .6% with blood-spots detectable by candling. In 1948 the specially selected line produced eggs of which 22.8% were detected to have blood-spots. During the same years, the production line which was selected against blood-spotting showed a slight increase in percentage of blood-spotted eggs, but never exceeded 1.35%.

Managerial factors—such as rations fed—varied from year to year, but within each year the stocks of the production and the selected blood-spot lines were hatched in the same incubators, reared under the same brooders, housed together and fed the same rations during the laying year, and had the same management.

All intact eggs laid were candled; there was some evidence that the accuracy of detection of blood-spots increased in later years of the experiment. All eggs suspected of carrying a spot were broken to verify the presence of blood. Probably many small spots were not detected.

The blood-spot line was started in 1939 by removal for breeding of those families from the production line of 1938 that had a relatively high incidence of blood-spotting. Until 1945, birds mated in this line were yearling hens having a high blood-spotting percentage based on the complete pullet year record and one to three cocks from families producing a high average percentage of blood-spots. This selection procedure resulted in practically two separate sub-lines being selected for blood-spots, since birds bred in 1941 produced a generation from which breeders were chosen for mating in 1943, and similarly 1942 breeders produced the generation of birds bred in 1944.

By 1945 the blood-spotting tendency

increased to such a high level that it could be detected—with sufficient accuracy—from early records in time to breed pullets and cockerels each year. The two sub-lines then merged gradually.

Additional families of birds were removed from the production line and added to the breeding flock in the blood-spot selection in several years, the latest in 1947. By this procedure the inbreeding of the blood-spot birds was kept within a 10% level, slightly lower than that of the production line, without apparently restricting the progress toward higher levels of blood-spotting.

Reciprocal crosses between blood-spot and production lines were made in 1947 and 1948. The blood-spotting incidence in eggs produced by pullets from these

matings was intermediate between the parental stock levels. Since only a limited number of pullets were produced, the difference between the reciprocal crosses can not be considered significant.

Various estimates of the heritability of blood-spotting in the University flock gave an average value of about .5. This

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Showing the incidence of blood-spotting in production and selected blood-spot lines, and in reciprocal crosses between lines. Substantially two different blood-spot lines existed between 1939 and 1945, each producing a generation in alternate years. Gradually these two lines merged into one.



