

GENETICS

Let's Talk Turkey

U. S. Department of Agriculture scientists are trying to find the cause of infertility in turkeys. No turkey substitute is in the offing, Tove Neville reports.

See Front Cover

► THIS TIME OF THE YEAR turkeys have a traditional date with the Thanksgiving table, but some day in the future, the "gobble gobble" should sound from a much greater number of birds than it does today. And the birds for stuffing should be much cheaper to buy.

That will be the day poultry scientists have discovered the reason and remedied the cause why millions of dollars worth of turkey eggs each year are not fertilized.

About 60,000,000 turkey eggs are produced each year. These eggs are worth 25 cents to 35 cents apiece. Yet, a great many of the eggs have to be discarded because no poults are hatched from them.

In order to find the cause of infertility in the turkey, poultry scientists at the U. S. Department of Agriculture, Agricultural Research Service, Beltsville, Md., are experimenting with parthenogenetic, or fatherless, turkeys.

These fatherless turkeys are hatched from unfertilized eggs, laid by either virgin hens or hens that have been mated at an earlier date.

The female turkey, opposite to humans, produces both X and O chromosomes (O being roughly equivalent to Y in humans) that are then normally paired with the X-chromosomes from the male to produce either male (XX) or female (XO) offspring. If the X-chromosome doubles in the germ cell, these female turkeys produce a fatherless male offspring. If it doubles the O-chromosomes, the offspring dies because at least one X-chromosome is necessary for offspring to mature.

Tend Toward Parthenogenesis

The Beltsville small white turkey has shown high tendency toward natural occurrence of parthenogenesis. After being vaccinated against fowlpox, these turkeys show an even higher tendency to double their X-chromosomes. Vaccination is believed to produce an agent in the blood that activates the double chromosome production, Dr. Marlow W. Olsen of the Beltsville research center told SCIENCE SERVICE.

The male turkeys produced by parthenogenesis, one of which is seen on the front cover of this week's SCIENCE NEWS LETTER, generally look like normally bred turkeys, with a few differences. Some are born with crooked legs, some with split wings. One has even been born with a displaced eye. Some of these turkeys have less of the male characteristics than ordinary turkeys; they have smaller spur development and smaller "beards"—a gray spot on the breast.

Other parthenogenetic turkeys have well

developed male characteristics, large spurs and "beards," and they are fertile. However, Dr. Olsen said that these birds do not mate with the females, nor do they show any inclination to do so.

Several of them have produced offspring, however, by artificial fertilization of ordinary female turkeys. The offspring from these parthenogenetic father turkeys appear to be normal in all respects.

The parthenogenetic turkeys are not expected to become commercially profitable. Even when selected Beltsville stock that shows particular tendency to parthenogenesis is bred in order to produce females that will double their chromosomes, only eight to ten percent of the eggs from such turkey females show true embryos.

One in a Hundred Hatches

Out of these few, one in a hundred may hatch, the reason being that many defects prevent the embryos from developing in the egg. This is because the doubling of the chromosomes in the mother represents 100% inbreeding.

Dr. Olsen believes that the trait in the female turkey of doubling its chromosomes is in some way connected with the failure of many turkey eggs to be fertilized by the male. If this connection can be found, something may be done about it.

Early in the season, the male turkeys show high fertility and nearly all the eggs are naturally fertilized. Later in the season, the males' fertility decreases. It is possible, Dr. Olsen said, that the female tries to "make up" for this by doubling her chromosomes to produce young without benefit of the male.

He said there is also a possibility that some eggs might be fertilized by a male if the female had not already doubled her chromosomes and perhaps competed with the male in producing young. This may be a pathological trait in the turkeys.

Made Genetic History

In working with parthenogenesis in turkeys, Dr. Olsen accidentally made genetic history. He fertilized female turkeys with sperm from Dark Cornish chicken roosters, in trying to encourage parthenogenesis in the turkeys. Instead he produced a true chicken-turkey hybrid, the first cross between two families of birds, *Meleagridae*, to which the turkey belongs, and *Phasianidae*, to which the chicken belongs. (See SNL, 78:291, 1960.)

However, the "churk," as this hybrid bird is called, will not replace the turkey on the Thanksgiving table or even make up for the infertility in turkey production. It took some 2,900 eggs to produce a few live birds.

These birds have both physical and

mental defects. They have either crooked beaks or legs, sometimes both, and they have no more than half the intelligence of either parent stock.

A bare-necked chicken, sometimes called a "turken" by poultry producers, has been sold as a cross between a chicken and a turkey. This bird, which is not hybrid but a Transylvania chicken fowl, will hardly take the place of the Thanksgiving turkey on a large scale. It is a very poor egg-layer, Beltsville poultry scientist Joseph P. Quinn reported.

It is a very hardy bird, which can take care of itself and live on what it picks up around the farm, where it is generally allowed to run around loose.

The resemblance of the turken to the turkey is a bare collar around its neck. It is a rather large bird. The female generally weighs six to seven pounds, the male eight to nine pounds.

Poultry scientists in Venezuela are now trying to breed these fowl, as well as New Hampshire chicken fowl, for better egg-laying. When both breeds have improved, they hope to cross them and get a hardy chicken that will lay more eggs.

The Turken Not "Perfect"

The turken, or Transylvania fowl, has not so far been admitted to the "standard of perfection" issued by the American Poultry Association, which sets the standard for breeds. To meet the standard, 90% of the progeny of a breed must be reasonably uniform in color and weight. The turken comes in many different sizes and colors and, although most are large, the baby chicks are not certain to be either the same size or color as their parents, Mr. Quinn said.

Another bird that has sometimes been taken to be a turkey is a cross between a guinea fowl and a chicken. Sometimes this cross has happened naturally; sometimes the two fowl have been bred. The cross is called a Guin-hen. It weighs five to six pounds and has a bare head.

• Science News Letter, 78:330 November 19, 1960

Do You Know

Barley seeds from Abyssinia hold promise for American plant breeders in developing new varieties of barley that will resist yellow dwarf virus disease.

Potatoes can be stored at 55 degrees Fahrenheit for a year without sprouting by using the chemical CIPC—isopropyl N (3-chlorophenyl) carbamate.

The *ant* has two stomachs: one for himself, and one a storehouse for food he shares with other ants.

• Science News Letter, 78:330 November 19, 1960