Seek Cottonseed Meal Factor Which Causes Pink Coloring of Eggs

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Probably you have never eaten a pink egg. For pink egg discoloration has long been known to be caused by the feeding of cottonseed meal, and consequently today's poultrymen avoid its use in feed for laying hens.

Research now in progress concerning pink egg discoloration and other problems associated with the feeding of cottonseed meal is aimed at finding and eliminating these problems. Methods for treatment of cottonseed meal and oil which will render it safe for poultry feeding are now under investigation. The ultimate aim is to make an inexpensive, locally produced protein concentrate, available for feeding to laying flocks in Arizona.

Pink Eggs Not Appealing

Pink eggs are not appealing. The white is a dirty pink to red color, while the yolk is apricot in appearance. The yolks are about 50 per cent larger than in a normal egg. This discoloration does not occur in fresh eggs, but may be produced by storage for several months. Many eggs are stored in months of peak production for sale in slack periods.

Extensive work done at Michigan State College has established the nature of the pink color. It is caused by a combination of iron, in the form of ferrous ion, a component of the yolk with conalbumin, an egg white protein. Normally the vitellin membrane which separates the white and yolk is impermeable and allows no interchange of white and yolk components. During the process resulting in pink egg discoloration, however, this membrane increases in permeability.

Cause of Larger Yolk

Diffusion of both water and proteins from the white into the yolk causes the yolk to increase in size. Once inside the yolk, the conalbumin combines with the ferrous ion to form the pink complex. Blending of this color with the natural yellow of the yolk results in an apricot color. Reverse diffusion of the pink complex into the white gives it a pink color.

From these studies it is apparent that the role of the cottonseed meal in pink egg discoloration is to cause increased permeability of the vitellin membrane.

When cottonseed meal has all of the oil extracted from it the oil fraction, not the oil-free meal, is found to cause pink egg discoloration. Further studies have revealed that a fatty acid is responsible for this discoloration. Since fatty acids are widely distributed in feedstuffs, the one causing this discoloration must not be a common one.

Australian workers believe this particular fatty acid contains a cyclopropene ring structure. Several other fatty acids of this type are known. One, called sterculic acid is a component of the oil of the Java Olive tree, *Sterculia foetida*. To test whether a fatty acid of this type is capable of producing pink egg discoloration, sterculic acid has been fed to laying hens in quantities of about 0.25 gram per day.

Due to Sterculic Acid

After one month of storage, eggs from these hens showed pink discoloration. A fatty acid similar to sterculic acid in cottonseed oil is apparently responsible for the increased permeability of the vitellin membrane which leads to pink egg discoloration. Now studies seek to isolate the fatty acid from cottonseed oil and determine its exact structure.

When this is accomplished, methods can be developed for chemical treatment of the cottonseed meal and oil to eliminate this fatty acid and make these products safe for poultry feeding.

Lab Studies Human Cells

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The first tissue culture laboratory in this area for the study of human tissues and diseases opened at the University of Arizona September 1. Already several human tissues have been grown and studied.

The lab is operated cooperatively by the Southwestern Clinic and Research Institute and the UA department of agricultural biochemistry.

The work is aimed at human diseases, with emphasis directed at the cellular level. Normal living cells will be compared with living diseased cells. These cells will be grown under varying environments and under the effects of various treatments.

Photography Used

One room in the basement of the agricultural building was subdivided into three laboratories, including a tissue transfer room, a photographic dark room and a general laboratory. The lab is well equipped with excellent photographic equipment. A two-phase microscope is housed in an incubator which is attached to a reflex camera for microphotography. This makes it possible to place a culture of living cells on the microscope stage and to photograph it at regular intervals without removing it from growing conditions.

Air-Conditioned

The tissue culture transfer room is air-conditioned and equipped with special filters to control air-borne contaminants. Rigid precautions are followed to insure freedom from contamination. Masks and caps are worn in the transfer room.

The small but well equipped dark room is used to process all of the microphotographs made. By means of an enlarger, separate cells and even parts of individual cells can be magnified for careful study of cell detail.

The general laboratory is used to prepare all media and solutions as well as for the cleaning and sterilization of glassware.