

## Eggs and Poultry

In the late 1940's, researchers at the Western lab pulled off a trick that had eluded the U.S. Army's mess sergeants during World War II. They made dehydrated whole eggs, the powdered eggs loathed by millions of men and women in uniform, fit to eat.

What made those wartime dehydrated eggs so unpalatable, it turned out, was the presence of small amounts of glucose in the egg solids. Scientists found a way to remove the sugar by treating the eggs with baker's yeast for 2 hours before the eggs

were dried. The process eliminated the off-flavors that had plagued wartime dehydrated eggs. The glucose-free eggs also had a shelf life 10 times longer than the older product. Since the eggs could be used in a variety of packaged items, they began to be used by industry as early as 1950 and led to a substantial increase in the U.S. market for eggs.

A few years later, the Western lab scientists reversed their field and found that *adding* certain carbohydrates to whole egg and yolk powders improved their stability in making cakes and other commercial bakery products. Industry began using these sugared egg powders in 1958.

As 1960 began, certain kinds of bacterial spoilage in shell eggs (eggs sold fresh) were costing the industry about \$20 million annually. Western researchers traced the cause to washing eggs in water containing a relatively high iron content of 5-10 parts per million. Despite suspicions that washing eggs might do more harm than good, it was common practice on egg farms to machine-wash all eggs, dirty and clean, to eliminate having to sort them. When research findings were made known to egg producers, they had their wash water tested and stopped using wash water high in iron.

Egg research in the mid-1960's led to methods for adequate pasteurization of egg white. While liquid whole eggs and yolks had been pasteurized for many years, the process had not been applied to egg white because the heat damaged the proteins. Western lab scientists devised ways to stabilize four heat-susceptible proteins in egg white, making it possible to use flash heating to pasteurize the albumin sufficiently to control micro-organisms. The egg white performed satisfactorily in whipping



*Conducting experiments to improve the quality of frozen poultry in 1960, WRRC scientists Agnes Campbell and Hans Lineweaver measured tenderness of processed turkey meat.*

for meringue and in angel food cakes. The WRRC subsequently published an *Egg Pasteurization Manual* to guide industry, and in 1973, Congress passed a law requiring all processed eggs to be pasteurized.

In 1970, Western researchers demonstrated that reverse osmosis, already used in other ways by the food processing industry, could be used to concentrate egg white for use in making candy and in baking. In another project, WRRC researchers adapted frozen convenience breakfasts originally developed for personnel at Air Force missile bases into products for the civilian market. Now widely available for heating in microwaves, the frozen breakfasts pioneered at WRRC typically include an entree containing at least one egg. Center engineers also helped industry to mechanize the production process for breakfasts.

Other regional labs also contributed to egg research. The Northern lab found that hydrogenated and winterized soybean oil could be used in formulating dried egg mixes for commodity purchase programs. And the Southern lab recently found a fast, simple way to detect spoilage in liquid eggs.

In poultry research, WRRC researchers in the 1960's solved a vexing problem for the processors of frozen chickens and turkeys. Fast, highly mechanized procedures had just been introduced in processing for freezing, and for whatever reason, the result was tough birds. Consumers were complaining, or worse yet, refusing to buy.

Western lab researchers, who had accumulated considerable expertise in freezing fruits and vegetables, discovered that poultry processors were too quick to freeze their birds after they were plucked. Aging poultry at chill temperatures for at least 12 hours before freezing, they found, improved tenderness. Moreover, birds aged before they were cut up were tenderer than those aged afterward. Further, some of the picking machines were beating the poultry too hard, and this also contributed to toughness, as did severe scalding. The WRRC findings were quickly applied by the industry, and consumer acceptance of frozen poultry soon improved. During the next 5 years, consumption of turkey and chickens increased by 2.5 billion pounds.