THE OBSERVATION POST

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Recent Developments in Food Processing

OUR FERTILE LANDS produce an abundance and wide variety of foods. All are perishable. The processing and/or preservation of these foodstuffs is to a large extent necessary for the maintenance of our way of life.

Food Preservation and Civilization

Our primitive forebears learned how to use heat, cold, dehydration, and smoke to control decay and destruction of foods. These simple devices permitted the development of static tribes. Historically, this was important because survival was no longer dependent on seasonal migration in order to avoid starvation. In recent years our ancient processing techniques have been greatly improved. They now reflect our advances in science and technology. In addition, entirely new physical, chemical, biochemical, and mechanical food processing techniques have been developed. These advances along with corresponding progress in marketing have almost obliterated seasonality.

Supermarkets, a Useful Institution

A visit to our modern supermarkets is an educational experience. These stores epitomize the advances in food processing and marketing. The most startling observation is perhaps the fact that we no longer need to endure monotony in our winter menus. Dietically and figuratively speaking, we can enjoy June in January. American women have learned to use the supermarket for purposes other than sheer economy. Hubby is usually invited to be a co-shopper—ostensibly to carry bundles. That responsibility, however, is only the beginning. His presence is desirable so that he can be impressed with the cost of foods. It's a sort of indoctrination to inculcate a sympathetic attitude towards a request for an increased budget. Finally, the job of planning meals and catering to the whims of her man are greatly simplified when the "buggy pusher" is afforded an opportunity to make some suggestions and selections of his own.

The development of new food processing techniques is symbolic of America. It's a result of changes in our agricultural, industrial, and social environments. Because agriculture has become more efficient, more people have gone to industrial areas and fewer folks have remained on farms. Not only has the urban population greatly increased, but more and more women are engaged in business or community pursuits. Furthermore, the majority of city women do not aspire to culinary honors. The result is the new emphasis on prepared or semiprepared foods. Because these packaged foods are scientifically prepared, and soundly tested, they are uniformly good.

Developments in Heat Processing

There has been a widespread belief, based on the early work of C. O. Ball and coworkers in 1927, that the ideal process for sterilization of canned foods would be to heat the product rapidly to the sterilization temperature, hold for the shortest time necessary for complete sterilization, and then cool rapidly to room temperature. Equipment has now been designed to put such a process into commercial use. The procedure consists essentially of sterilizing the product under pressure and at high temperature by quickly heating, then quickly cooling in a continuous flow-type pressure cooker. The cold, sterile product is filled into sterile containers under aseptic conditions. Inasmuch as the whole procedure is carried out in an atmosphere of superheated steam or other sterile inert gas, contamination is effectively prevented.

High-Short for Streamlining

Short, high-temperature sterilization methods have found effective use in the canning of fluid whole milk, baby foods, soups, canned ice cream mixes, and certain concentrated fruit juices and purees. The process lends itself to continuous operation and thus permits streamlining of factory layout.

Of interest too, in the rapid sterilization of liquiform foods, is an improvement in the old Grindrod direct steam injection method patented in the early 1930's. The improved technique incorporates a direct steam injection heater capable of heating fluids to pasteurizing and sterilizing temperatures in one second or less in the absence of solid heat-transfer surfaces, thus reducing fouling. Dilution of the fluid by condensed steam, a disadvantage of steam injection heating unless the feed is preheated, is offset in this novel heater by combining an evaporator which controls product concentration during processing with little regard to feed temperature or to pressure maintained in the vapor-liquid separator.

The hot liquiform food leaving the injection heater-evaporator combination is cooled by flashing into a vapor separator maintained under vacuum. Interest in this type of steam-injection heating is evident from initial commercial installations in processing of tomato puree and juice and in controlling cloud stability in the preparation of frozen concentrated orange juice.

Falling Film Evaporators

New types of falling film evaporators have made possible concentration of fruit juices at low temperatures, resulting in such frozen concentrates as orange, tangerine, grapefruit, and pineapple juices. Low-temperature concentration was not economically possible in the older type steam evaporators because they were too expensive to operate at the low temperatures necessary to maintain quality in the juices being concentrated.

In one type of the new evaporators, the latent heat of the water evaporated from the juice at about 16° C. is transferred to anhydrous ammonia. On compression, the temperature of the ammonia is raised to about 38° C. and is used instead of steam for heating the evaporator tubes. The ammonia is then condensed to a liquid, cooled to 7° C. by expansion, and piped to the surface condensers of the evaporators. Here water vapor is condensed at 16° C., and ammonia vaporized at 7° C. A compressor is then used to compress this vapor back to 38° C. for re-use in heating the evaporator tubes.

(In the next issue, Harry W. Von Loesecke will discuss other food processing techniques)