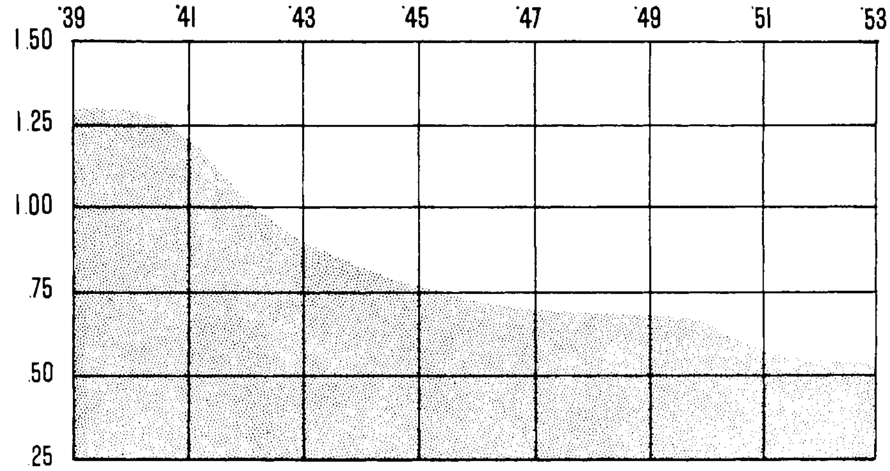
The NRC committee's lack of enthusiam for extensive amino acid enrichment of the country's food supply is based on the variety of our dietary proteins. Bread proteins are eaten along with meat, milk, and other protein containing foods. There may be some advantage, however, of bringing the value of each individual food up to its maximum for the sake of those who do not eat properly balanced diets.

Lysine is just beginning to feel its way around the market place and it will be at least two years, and probably longer, before it will be in full-scale production and can join methionine as a really commercial product. Tryptophane has some potential in swine feeding, but is still too expensive. Much farther away from the market is threonine. The integration of synthetic amino acids into our over-all food production scheme will undoubtedly be slow, but it nevertheless seems to be proceeding steadily.

Tin-Less Cans

Concerted efforts being made to eliminate tin in cans for food packing, but no one satisfactory substitute is seen for awhile

AVERAGE POUNDS OF TIN USED PER BASE BOX



Being cut off from world tin sources could be a real danger, and research on substitutes for tin in can manufacturing has been accelerated. Prompted by tin shortages in World War II, producers of food cans embarked on a program of study to determine what substitutes can be utilized satisfactorily. The Korean War renewed interest in the program, and studies are currently being made on a number of materials, despite stockpiling of tin and tinplate by Government and industry. The Government's stockpiling program for tin has reached its goal, and the several hundred thousand tons of tin on hand provides an adequate supply of tin for seven to 10 years at current consumption rates. Every peacetime year adds another half year's supply from the surplus mine production.

Perhaps no one metal coating on steel will serve as a universal alternate for tin, but substitutes may come from a number of metals, each tailored to fit a specific need. One of the most thoroughly studied substitutes is aluminum, which is plentiful and readily adaptable to a variety of uses.

Aluminum cans are being made and used in Europe to a much greater extent than in this country. Lack of tin smelting facilities results in a relatively high price for tinplate there, and the cost of aluminum sheet compares favorably with the cost of tinplate. Norway is producing food cans from continuously anodized and lacquered aluminum alloy strip more cheaply than from tin-coated steel. However, recent construction of European tin refining units and resulting lower cost of tinplate will probably reduce use of aluminum in food canning.

Economics are not the only handicap to commercial application of aluminum in the United States: Only foods of a relatively neutral acidity could be successfully packaged in aluminum; and handling of canned items would have to be modified drastically to prevent excessive container damage due to the metal's softness. Also being investigated is aluminum-coated steel obtained by cladding, electroplating, and vapor deposition. In these instances, aluminum supplies the necessary protection, and strength is obtained from the steel.

Other domestic metals that may be promising replacements for tin include zinc, nickel, titanium, and chemically treated steel. Even though comparatively plentiful, titanium also poses the problems of high cost and technological changes required to utilize it. Nickel-plated steel can be successfully worked at commercial can making speeds on conventional equipment. Chemically treated steel (usually Bonderized) holds promise of being one of the first alternates for tinplate. Used during the war, chemically treated steel plate is rust resistant. Emphasis is being placed on the development of economical methods for continuous chemical treating of the steel coils at steel mills.

Steel without tin is currently being used principally for packaging dry products, as organic coatings commonly used on tinplate do not adhere well when tinless steel cans undergo steam pressure processes. Packing these cans with vegetables, meats, and other low-acid foods requires a process-resistant inside enamel in addition to outside coatings, which resist both the process and abrasions in handling. The most generally used coatings in the can industry are oleoresins, although studies are being made on the use of epoxy, phenolic, and urea-formaldehyde resins. Silicones and fluorocarbons are under consideration, but no application of these has been developed as yet.

No method of applying coatings that guarantees fool-proof protection has been devised. Microscopic holes (perforations) in the coatings occur at times, hastening corrosion of the container.

Paperboard containers are undergoing studies directed toward their use for other than dairy products. Salt, frozen foods, and ready-to-bake-biscuits are recent applications of paper in food packaging. Here again, coatings and their application pose problems. The end use of a carton determines the type of coating to be used. Paraffin, plastic cements, asphalts, adhesives, and laminants are materials most adaptable to coating of paperboard.

A facet of the tin replacement program that has a bearing on the kinds of substitutes that will eventually be used is the sealing of the can's side seam. Replacing conventional tin-lead solder with high-speed welding has been accomplished, and can be an important step in the development of tinless cans. Welding offers many advantages not available in conventional soldering, being generally applicable to metals whereas soldering is limited to a few. Non-solderable chemically treated steels for use in the manufacture of food cans could be made practical through welding.

Cemented side seams have already found application in cans for packaging dry foods. Frozen fruit concentrates are currently being put up in cans with cemented seams, which may ultimately be preferable to welded or soldered seams.