

The cocoa butter replacement is perhaps the best known of the projects. Dr. H.L. Rothbart, head of the physical chemistry laboratory team that developed the product, says various candy makers have tested the product and said it performed as well or better than cocoa butter. With tallow at 15 cents a pound and cocoa butter at \$2.60 a pound, there's an incentive. An economic evaluation of the product was published in JAOCs in July 1976 with the conclusion, "The initial cost comparisons indicate that the products which result from beef tallow fractionation can compete economically with cocoa butter and other vegetable oils in the food and confectionary industries."

The solid portion—consisting of the first two fractions—"can be used to harden shortenings and margarine stock in place of hydrogenated oils," the March 1976 patent states. "Not only is the hydrogenated step eliminated, but the product is free of oleic acid isomers common to partially hydrogenated oils. It can also be blended with liquid oils with or without catalytic rearranging to formulate specialty shortenings. Its high ratio of stearic acid makes it valuable for many nonfood uses including cosmetic bases, pharmaceuticals, soaps and as a commercial source of stearic and palmitic acids."

The semisolid portion yield is about 20 percent of the total product in the process, which has been scaled up to 350 pounds of tallow in a batch. The solid portion is about 15 percent. The third portion—beef oil—totals about 65 percent of the yield.

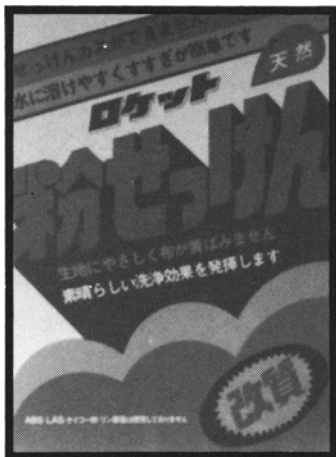
The beef oil does not require winterization to remain liquid at 45 C, but does require a crystallization inhibitor in order to remain clear during longterm storage at 40 F. It is potentially useful in salad oils, margarines, liquid shortenings or, as previously mentioned, as a frying oil.

Frank Luddy, one of the researchers on the fractionation program, said some performance studies remain uncompleted. Dr. H.L. Rothbart, head of the fractionation team, says potentially useful work remains.

One firm has expressed interest in obtaining a license for the patent. The ERRC's Industrial Development staff will forward inquiries from potential users to that firm.

One research project unaffected by the federal fund reduction is the surfactants research program led by Dr. Warner Linfield. The project is funded as an antipollution project in that it seeks surfactants with minimum adverse effects on the ecology. The research began in 1970-71.

The work to produce a phosphate-free detergent already has found commercial application—in Japan. At least two detergent manufacturers there are marketing products based on ERRC research.



#### Why Japan and not the United States?

First of all, Dr. Linfield says, Japan has a sizable soap-production capacity—the capability of processing tallow. The United States, with its emphasis on detergents based

entirely on synthetic ingredients, lacks that capacity. Japan also shows a strong enthusiasm for innovation, he says, whereas in the United States there is less economic incentive for innovation.

Dr. G. Maerker, head of the ERRC Animal Fat Products Laboratory, adds a few more reasons.

"In Japan, washing is done almost exclusively in cold water," Dr. Maerker says, "and they use the same detergent for washing dishes that they use for washing clothes. Japanese seem to have skin that is sensitive to petro-based detergents and there is a strong consumer movement toward ecologically safe products. The Japanese think it's worth paying the extra penny or two."

The Far East is a prime customer for U.S. tallow, accounting for about half the U.S. export trade. Palm oil is a potential competitor in that area.

Linfield sees several areas that need further work before the project could be termed completed.

"We've got to work in process development to produce lime-soap-dispersing agents, working with industry," he said. "We need to streamline the formulation to reduce costs—an area where we've barely scratched the surface. We could expand research to include toilet soaps and analytical techniques."

Also on his list are formulation studies, formulation processing studies, and market research studies.

The Animal Fats Laboratory was still working late last year to determine what projects it would undertake after the unexpected fund reduction. Center officials were not yet able to be specific and were reluctant to speculate on possible projects.

But the ERRC's animal Fats laboratory is one of the few laboratories in the nation working exclusively on new or better uses for animal fats such as tallow.

Federal agricultural research takes two directions—one aimed at increasing production, the other at making better use of what's being produced. At the animal fats laboratory, the staff thinks there are quite a few good ways to make use of tallow—the nation's second largest supply of fats and oils. ●

## Regional Centers affected by fund cut

The Eastern and Northern Regional Research Centers of the USDA's Agricultural Research Service have been most affected by a \$2 million reduction in federal funds for research on industrial uses of fats and oils during the current fiscal year.

ARS internal reallocation of funds eased the impact on the two centers. No staff reductions have been forced, but some researchers have retired and others have been reassigned without replacement. Some research projects have been halted, others curtailed, and another group faces elimination if financing is not renewed.

The reduction was specifically mandated by the Office of Management and Budget for FY 1977 (which began Oct. 1, 1976) in preparing the budget. "A \$2,000 thousand decrease is requested in 1977 to reflect the increased capacity of industry and commodity groups to fund research in this area," the budget appendix said. The "area" referred to was oil utilization marketing, which includes regional centers' work on industrial uses of fats and oils.

The Senate restored \$1.5 million of the proposed cut when it acted on the budget. The House approved the budget with the full \$2 million cut. The joint conference committee accepted the House position, but aded a sentence to the budget telling ARS to continue research on industrial uses of fats and oils. In effect, the funds were to be reduced, but ARS was told to continue the work.

The ARS total budget for the current fiscal year is \$270.57 million, an increase of approximately \$8.3 million over the previous fiscal year's \$262.3 million.

The Eastern Regional Research Center (ERRC) was cut \$1.1 million from its over-all budget of \$9.5 million. Re-allocation of other funds provided \$672,000 for the animal fats work, but the cut meant that projects on using animal fats as basic raw material for lubricants or plastics had to be curtailed. The ERRC plans to support animal fats research for industrial uses at approximately two-thirds of its former level on a temporary basis during the current fiscal year by redirecting funds. This will lower the level of research in the other six laboratories which together with the animal fats laboratory comprise the ERRC.

The United States produces more than five billion pounds of tallow annually. About half of this amount is exported. Most of the remaining tallow, a replenishable agricultural resource, is used domestically as an ingredient in animal feeds, as a source of fatty acids and their derivatives and as a raw material from which soap, lubricants and other industrial products are made. Chemically, tallow is closely related to petroleum. Petroleum is the prime source of many chemicals, some of which could be manufactured from tallow and other agricultural fats and oils.

Commenting on the decreasing emphasis on fats and oils research for industrial uses, Dr. G. Maerker, chief of the ERRC animal fats laboratory, said, "We're shifting to new projects, some closely allied, some not at all related." Among areas being considered are food lipids, new sanitizing agents and bacteriocides based on lime-soap-dispersing agent research, and compounds which may alter the water absorbitivity of soils.

A physical chemistry laboratory team at ERRC, headed by H.L. Rothbart, has been fractioning edible tallow to develop new marketable fractions. One fraction is a potential replacement for \$2.60 per pound imported cocoa butter. Another fraction shows promise as a frying oil. "Potentially useful work remains to be carried out in the beef tallow fractionation program where we feel we complement, not duplicate industrial research. We wonder, however, whether ARS and Congress will want us to continue this work. If not, we will shift our effort to other commodity areas."

Dr. J.W. Harlan, assistant director for program operation at ERRC, summarized, "The extent to which shifts of this type are mandated depends on how vocal and effective

interested industry and consumer groups are in supporting continuation of fat and oil utilization research."

The Northern Regional Research Center was asked to cut projects totaling \$763,400.

"Our program on processing technologies for industrial uses of oilseeds was cut \$763,400 for FY 77, but most of the cut, all but about \$100,000, was offset by increases in other areas of the center's research budget," Dr. William Tallent, center director, said.

Increases included those in programs for research on metabolism of isomeric polyunsaturated fatty acids and \$150,000 specifically earmarked for "soybean research including marketing and utilization," Dr. Tallent said.

The soybean work will include research on water-base and other nonpolluting paints derived from soybean oil, sperm oil replacements from soybean oil for the lubricant industry, and biodegradable plasticizers from soybean oil, Dr. Tallent said.

Work has been halted on developing lubricants from new seed oils, on new linseed oil emulsions and solutions for cutting and protecting concrete, linseed oil derivatives for water base and solventless coatings, and biodegradable plasticizers from vegetable oil soapstocks. The last project named was the largest single project terminated, Dr. Tallent said, and was a soybean-oriented project.

The major area for increase is in photosynthesis research, specifically the role of yellow pigments, particularly in soybeans, to be headed by Dr. Herb Dutton. To provide Dr. Dutton with the time for research, Dr. Everett Pride has been named oilseed crops research coordinator for day-to-day management of oilseed research with Dr. Dutton maintaining over-all policy guidance, Dr. Tallent said.

"Fiscal 77 will be a tight year, but in no sense disastrous," Dr. Tallent said. "Ironically though, cutting out of this research to provide a scientific basis of new technology of industrial uses of agricultural oils comes at a time when many highly regarded prognosticators of science are urging increased attention to renewable resources. And it comes at a time when increased use of palm oil is causing at least transient surpluses of soybean oil."

At the Southern Regional Research Center, the reduction came after plans already had been made to redirect some research effort to triticale, grain sorghum, and pearl millet.

At the Western Regional Research Center, the major effect was reallocation of some new project funds to other centers. ●