Milk Products For The Lactose-Intolerant

For most Americans, milk is an almost perfect food. Its digestion is difficult for some, however, because of their low tolerance for the milk sugar, lactose.

ARS scientists are working to develop special dairy products in which most of the lactose is predigested. Such products could be consumed in unlimited quantities, even by people with severe lactose intolerance.

Worldwide, lactose intolerance is common. Many blacks and people of oriental descent are affected by it. It is far less prevalent among caucasians.

The reasons for these racial differences are not well understood, but the mechanism of lactose intolerance is known It arises from deficiency in the intestines of an enzyme called lactase. Lactose is not utilized by the body unless lactase first hydrolyzes it--that is, breaks it down--into its two simple sugars, glucose and galactose

The lactase-deficient can suffer abdominal pain, flatulence, bloating, or diarrhea if the capacity of their system for lactose utilization is exceeded

Since most of the world's population, and in particular millions of its hungry and malnourished, have varying degrees of lactase deficiency, the problem must be reckoned with. The answer is not, according to the United Nations Protein Advisory Group, to eliminate milk as a protein source in large-scale feeding programs for the malnourished. The benefits of milk's high-quality protein are too great to justify such restriction. Instead, these experts recommend development of low-lactose dairy foods to provide protein where normal dairy products are not readily digestible because of lactase deficiency or other gastrointestinal malfunctions

At the ARS Eastern regional research laboratory, Philadelphia, dairy products are being treated with lactases from molds and bacteria These enzymes hydrolyze lactose, but they work effectively only under acidic conditions, which cause fluid milk to coagulate

One of these lactases, however, from the mold Aspergillus niger, was used successfully to treat cottage cheese whey. Unlike most wheys and other dairy products, which are neutral in pH, cottage cheese whey is highly acid Hence this mold lactase treats it readily Because the enzyme is rather expensive for use on a low-cost product like whey, chemists John H Woychik and Valerie Wondolowski chemically bound the lactase to porous glass beads and then pumped the liquid whey through the column, using the same lactase again and again.

In other work, at the ARS Western regional research laboratory in Berkeley, Calif., scientists working on aplications for various bound enzymes, developed another method for converting lactose in whey. Chemists Alfred C. Olson and William L. Stanley found a way to absorb lactase to a granular phenol formaldehyde resin, then bind it to the resin with another chemical, glutaraldehyde

More recently, yeast lactases have become available that are highly promising for dairy products. Yeast enzymes operate near the neutral pH range, but the conventional ones affect flavor. Dr. Woychik observed that these new yeast lactases effectively split the lactose of whole and skim milk into glucose and galactose without causing off-flavors. The only flavor effect was the increase in sweetness that always results because the simple sugars have a sweeteer taste than lactose.

The new yeast lactases have also been used at the ARS Dairy Products Laboratory in Washington, D. C , to make low-lactose fluid, concentrated, and powdered milks, and whey-containing ice cream. The enzymes were simply added to these products in pilot-plant processes developed by food technologist Eugene J Guy and chemists Arjen Tamsma, Floyd E Kurtz, and Michael J. Pallansch.

All these products had 90 percent or more of their lactose hydrolyzed Their flavor was unchanged, except for the added sweetness This would be an advantage, permitting sweetened and flavored milk drinks to be made with less added sugar, hence less calories For some applications, in fact, splitting lactose with enzymes may be valued for the sweetening effect alone.

Substantial quantities of the enzyme-treated products have been made in the Dairy Products Laboratory pilot plant. Industrial firms that have received samples have expressed interest in them.

Meanwhile, the search goes on for additional lactase sources. Microbiologist Leroy C. Blankenship, of the Dairy Food Nutrition Laboratory at Beltsville, Md., is screening microorganisms for lactase activity. Of 350 species he has examined so far, about 10 look promising for further study. It may well be that the lactase produced by one or more of these will eventually be found useful for splitting the lactose in dairy products.

If lactase treatment with enzymes can be translated to a practical commercial operation, nutritious dairy foods and drinks may play an even larger part in relieving hunger at home and abroad.

Cotton Bur Provides Feast For Livestock

That sizzling steak on your dinner plate could have come from a steer that got healthy on cotton bolls — minus the fiber, that is.

Until recently, the dried-up bolls that originally held the fiber were considered a nuisance and presented a giant disposal problem for gins.

Now however, reports the National Cotton Council, the dried bolls or burs are proving to be valuable for livestock feed. They're becoming increasingly popular not only as the roughage component for feedlot animals but also as a supplement food for range and pasture stock

Protein content of the burs ranges from 7½ to 12 percent. The burs are made into pellets, which can have molasses or other liquid supplements added to them upon request.

The first facility for converting the burs into pellets was built by a gin near Lubbock, Tex , a few years ago And demand is now outstripping production. The bur pellets are currently being trucked to feedlots and feed mills in Texas, Oklahoma, and Kansas.

This new use of burs adds to the growing list of by-products from almost every part of the cotton plant A concentrate produced from cottonseed was recently discovered as a valuable new source of protein-rich human food. Cottonseed meal, the dry substance that remains after oil is pressed from the seed, is widely used as a protein supplement for cattle.

Refined oil from cottonseed goes into margarine, salad and cooking oils, shortening, and a frozen dessert called *mellorine that's similar to* ice cream.

Linters, the short tag ends of cotton fiber left on the seed after ginning, are used in mattresses, twine, candlewicks, carpets, gauze, film, lacquer, explosives, phonograph records, and other products.

And cottonseed hulls, used chiefly as a cattle feed roughage, also are the basis for modern plastic articles as well as sweeping compounds.

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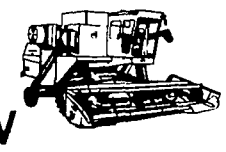
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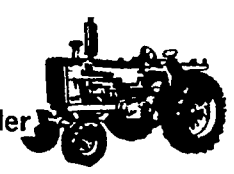
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