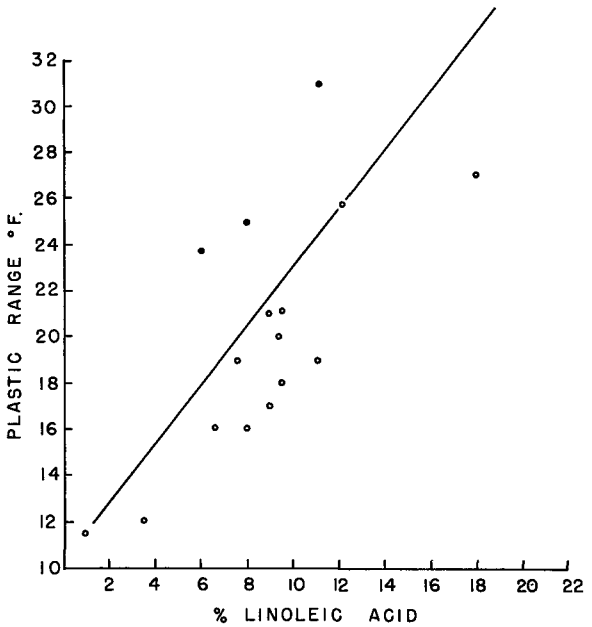

FIG. 13. Relationship between plastic range and % of linoleic acid for all types of shortenings, animal or vegetable (plastic range expressed as °F./100 pen. units, between 300 and 200).

is only intended to estimate the slope or rate of exchange between these two properties and also to separate the areas of conventional shortenings and directed lard shortenings. These data indicate that the directed lard shortenings have better plastic ranges at any given degree of polyunsaturation than any other conventional shortening type.

In baking performance the directed lard shortenings exhibit all of the desirable properties of the premium vegetable shortenings. In addition they also exhibit an improved cake performance at higher batter temperatures, such as would be encountered in the summer in bake shops or kitchens. Another very interesting property of the directed lard shortenings is their stability against change under market-aging conditions. The normal tendency for vegetable shortenings is to firm slightly on aging and become somewhat poorer in texture and blending properties. There is practically no change in the directed rearranged shortenings on market aging in consistency or blending properties. This behavior is possibly associated with the different polymorphic behavior of the solids in vegetable shortenings and those in directed lard shortenings. The former are almost universally in the Beta prime form and stay in this form for years on the market. The fat crystals do grow in size though on aging and tend to intermesh more with a resulting stiffening action. The directed interesterified lard is customarily in the Beta prime form on being freshly made but upon aging slowly changes to the Beta form. It is conceivable that this phase change interrupts the normal tendency of shortening crystals to digest, grow, and become stiffer since it is known that fat solids in the Beta form have less stiffening effect than when in the Beta prime form (14).

Because of the vast flexibility possible with directed interesterification, there has been no difficulty in producing a uniform product out of crude lards that have varied quite widely in hardness.

Summary

The directed interesterification process has been put into successful factory use on lard shortenings. This process increases the fraction of high melting solids (trisaturated glycerides) and decreases the fraction of intermediate melting glycerides (disaturated glycerides) in lard. This change in glyceride composition allows the following advantages to be realized in lard shortenings:

a) an improved plastic range for any given level of oxidative stability, meaning less variation in softness and creaming properties from cold to warm temperatures, achieved without the use of relatively expensive hardstock (completely hydrogenated fat);

b) an improved uniformity from a variable raw material, and a flexibility that makes possible a wider selection of raw materials; and

c) an overall performance equivalent to the premium vegetable shortenings.

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[Received September 23, 1955]

Erratum

A. S. Henick of the Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill., writes as of December 7, 1955: it has come to our attention that the equation for unsaturated carbonyl in Correction *31*, 447 (1954), contains an error. The denominator of this equation is 0.707, not 0.469 as printed.

The previous correction referred to a paper published on page 88, of the March 1954 issue of the Journal, which was entitled "Estimating Carbonyl Compounds in Rancid Fats and Foods," by A. S. Henick, M. F. Benca, and J. H. Mitchell.