FATS AND PROTEINS RESEARCH FOUNDATION, INC.

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WERNER R. BOEHME
Technical Director

2720 DES PLAINES AVENUE
DES PLAINES, ILLINOIS 60018
AREA CODE 312—827-0139

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Globin Protein Evaluated as a Food Emulsifier

The globin protein fraction of bovine blood compares very favorably with commercially available proteinaceous emulsifying agents according to scientists working at Texas A&M University with grant support from the Fats and Proteins Research Foundation. Particularly effective in acidic media, the globin protein could find large scale applications in food products.

Functional properties, such as solubility, whipping ability and emulsification capacity are among the principal criteria measured for estimating the usefulness of a protein isolate in the food industry. Emulsification capacity is especially important in the manufacture of fermented sausages and salad dressings. In the laboratory it is measured by the quantity of a fat, such as corn oil, that can be dispersed in an aqueous solution of the emulsifier. To measure this property the oil is added gradually to the emulsifier solution under standardized mixing conditions. As the added oil becomes emulsified the viscosity of the mixture increases up to a point at which the emulsion "breaks" or inverts from an oil-in-water to a water-in-oil system. At the breaking point the viscosity now decreases sharply and the reduced power consumed by the mixer can be monitored electronically. Emulsification capacity, however, is highly dependent upon the type of oil and the rate of addition, pH of the system, type of the emulsifier and its concentration, mixing speed and so forth. As a result meaningful comparisons of different proteins must be made when emulsification conditions are optimized for each sample.

Experimental evaluation of globin protein in the laboratory indicated it to be a more efficient emulsifier than such protein fractions as a soybean isolate, glandless cottonseed flour and non fat dry milk. Table I compares the emulsification capacities of the four protein fractions under their optimum conditions.

Additional studies are in progress to evaluate the properties of the corresponding bovine plasma protein. This fraction is an outstanding emulsifier and binder in such ground meat products as machine-made hamburger patties which normally crumble very readily. A preliminary report of the blood protein emulsifiers was the subject of an earlier Director's Digest (No. 106, April 26, 1973). The present investigation was conducted by D. D. Crenwelge, C. W. Dill, P. T. Tybor and W. A. Landmann, "A Comparison of the Emulsification Capacities of Some Protein Concentrates", and published in the Journal of Food Science, 39, 175 (1974). Reprints of this article are available upon request from the FPRF office.

TABLE I.

EMULSIFIER		OPTIMUM CONCENTRATION		OPTIMUM	EMULSIFICATIC
Source	Protein Content (%)	Weight (g/100 ml)	100% Protein basis (g/100 ml)	pH	CAPACITY (% oil in emulsion)
Bovine Globin	90.1	.40	.36	3.1	83.9
Soybean Isolate	67.5	1.15	.78	9.4	82.7
Glandless Cottonseed Flour	57.5	1.96	1.13	8.9	75.8
Non Fat Dry Milk	35.4	1.19	.42	7.1	75.5