



FATS AND PROTEINS RESEARCH FOUNDATION, INC.

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THE DIRECTOR'S DIGEST

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NEW EMULSIFIERS DEVELOPED FROM BLOOD PROTEINS

Investigators at Texas A&M University reported recently that the dried serum and globin fractions of bovine blood are excellent emulsifiers. These proteins can be made available in commercial quantities for industrial and food applications via procedures developed by Drs. W. A. Landmann and C. W. Dill with grant support from the Fats and Proteins Research Foundation, Inc. A brief outline of the separation process was the subject of an earlier Director's Digest (No. 96, June 20, 1972).

The effectiveness of emulsifiers is subject to numerous variables which include processing conditions, pH, the presence of sugars and salts and especially, the concentration of the emulsifier. Earlier work by the Texas A&M group indicated blood globin to be markedly superior to soy, cottonseed and milk proteins on a weight basis. The present study compared bovine serum and globin fractions prepared under various conditions for their effectiveness as emulsifiers at different pH values. Modifications in processing of the protein fractions included purification by reprecipitation and addition of lactose before spray-drying. Crude serum was spray-dried (I) or reprecipitated and then spray-dried (II) or reprecipitated and spray-dried in the presence of lactose (III). Blood globin was prepared by spray-drying in the absence (IV) and in the presence (V) of lactose. Emulsification capacity, the maximum percentage of oil emulsified before inversion, was determined under standardized conditions.

Serum products I and III gave outstanding performance at 1% concentration in both acidic (pH 4.0) and neutral (pH 7.0) media and formed emulsions containing over 80% corn oil. On the alkaline side (pH 9.4), however, serum products I and II were excellent emulsifiers approaching the performance recorded for I and III at pHs 4.0 and 7.0. Blood globins IV and V resembled serums I and III in emulsification capacity in 1% concentration at pH 4.0 but were relatively ineffective at pH 9.4.

These data suggest that selected blood protein preparations be tried in such large scale industrial applications as the coatings and processed meat industries. Serum fractions I and II, for example, may prove useful in latex paint formulations which are generally alkaline in nature. The manufacture of fermented sausages, which is conducted under acidic conditions, may benefit from the addition of either serum proteins I and III or the globin products IV and V.

Details of these studies were published in the Journal of Food Science (1973) 38:4 (P. T. Tybor, C. W. Dill and W. A. Landmann, "Effect of Decolorization and Lactose Incorporation on the Emulsification Capacity of Spray-dried Blood Protein Concentrates") and in a monograph by W. A. Landmann and C. W. Dill entitled "Blood Protein Recovery Research" published by the Animal Science Department of Texas A&M University, College Station, Texas 77843. Copies are available upon request from the FPRF office.