FATS AND PROTEINS RESEARCH FOUNDATION, INC.

Director's Digest

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Blood Protein Production in Pilot Plant

Scientists at Texas A & M University report scaling up the isolation techniques for the plasma and globin proteins from bovine blood. Drs. Tybor, Dill and Landmann, working with grant support from the Fats and Proteins Research Foundation, have now developed a continuous process which is said to be adaptable to commercial production.

By the new procedure whole blood was diluted with isotonic (0.85%) salt solution and a small amount of sodium citrate as an anticoagulant and the cellular components were concentrated by centrifugation. The dry plasma protein was obtained directly by spray drying of the aqueous phase. The solid cellular mass was then diluted with water to rupture the red cells and release the hemoglobin. Further treatment with chloroform and ascorbic acid followed by aeration released the heme and the globin protein was precipitated with acetone and spray dried from a water solution as a colorless powder. A flow diagram of the process is depicted in Figure 1.

The filtrates of the globin precipitation were purified by distillation and the recovered acetone recycled as illustrated in Figure 2.

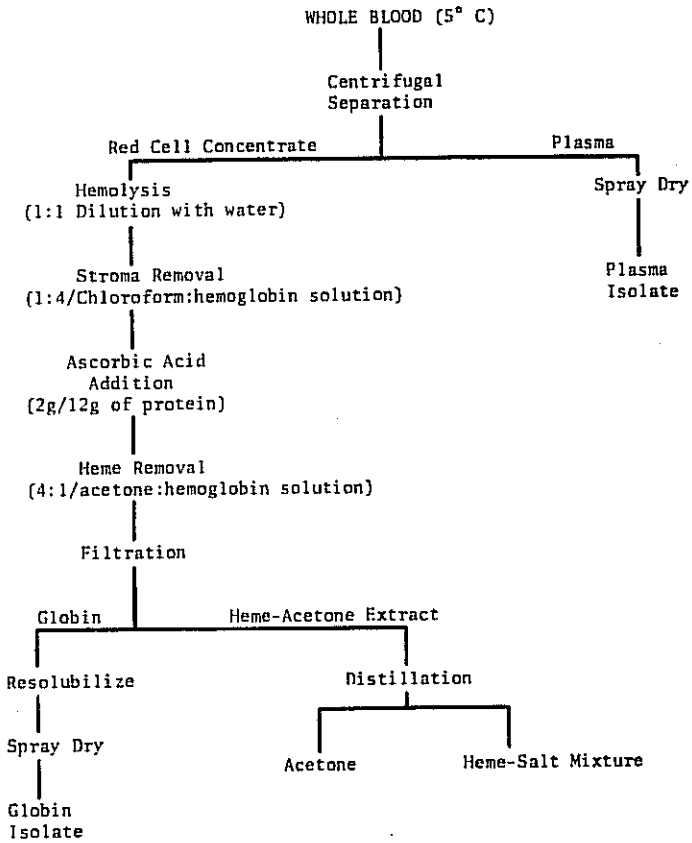

Fig. 1—Flow diagram of the process for preparing blood protein isolates.

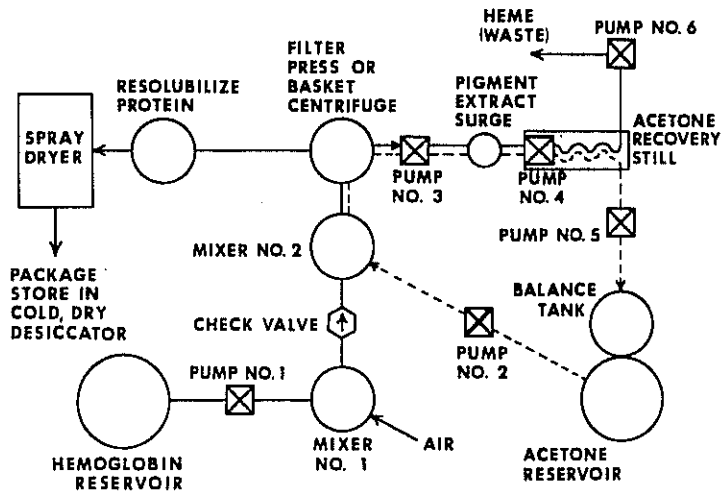

Fig. 2—Schematic layout of the continuous system for decolorizing hemoglobin.

Analysis of the isolates showed the plasma and globin fractions to contain about 91% and 71% protein, respectively, with the non-protein components principally salt and citrate. Amino acid profiles indicate the protein fractions to contain all of the essential amino acids for human nutrition. They are excellent sources of lysine and leucine and the levels of threonine, valine, phenylalanine and tryptophan exceed the standard for protein recommended by the FAO/WHO. A high level of microbiological safety was indicated by the absence of pathogens and very low levels of aerobic microorganisms.

Application of these blood proteins as emulsifiers and foaming agents reported previously were confirmed in this study which appeared in the Journal of Food Science (1975) 40, 155. Their properties and nutritive values have been summarized in Director's Digests Nos. 96 (June 20, 1972), 106 (April 23, 1973), 114 (December, 1973) and 115 (Jan., 1974). Both protein fractions are excellent emulsifiers and foaming agents under controlled experimental conditions. Spray drying does not significantly impair their solubility and the solubility of the plasma protein appears to be somewhat enhanced by spray drying in the presence of lactose as a protective adjunct.