FATS AND PROTEINS
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RECOVERY OF BLOOD PROTEIN

Currently large quantities of blood are "washed down the sewer." This is a contributing factor to high water pollution levels and is a great economic loss in this era of high quality protein shortage. Dr. W. A. Landmann and Dr. C. W. Dill, Texas A&M University, with grant support from FPRF, have developed techniques for the separation of most of the protein from animal blood (see Director's Digest, No. 66, December, 1969).

The method of separation and purification is summarized below.

1. Fresh animal blood is treated with citrate and cooled to 33°-35°F.

2. The blood is separated into a red cell concentrate and a serum fraction by centrifugation in a milk separator.

3. The serum fraction is concentrated and desalted by ultrafiltration.

4. Lactose (or other similar carbohydrate) is added to the serum concentrate (1 part lactose for 1 part protein), the solution is pasteurized at 143°F. for 30 minutes then spray dried to yield a white, stable, free flowing powder.

5. The red cell concentrate from the centrifugal separation (Step 2) is mixed with an equal volume of water and maintained at 41°F. or lower to hemolyse the red blood cells.

6. The stroma are separated by the addition of chloroform followed by centrifugation (or gravity separation by holding for 24 hours).

7. Ascorbic acid (2 parts/12 parts protein) is added to the cold hemoglobin solution and air is added by means of a high speed turbomixer.

8. Acetone acidified with hydrochloric acid is added in a second turbomixer (acetone to hemoglobin ratio of 5 to 1) and the globin protein separates as a white precipitate.

9. The globin precipitate is separated in a basket centrifuge, washed with acetone, and redispersed in tap water at 41°F.

10. Lactose is added, the solution pasteurized and spray dried in the same manner as the serum protein (Step 4). The globin fraction is obtained as a white free-flowing powder.

11. The acetone can be readily recovered from the heme solution by vacuum distillation and reused.

A bench scale pilot plant for the separation is in operation and significant quantities of both protein fractions have been distributed to a number of food companies for evaluation.

Both the globin and serum fractions show good amino acid profiles and are particularly high in lysine and tryptophan. Both fractions are completely soluble in water and are excellent emulsifiers. The preparations produced in the laboratory have remarkably good bacteriological properties - total counts of 250 to 2500 microorganisms per gram with no Salmonella, Staphylococus or Clostridium present in any of the samples.

Several companies have indicated interest in producing one or both of the protein fractions on a commercial scale. If this is done, millions of pounds of high quality animal protein can be recovered for food use.

PUBLICATIONS ON FPRF RESEARCH

The April 17, 1972 issue of Feedstuffs included two articles describing results of research sponsored by FPRF. These are "Amino Acid Content and Availability of Different Meat and Bone Meal Samples in the Broiler Chick" by Burgos, Floyd and Stephenson, and "Acid Antagonists for Salmonella Control" by Doty. Reprints may be obtained from the Foundation office upon request.