FATS AND PROTEINS
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FOOD PROTEIN SUPPLEMENT OF HIGH QUALITY

The possibility of "up-grading" animal protein now utilized only in animal feeds is the subject of a research project supported by FPRF at the North Star Research and Development Institute under the direction of Dr. Harold A. Nash. Results from the first phase of the study were reported in "The Director's Digest," No. 68, February 18, 1970. Data included in a recent progress report on this project indicate that it is possible to prepare a high quality protein supplement from meat and bone meal. Some of the results are summarized below.

Hair Removal. Hair fragments present in the "float" fraction (MBF) from the meat and bone meal could be separated by a sequential screening technique - a gentle shaking that allowed the fine meat particles to pass through the screen, followed by vigorous shaking of the coarse hair-containing fraction that caused the hair fragments to "up end" and pass through the screen.

Flavor Improvement. The MBF fraction carries a somewhat undesirable flavor that would undoubtedly limit its acceptability in some types of food products. It has been found that extracting the MBF fraction with dilute alkali (0.1 N NaOH) for 1-2 hours removed essentially all the flavor leaving a residual material that was almost entirely tasteless. About 25% of the MBF was lost in the extraction procedure. However the extracted protein was of relatively low nutritive quality with an amino acid profile similar to that of collagen (high in proline, hydroxyproline, and glycine, and low in cystine, methionine, tryptophan, threonine, valine, leucine and isoleucine).

In addition to improving flavor, extraction with alkali removed some of the red color leaving a gray-colored material. The incorporation of the alkali-extracted MBF into simulated baked foods resulted in completely bland products.

Fractionation by Size. Fine particles in the MBF fraction had a different appearance than coarse particles which suggested that separation by particle size might yield fractions with different amino acid composition. This was confirmed by amino acid analyses on the different fractions (Table 1). The fine fraction (≤ 115 mesh) included about 50% of the original MBF fraction.

Table 1. Essential Amino Acid Content of Materials Separated by Size Fractionation of MBF (Expressed as grams/16 grams nitrogen)

Size fraction (mesh):	≤ 24 ≥ 60	≤ 60 ≥ 115	≤ 115
Tryptophan	0.4	0.5	0.8
Lysine	4.0	3.7	5.5
Leucine	5.4	6.1	6.6
Isoleucine	2.8	2.9	3.3
Methionine	1.3	1.4	1.6
Phenylalanine	2.9	3.1	3.5
Threonine	2.7	3.2	3.5
Valine	4.0	4.2	4.6

Feeding Trials. Feeding trials with rats are in progress to determine the relative nutritive value of the various fractions prepared from meat and bone meal. The preliminary results (Table 2) indicate that MBF "fines" or MBF extracted with dilute alkali are satisfactory when fed as the sole source of protein (except for methionine supplementation).

Table 2. Weight of Rats After Three Weeks When Fed Different Protein Supplements

Supplement	Weight (grams)
10% Casein	120
15% MBF + methionine	105
15% MBF fines + methionine	130
15% MBF alkali extd. + methionine	145
20% MBF fines + methionine	165

These results are quite promising. They indicate that a protein fraction of good nutritive quality can be separated from meat and bone meal by density separation followed by either alkali extraction or by particle size separation.