FATS AND PROTEINS RESEARCH FOUNDATION, INC.

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New Drying Techniques Preserve Lysine in Blood Meals

Slaughterhouse blood is still a relatively neglected source of high quality protein in the United States and it is estimated that little more than half of the approximately 150,000 ton annual potential of dried blood is currently utilized. In past years blood was widely used as a fertilizer and as an adhesive for plywood manufacturer but has been largely superseded in these applications by the synthetic fertilizers and resins. Blood is now recognized as a valuable animal feed supplement which is particularly rich in essential amino acids. More recently it has been realized, however, that not all dried bloods are equally effective as dietary supplements because of denaturation suffered during the drying procedure.

Professor Paul Waibel of the University of Minnesota, working with grant support from the Fats and Proteins Research Foundation for the past several years, related drying procedures to chemical assay and biological availability of the lysine in a report presented recently at the National Renderers Association Georgia Nutrition Conference Symposium in Atlanta. Dr. Waibel's investigation of the chemical and biological availability of amino acids in blood meals prepared by several processes were summarized in an earlier Director's Digest (No.98, August 28, 1972). In that study it was found that, although the chemical assay indicated moderate (62%) retention of lysine in conventional vat dried blood meal, the bioassay in turkey poults proved that as little as 14% of the lysine remained available. Ring-dried blood meal, on the other hand, showed near quantitative retention of lysine by chemical assay (96%) and an 82% availability by bioassay.

In more recent studies he has examined blood meals produced by a variety of newer, commercially available drying equipment and the effects of modifying the processing conditions of the vat and ring driers. The results, which at this time should be considered preliminary until additional samples have been evaluated, indicate very

clearly that shorter drying times at lower temperatures can give up to 95% biological retention of the lysine. Table I summarizes these results.

Table I

Total, chemically available, and biologically available lysine with various methods of processing.

Process	Number of Samples	Lysine		
		Total	Chem. Avail.	Biol. Avail.
		g/16 g N --	% of total	--
Early data:				
Conventional	3	7.8	62	14
Ring	3	9.7	96	82
Later data:				
Conventional	12	7.6±0.5	80±6	49±16
Fast conventional	2	7.6	80	50
Ring-usual	6	9.3±0.5	86±3	83±3
Ring-725° F. inlet 200° F. outlet	2	9.5	89	78
Ring-875° F. inlet 265° F. outlet	2	8.3	69	55
Spray	3	8.7	86	83
Centrif.-conv. dr.	2	9.5	91	89
Centrif.-steam coil tumble	2	8.8	96	95
Coag.-series dryer	2	8.8	92	86
Flash dryer	1	9.2	99	94

± indicates standard deviation.

Let us now compare the economic value of a typical blood meal prepared by the conventional vat drying process having an average lysine retention of 49% with, for example, a coagulated, centrifuged and steam-coil tumble-dried meal of 95% retention. Assuming a lysine content of 9.2% based on total blood solids the lysine value difference between a ton of blood meal prepared by these two processes is 2000 x .092 (.95-.49) or about 85 lb. of lysine. At today's price of synthetic 100% L-lysine at $2.21/lb. (L-lysine monohydrochloride 98% at $1.73/lb.) the difference in value is $185. per ton! Equipment manufacturers have been diligent in improving their drying equipment and have enjoyed the support and collaboration of the rendering and meat packing industries in developing these improved blood drying techniques.