RESEARCH NOTES

CRUDE FAT OR ETHYL ETHER EXTRACT DETERMINATION IN COCONUT MILK[1]

Determinations of crude fat in food products have been made using the Babcock,[2] Gerber,[3] Mojonnier,[4] Rohrig,[5] Roese-Gottlieb,[6] and Soxhlet,[7] tests. Modifications of these tests have been employed successfully to great advantage in certain products. Joslyn[4] states that variations in results owing to solvents are negligible in comparation with variations due to the method used. It has been accepted that analytical methods for fat determination must be modified to fit the requirements of the product in question.

The Babcock and Gerber methods depend on the solution in sulfuric acid of all components of the sample except fat and lipoid bodies, and the subsequent determination of the fat by centrifuging to separate the fat phase to facilitate measurement. Fat in coconut milk can not be determined by this method because the sugar chars and the particles of coconut pulp rise in the fat column.

The Mojonnier, Rohrig, Roese-Gottlieb, Soxhlet and their crude fat test determination modifications are solvent extraction processes. The Roese-Gottlieb method was found to be suitable for the determination of fat in coconut milk, and is recommended in the literature.[8] However, after a prolonged use in our plant and laboratory practice, the need appeared for a more practical method.

An initial evaluation of the product and its analytical needs suggested the possibility of using the dried coconut milk sample obtained from the moisture determination to proceed with the fat analysis. Preliminary work

[1] Manuscript submitted to the Editorial Board October 5, 1972.

[2] Jacobs, M. B., The Chemical Analysis of Foods and Food Products, 3rd ed., D. Van Nostrand Company Inc., Princeton, New Jersey, pp. 296–7, 1958.

[3] Mehlembacker, V. C., The Analysis of Fats and Oils, The Garrard Press, Champaign, Illinois, pp. 43–6 and 52–3, 1960.

[4] Joslyn, M. A., Methods in Food Analysis, 2d ed. Academic Press, New York, N. Y., pp. 143–60, 1970.

[5] Official Methods of Analysis of the Association of Official Agricultural Chemists, 10th ed., Washington, D.C., pp. 240–1, 308 and 331, 1965.

[6] Woodman, A. G., Food Analysis, 4th ed., McGraw-Hill Book Company Inc., New York, N.Y., pp. 129–33, 1941.

[7] Hart, F. L., and Fisher, H. J., Modern Food Analysis, Springer-Verlag New York Inc., New York, N.Y., pp. 190–1, 1971.

[8] Cancel, L. E., Coconut Food Products and Bases, Coconuts: Production, Processing and Products, edited by J. G. Woodroof, The Avi Publishing Co., Inc., Westport, Connecticut, pp. 186–7, 1970.

showed that the sand dried product mixture obtained in the moisture test was difficult to remove from the metal dish. When a filter paper was placed under the sand in the metal dish, the resulting material was too bulky to introduce in the extracting thimble of the Goldfish extractor although easy to remove. Both modifications were tried with acceptable results but the method was cumbersome. To simplify the procedure, cellulose powder was placed in the metal dish which absorbed the moisture in the sample and eliminated need for preliminary evaporation before placing it in the drying oven. After the sample is dried to constant weight, it is then easily transferred quantitatively into the extracting thimble of the Goldfish extractor. The regular Soxhlet method is followed from this point on.

In a series of experiments for determination of fat in coconut milk using the method of Roese-Gottlieb, and the modified method of Soxhlet, the latter gave more precise results. An analysis of the results for precision purposes, as recommended by Kramer and Twig,[9] showed that the R_p (relative precision) of the modified Soxhlet and the Roese-Gottlieb methods were 2.05 and 5.35 percent, respectively.

In the suggested method for determining fat in coconut milk, the analyst should proceed as follows.

1. Put about 0.6 g. of cellulose powder in a round, flat-bottom metal dish provided with a tight-fitting, slip-in cover, 6.5 cm. in diameter. Dry to constant weight.
2. Homogenize the coconut milk just before weighing the sample to avoid sampling error due to separation of the fat and water phase.
3. Pour about 1.5 g of coconut milk into the metal dish containing the cellulose powder, spreading it over the cellulose powder, then weigh.
4. Dry in vacuum oven as recommended by A.O.A.C.[7] methods of analysis for moisture in fruits and fruit products. Calculate the percentage of moisture in the sample.
5. Transfer the dried sample to an alumdum thimble, using a short, wide-stem funnel to facilitate the transfer. Rinse both metal dish and funnel with ether.
6. Place in Soxhlet or Goldfish extractor and proceed as directed by the A.O.A.C. for crude fat in grain and stock feeds.

There are many advantages in the suggested method. The same sample is used for both moisture and crude fat extract determinations. Only one solvent is needed. The Roese-Gottlieb method requires Ethanol, ethyl,

[9] Kramer, A., and Twig, B. A., Fundamentals of Quality Control for the Food Industry, 2d ed., The Avi Publishing Company, Inc., Westport, Connecticut, pp. 441-2, 1966.

and petroleum ether. Cost of the analysis is greatly reduced because of reduction in the quantity of reagents needed and time required to make determinations.

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