Lard Hydrogenation and the Bomer Test

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Addition of Hydrogen Likely to Cause Unfounded Suspicion of Presence of Beef Fat in Pure Hog Product

THE Bureau of Animal Industry of the U. S. Department of Agriculture has ruled that hydrogenated lard is lard stearine, and permits its use in pure lard without declaration on the label. (*BAI order No.* 211, *Revised, Regulation* 17, *Section* 9, *Paragraph* 7.)

Since this ruling has gone into effect, it has been proposed that the consistency of lard be controlled and standardized by hydrogenation of a certain portion of lard and admixture of this hydrogenated portion in desired quantities in the remainder of the lard.

In view of this potential use of hydrogenated lard, it has been thought desirable to call attention to the fact that hydrogenated lard gives the same effect as beef fat in the Bomer method for detection of beef fat in lard. The Bomer method (A. Bomer, *Zeit. fur untersuchung der Nahrungs und Genusmittel,* 1913, Vol. 26, Pages 559-618) is based upon the difference between the melting point of the glycerides twice crystallized from ether, and the melting point of the fatty acids resulting from those glycerides. In its application, the difference between the two melting points, in degrees centigrade, is multiplied by two, and added to the melting point of the glycerides. The figure thus obtained is called the Bomer number, and if it is less than 71.0 the sample is presumed to have beef fat present. This method is in very general use, especially in Europe.

The result of a number of analyses made in this laboratory is given to show the effect on the Bomer number of different quantities of hydrogenated lard added to lard.

TEST No. 1

Mixtures made, using prime steam lard, having an iodine value of 65.3 and a titer of 38.5°C with hydrogenated lard, having an iodine value of 26.8 and a titer of 53.5°C.

		Bomer No.
(a)	Straight prime steam lard	74.0
(b)	97½% Prime steam lard 2½% Hydrogenated lard	70.7
(c)	95% Prime steam lard 5% Hydrogenated lard	68.5
(d)	90% Prime steam lard 10% Hydrogenated lard	66.8

TEST No. 2

Mixtures made, using prime steam lard having an iodine value of 66.0, with hydrogenated lard having an iodine value of 10.0 and a titer of 58.1°C.

		Bomer No.
(a)	Straight prime steam lard	72.4
(b)	97½% Prime steam lard 2½% Hydrogenated lard	66.3
(c)	95% Prime steam lard 5% Hydrogenated lard	64.0
(d)	90% Prime steam lard 10% Hydrogenated lard	61.6

TEST No. 3

A mixture of prime steam lard having an iodine value of 65.0, with hydrogenated lard of unknown iodine value.

		Bomer No.
(a)	Straight prime steam lard	72.9
(b)	90% Prime steam lard 10% Hydrogenated lard	67.0

TEST No. 4

Mixture of pure leaf lard, with hydrogenated lard having an iodine value of 10.0 and a titer of 58.1°C.

		Bomer No.
(a)	Pure leaf lard	72.9
(b)	97.5% Pure leaf lard 2.5% Hydrogenated lard	69.9

The above experiments showed that hydrogenated lard in mixture with pure lard lowered the Bomer number similarly to beef fat, and they indicated that as little as 2.5% of more or

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THE CASE OF WHALE OIL VS. TALLOW

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were a factor favoring increased availability as they shrank from 33 million pounds in 1924 to slightly in excess of 5½ million pounds in 1930. (Such exports though were in all probability edible tallow since for the past several years inedible tallow exports have been placed in a miscellaneous classification and not separately identified.) Greases likewise bolstered the net availability of supplies through a drop of 16 million pounds in this span of years. Imports of tallow have dropped sharply in the last few years from about 2½ million pounds in 1924 and an average for the years 1926 to 1929 inclusive of between ten million pounds and 14½ million pounds to a negligible amount in 1930. Thus smaller imports have tended to offset reduced exports of tallow.

Whale oil imports all of which have been destined for the soap kettle have remained practically constant in the relationship they have borne to total available supplies of oils and fats. Whale oil has comprised 5 per cent of the entire quantity of fats employed in soap each year since 1924 except in 1930 when 4½ per cent was so consumed.

Let us consider the status of vegetable oils. Palm oil has aided in supplementing tallow in making good the deficiency in soap fats. Consumption of this oil in 1930 was 2½ times in excess of 1924 thus reflecting an advance in its percentage from 9 per cent to 16 per cent of total available soap oils and fats. Although the use of coconut and palm kernel oils in soaps had increased 70 per cent in 1930 over 1924 and was more than double the quantity for 1920, approximately 4 per cent less oil from these sources entered into soaps in 1930 as compared with 1924. The percentage dropped from 30 per cent in 1920 to 26 per cent in 1924 and then advanced to 31 per cent in 1929 falling 1 per cent in 1930. (See following table.)

Cottonseed oil maintained a stationary percentage of 14 per cent for 1928 to 1930 inclusive which was 2 per cent less than either 1927 or 1926 but 1 per cent greater than 1920. Quantities of cottonseed oil available for consumption have suffered but slight variation since 1926. Fish oils have constituted 3 per cent or 4 per cent each year of the total oils available except in 1928 when 5 per cent was reported.

The data below illustrate the foregoing remarks and the details of the figures discussed.

(*Continued in February Issue*)

Vegetable Oil Industry in the State of Jalisco, Mexico

THE value of the oil production of the State is estimated at 4,000,000 pesos annually, though last year a small decrease was noted, due to the failure to secure supplies. This was on account of the condition within the State itself.

This production comes from two factories located in Guadalajara, and one in Ciudad Guzman. Their combined productions are estimated at 5,500,000 kilos of oil, with 4,000,000 kilos of this being cocoanut oil. The crops of "coquito de aceite" have been considerably increased,

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less completely hydrogenated lard could be detected by this method.

Another series of analyses was then made on samples taken during the progressive hydrogenation of a prime steam lard in laboratory equipment.

EXPERIMENT No. 5

	Iodine value	Bomer No.
(a) Original lard.....	64.9	72.8
(b) Sample 1.....	63.2	72.5
(c) Sample 2.....	52.3	69.6
(d) Sample 3.....	47.9	69.3

This experiment indicated that the Bomer number decreased as hydrogenation progressed, and that the Bomer number went below 71.0 at a reduction of iodine value of between 2 and 12 points. The exact point where this occurs probably depends upon the type of reduction that occurs during hydrogenation.

From the information obtained from these experiments it appears that results by the Bomer method lower than 71.0 cannot be taken as a sure indication of the presence of beef fat in lard or hog grease, since lard stearine made by hydrogenating lard lowers the Bomer number below that point.