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THE DETECTION OF COCOANUT OIL IN BUTTER.

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(Read at the Meeting, March 7, 1906.)

THE addition of cocoanut stearin to butter has been an increasing practice since an odourless neutral fat was put on the market about 1897. From this date the number of samples examined showing an excessive amount of insoluble volatile fatty acids has gradually increased.

I have felt the need of a method of estimation of the insoluble acids which would be supplementary to the Reichert-Wollny determination, and I venture to think that a description of the method I have found to work satisfactorily in a commercial laboratory may be of interest.

The methods of Polenske (*ANALYST*, 1904, p. 154) and of Muntz and Coudon

(ANALYST, 1905, p. 155) involve the use of special distillation apparatus, and have not the advantage of the method I have practised. I determine the Reichert-Wollny figure, and then proceed to an approximate estimation of the insoluble volatile acids if the indications are suspicious.

I proceed as in the Reichert-Wollny test, but prefer heating the flask over a sand-bath instead of a naked flame. I distil off 110 c.c., and place the receiver in cold water for a short time. If there is any considerable quantity of cocoanut oil in the sample, oily drops will appear on the top of the distillate. I filter and titrate in the usual way, add 110 c.c. water to the flask, and distil off another 110 c.c. as before. I cool the second distillate, pour it over the same filter, and titrate the second filtrate; wash the apparatus with 50 c.c. alcohol and pour this over the filter, then wash the filter with another 50 c.c. of alcohol (90 per cent.), slightly warmed so as to hasten solution of the insoluble volatile acids; finally titrate the alcoholic solution with $\frac{N}{10}$ caustic soda and phenolphthalein.

The accompanying table of English butters blended by myself with cocoanut oil in varying proportions shows the result of my experiments. I also add the result of experiments with various foreign butters of undoubted purity and known origin.

It will be seen that the number of c.c. $\frac{N}{10}$ NaOH for pure butter was in no case higher than 8.4, whereas cocoanut oil requires 34 c.c.

	Reichert-Wollny Figure.	No. of c.c. $\frac{N}{10}$ NaOH registered by Second Filtrate.	No. of c.c. $\frac{N}{10}$ NaOH registered by Alcoholic Solution.
Butter fat	29.2	3.1	7.6
Cocoanut oil	8.0	4.0	34.0
Mixtures :			
90 per cent. butter fat, 10 per cent. cocoanut oil	27.1	3.7	10.2
80 " 20 " "	24.6	4.0	15.5
70 " 30 " "	23.4	4.0	18.1
60 " 40 " "	21.5	3.9	20.1
50 " 50 " "	19.4	4.2	21.8
40 " 60 " "	17.6	4.4	24.4
30 " 70 " "	15.1	4.2	26.0
20 " 80 " "	13.3	4.4	27.1
10 " 90 " "	10.6	4.4	29.1
Margarine	2.9	1.2	7.5
Italian butter	32.6	3.2	8.1
French butter	{ 31.1 32.0	{ 3.6 4.6	{ 7.4 6.5
Australian butter	32.3	4.0	7.2
New Zealand butter	34.1	3.0	6.6
Argentine butter	31.0	3.1	6.2
Irish butter	27.8	2.9	5.2
Danish butter	33.4	3.7	7.1
U.S.A. butter	29.0	3.1	8.4
Russian butter	26.1	3.0	7.3

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DISCUSSION.

The PRESIDENT (Mr. Bevan) said that he had had a sample which showed a Reichert-Wollny figure of 31 and a figure of something over 3 for the insoluble volatile acids, but in which the globules were perfectly oily at 10° C., and he had felt quite satisfied at the time that there was some cocoanut oil present, though the Reichert-Wollny figure of 31 did not leave room for much. Mr. Hehner, however, had since told him of a case in which a sample giving exactly similar results was proved beyond doubt to be genuine butter, so that the oiliness of the insoluble volatile acids at 10° C. seemed, after all, to mean nothing. To his mind the most promising test seemed to be the amount of soda absorbed by a certain proportion of the insoluble non-volatile acids. In the case of cocoanut oil the insoluble non-volatile acids from 1 gramme required 4.7 c.c. of normal soda solution, whereas in the case of genuine butter the figure varied from 3.8 to 3.85 c.c.

Mr. BODMER said that he had met with a case in which the insoluble volatile acids, which had a titration value of about 3.1 c.c. of decinormal soda solution, remained quite fluid even at 10° C. The Reichert-Wollny figure, however, was 30.3, which seemed to leave no room for any cocoanut oil. He had been trying to make the process of Knud Jensen and Kirschner, published recently in the ANALYST (xxx. [1905], 205, 396) applicable to butter; but, although it worked very well with margarine, where the quantity of cocoanut oil was relatively large and the Reichert-Wollny figure low, in butter the smallness of the quantity of cocoanut oil present and the variations in the Reichert-Wollny figure for genuine butter threw out the formula altogether.

Dr. DYER said that the silver test mentioned by Mr. Bodmer had been tried in his laboratory for some time, and at first seemed likely to be useful; but on further experience it was found to break down. Some samples of butter believed to be pure gave quite distinct precipitates with silver nitrate.

Mr. F. J. LLOYD said he had found that in the spring pure butter fat sometimes contained relatively large quantities of liquid fats which were not present at other times of the year. In the case of one farm some years ago, with which he had to do, the fat was of so liquid a nature that when the milk was made into cheese the fat was actually squeezed out, and could not be retained by the curd.

Dr. RIDEAL said that he had made comparisons of the butter from different English counties, and had found considerable variation according to season and feeding. In some cases the figure for the insoluble volatile acids was more than 6 per cent. of the Reichert-Wollny figure, but as a rule English butters have a smaller ratio than found on the Continent by Polenske.