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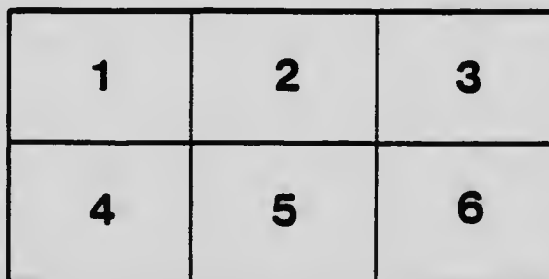
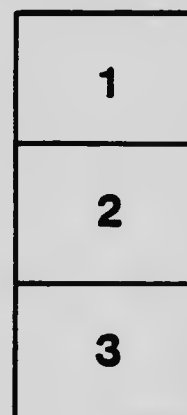
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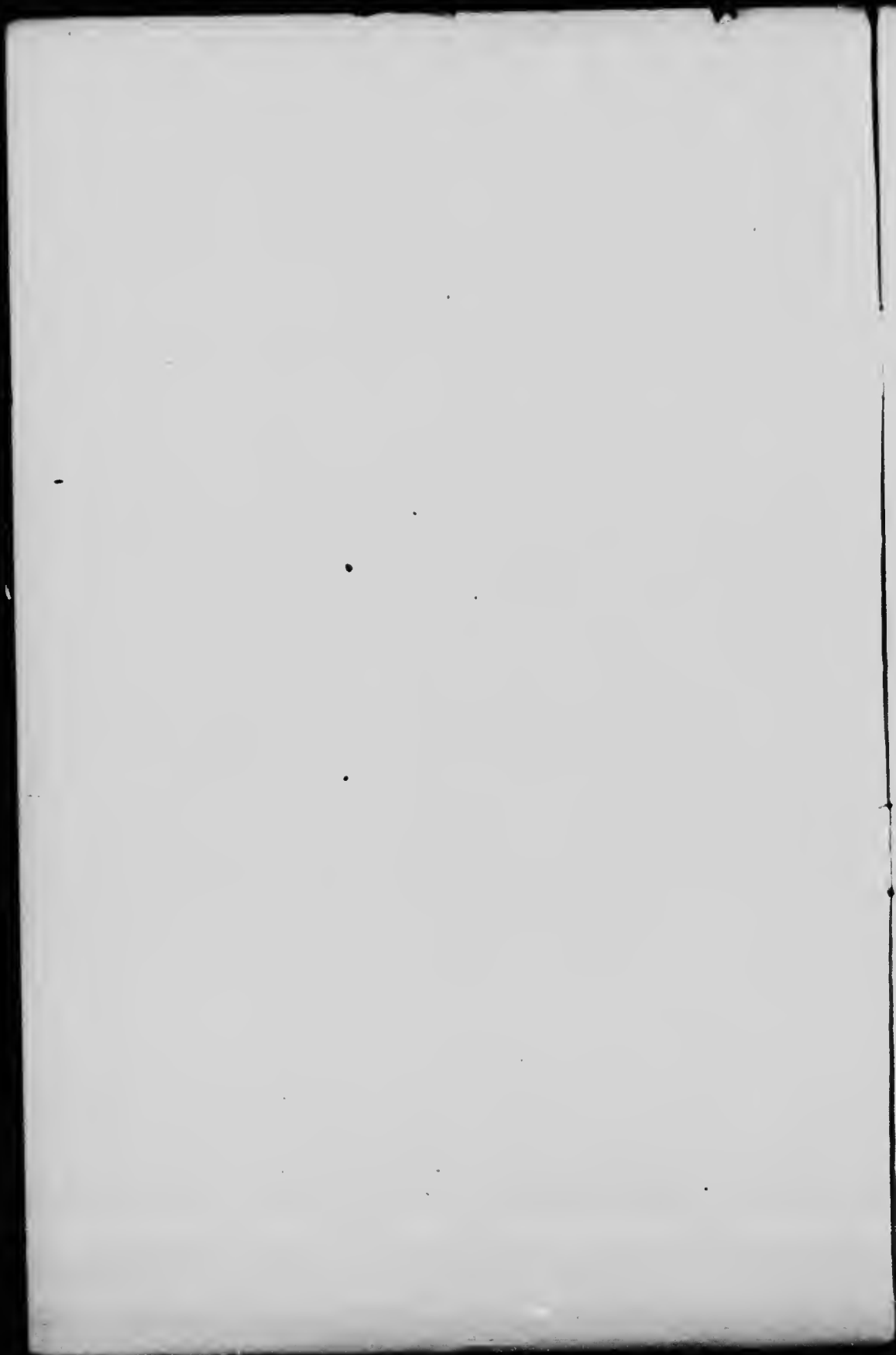
THE PERCENTAGE OF WATER  
IN  
CANADIAN CREAMERY BUTTER

BY  
FRANK T. SHUTT, M.A., F.I.C.,  
Chemist, Dominion Experimental Farms.

NEW SERIES—No. 4.

PUBLISHED BY DIRECTION OF THE HON. SYDNEY A. FISHER, MINISTER OF AGRICULTURE.  
DECEMBER, 1902.

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DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

COMMISSIONER'S BRANCH

The Percentage of Water in Canadian Creamery Butter.

By FRANK T. SHUTT, M.A., F.I.C.,

*Chemist, Dominion Experimental Farms.*

The genuineness and purity of Canadian Creamery Butter have never, we believe, been called in question. In view, however, of the fact that quite recently a new enactment has been made in England (where a large quantity of Canadian butter is sold and consumed), fixing the limit for the water-content of the butters to be accounted legally genuine at 16 per cent., it has been thought desirable to ascertain the percentage of moisture in a number of samples taken at creameries throughout the Dominion from butters as ready for the final export package. The passage of this Act was occasioned by the presence on the English market of certain butters, not Canadian, which had been made under conditions (churning and washing at high temperatures, salting with hot brine, &c.) resulting in the incorporation of an amount of water frequently far in excess of the limit here stated.

To obtain these samples of Canadian butters, the following instructions were prepared by Mr. J. A. Ruddick, Chief of the Dairy Division, and the writer, and forwarded to creameries in various parts of the Dominion:

"Fill a (half-pint or one pint) clean, dry 'gem' jar with a sample of the butter being worked and as it is ready for the final package. Screw on the lid, first seeing that the rubber washer is in place, and label the jar with the name of the creamery and buttermaker, and the date of churning. Two samples taken a week apart may be sent from each creamery, the first to be held until the second is ready, and both forwarded together. Pack the jars with Excelsior, or some other suitable material, in a light wooden box, and forward by express to Mr. J. A. Ruddick, Department of Agriculture, Ottawa. Mark each package on the outside—'Butter for Analysis.'"

Blank forms were also sent upon which particulars as to the temperatures and other details of manufacture could be entered and returned with the samples. It was thought that such data might possibly show the effect of temperature on water-content and explain any abnormal results that might be obtained.

In addition to the butters received in response to this circular, 30 samples were taken by the Official Referee of Butter and Cheese, at Montreal, from packages ready for export. The data of these latter samples would enable us to ascertain with what degree of accuracy the

percentage of moisture could, be learnt from mere inspection. In all, 105 samples of Canadian Creamery Butter were submitted to analysis in the Experimental Farms Laboratories.

#### SAMPLING AND METHOD OF ANALYSIS.

The samples as collected at the creameries may be taken as representing the butter as packed for export; those collected at Montreal, butters already on their way to the English market.

To avoid errors from possible lack of uniformity throughout the mass, the whole sample as received was melted at a low temperature till the butter assumed a semi-fluid or plastic condition. It was then thoroughly stirred until homogeneous, and a sample at once removed, placed on the absorbent asbestos, and weighed. From three to four grammes were taken in each case.

The drying tubes were of glass,  $1\frac{1}{2}$  inches in diameter and  $2\frac{1}{2}$  inches in length open at both ends, but constricted during the lower fourth to an orifice of about  $\frac{1}{8}$  inch. These were loosely packed with asbestos wool to a depth of, say  $\frac{3}{4}$  inch, on the top of which was placed a further wad of asbestos. The tubes with their asbestos were dried in the steam bath during the night previous to use—about 15 hours.

The cooled tube was weighed directly from the desiccator, the upper wad of asbestos carefully removed with the forceps, the semi-fluid butter placed on the lower bed of asbestos, and covered by the replacement of the asbestos wad, and the whole immediately weighed. The drying was accomplished in a steam oven which had a temperature of  $96^{\circ}\text{C.}$  to  $98^{\circ}\text{C.}$ , and through which a current of air constantly passed. The tubes were placed on racks in the oven and the drying continued for a uniform period of 20 hours. By direct experiment it was found that under these conditions all the moisture in the butter was evaporated and that there was no increase in weight due to oxidation of the fat.

Of the 105 samples analysed, 6 were from creameries in Prince Edward Island, 2 from New Brunswick, 15 from Quebec, 26 from Ontario, 26 from the North-west Territories, and 30 from warehouses at Montreal. With one or two exceptions, these butters were all manufactured in July or August.

All were in excellent condition and of first-class quality when received. The analysis was made immediately on arrival of the butter at the Laboratory. In the following particulars the data as regards moisture-content of both series have been summarized:

#### RANGE OF WATER-CONTENT.

Percentage of Water.			Number of Samples.
Between 7 and 8	..	..	1
8 " 9	..	..	1
9 " 10	..	..	4
10 " 11	..	..	15
11 " 12	..	..	24
12 " 13	..	..	23
13 " 14	..	..	24
14 " 15	..	..	10
15 " 16	..	..	2
16 " 17	..	..	1
Total	..	..	105



## AVERAGE PERCENT OF WATER.

In samples from creameries (75).....	12.10
In samples taken at warehouse (30).....	12.69
In 105 samples.....	12.31

## MAXIMUM AND MINIMUM.

	Maximum.	Minimum.
In samples from creameries .....	16.77%	8.92%
In samples taken at warehouse.....	15.37	7.94

The fact that of 105 samples only two show more than 15% water, that only one exceeds 16%, and that nine-two fall below 14%, is fairly conclusive evidence that Canadian Creamery Butter is well within the limit allowed by the English law. Indeed, Canadian Creamery Butter would appear to be drier than much of the butter made in Europe and which finds its way to the English market. This latter statement receives corroboration from a comparison of the averages we obtained with the following, taken from the recent Report of the Departmental Committee on Butter Regulations (England, 1902):—

## PERCENTAGE OF WATER IN FOREIGN BUTTERS.

(a)—Danish: average of 2,001 samples, summer.....	14.03%
“ “ 1,930 “ winter.....	14.41
(b)—Danish: average in 1889-1892, 1,288 samples.....	14.58
“ “ 1887-1900, 8,314 “.....	13.97
(c)—Swedish: average in 1894-1900, 8,340 samples....	13.57
(d)—Irish: Munster Dairy School, average, 52 samples..	14.06
“ Estate No. 1 “ 23 “ ..	12.74
“ Co-operative Dairy 5 “ ..	14.32
“ Tenant Farmer No. 1 21 “ ..	14.61
(e)—Irish: yearly average, 1896, 131 samples.....	13.93
“ “ 1897, 329 “ ..	14.31
“ “ 1898, 298 “ ..	14.42
“ “ 1899, 552 “ ..	14.24
“ “ 1900, 615 “ ..	14.11

(a) Amount of moisture found in Danish butter, handed in by Mr. Bannister.

(b) Amount of moisture found in Danish butter, handed in by Mr. Harald Faber.

(c) Amount of water in Swedish butter (creamery), from tables supplied by the Swedish Agricultural Agent in England.

(d) Amount of water in certain Irish butters, from data supplied by Beamish, Harrington & Forrest.

(e) Amount of water in Irish butters, handed in by Dr. Gissel.

## RELATION OF MOISTURE-CONTENT TO INSPECTION RATING.

The *appearance* of a butter as sampled, affords, generally speaking, no criterion as to its moisture-content. Many of those reported as “dry” contain more than the average amount of water; while several returned as

\* *NOTE*.—It is worthy of remark that this butter was churned above 60° F. and that the washing temperature was 64° F., unusually high temperatures in Canadian creamery practice.

“moist” and “very moist,” show on analysis the lowest percentages. It seems quite possible, under certain circumstances, to incorporate a considerable amount of water without making its presence noticeable, and, on the other hand, the physical condition of a butter may be such that a small percentage of moisture shows in “heads” and “tears” dripping readily from the trier.

#### CANADA'S TRADE IN EXPORT BUTTER.

Canada's export trade in creamery butter to England has increased very rapidly of recent years. Thus in 1895 it was valued at \$697,476, last year (1902) it was valued at \$5,660,541. Nor are we to suppose that our present export in butter, large as it is, marks the extent to which this trade can be developed. England can consume more of our butter, and Canada can increase her production. There exists in the Dominion of Canada the very best conditions for the making of first-class butter. In climate, soil, foders and water we have natural factors unsurpassed for dairying in any other country; in skilled workmen, well equipped creameries and excellent cold storage facilities we have the acquired factors conducive to a manufactured article of the first quality. By these means and an honest endeavour to produce and sell nothing but the best, Canada has won an enviable reputation in the English market for her butter—a reputation she will be jealous to guard.

