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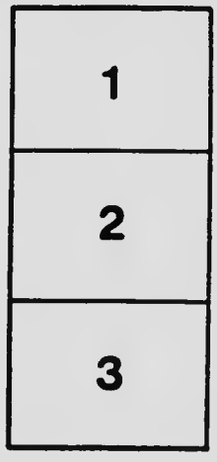

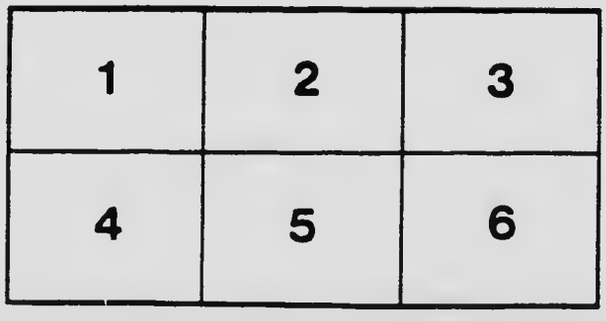

LABORATORY

OF THE

INLAND REVENUE DEPARTMENT

BULLETIN No. 98.

WHEATEN FLOUR

OTTAWA, July 22, 1904.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—During the months of January and February last, samples of wheaten flour were obtained in all the collection districts of the Dominion as required in your letter of January 14, 1904. These are described in the statement, Table I appended to this report from which it will be seen that the number of samples collected in the various districts was as follows:—

Halifax	8
Prince Edward Island	2
New Brunswick	6
Quebec	13
Montreal	12
Kingston	7
Toronto	8
London	7
Winnipeg	4
Calgary	2
British Columbia	6
Total	75

The results of testing these samples are given in Table I which also contains all the information obtained by the food inspectors as regards the designations of the various brands, and the names of the manufacturers or furnishers. Many of the samples were simply sold as 'flour,' and it is quite possible that the manufacturers names as given by the vendors may not be accurate. Besides the descriptions of the 75 purchased samples there have also been introduced into the table the results of examining 7 standard samples of flour obtained from the Secretary of the Board of Trade, Montreal, as well as of 4 samples of their regular brands furnished by the Lake of the Woods Milling Co. These will be found useful for purposes of comparison, and perhaps afford a means of ascertaining whether any of the samples collected in the open market are of abnormal quality.

The characters possessed by the samples are detailed in the various columns of Table I and under the following numbers:—1. Total nitrogen; 2. wheat proteids; 3, 4 and 5. gluten; 6, 7 and 8. degree of fineness as shown by bolting; 9. acidity; 10. Total ash; 11, ratio of proteids to dry gluten. It will thus be seen that, besides being chemically examined, all the samples were subjected to some of the practical tests known

to millers. Regarding the value of the results stated in Table I the following remarks may be made.

In no case of the purchased samples does the ash exceed 0·85 per cent, and the highest ash of the Montreal standard samples is 0·82 per cent. This demonstrates that there is no such thing practiced in Canada as the addition of inorganic substances to wheaten flour, and disproves most effectually the absurd rumour occasionally heard that very white and very finely ground gypsum is sometimes used for adulterating flour.

No indication has been found of the admixture in these samples of flour from any other or lower priced grain. Such an addition would in the case of maize flour be economically possible, but would result in lowering the quantity of gluten yielded by the sample. All those samples in which the percentage of dry gluten was less than 10 or in which the ratio of dry gluten to proteids was less than 1·2 to 1 have however been examined under the microscope without the discovery of any foreign starch. The number of samples so examined amounts to 37 and it was thought quite unnecessary to examine the others. It is therefore safe to conclude that no suspicion of adulteration by foreign grain attaches to any sample of Canadian flour.

The fineness of the various samples is indicated in columns 6, 7 and 8, which show the results of the bolting test. The quantity remaining on the bolting cloths Nos. 10 and 12 indicates the coarser particles present which no doubt, when the flour is made into dough, require a somewhat longer time to take up the necessary quantity of water. It may here be mentioned that no attempt has been made to determine the degree of whiteness of the various samples. The differences are so extremely slight that Lovibonds Tintometer was found useless for the purpose. The finest product in bolting is usually a shade lighter in colour than that collected between No. 10 and 12 bolting cloths, but it was not considered of sufficient importance to attempt to record this in the case of each sample.

It is generally supposed that the value of wheaten flour for breadmaking purposes depends on the quantity and elasticity of the gluten which it contains. As regards quantity it would appear that flours are on sale in Canada which give widely different percentages on being subjected to the gluten test. The columns 3, 4 and 5 give the results yielded by this process, which consists in making up 25 grammes of flour with as much water as is necessary to make a ball of stiff dough. This is then allowed to rest half an hour in order that the flour particles may be completely permeated by the water. The ball is then kneaded by the fingers over a fine hair sieve and under a stream of tepid water, until all the starch is removed and the water passes off perfectly clear, when the crude or wet gluten remains, brown coloured, soft and more or less elastic. The latter quality should be noted, although there is no precise means of expressing the degree of elasticity. After all excess of water has been squeezed out of the crude gluten it is made to assume the form of a thin round cake, and weighed in the moist condition. It is afterwards dried in the water bath at 98°C, and the loss of water calculated on the wet or crude gluten. The three results for each sample were thus obtained, which are recorded in Table I. With reference to the percentage of water in the crude gluten, it has been said that it is highest in the flours best adapted for breadmaking, and that the water in glutens from first class flours amounts to 70 p.c., while the medium grades yield glutens containing only 62 to 65 p.c.* These statements are not supported by the numbers given under columns 3, 4 and 5, because none of the crude glutens from the standard samples contain more than 64·6 p.c. water and none of the collected samples yield a gluten with more than 69·8 p.c. The percentages of dry gluten yielded by the Montreal standard samples range from 15·64 to 8·08 per cent. Among the collected samples are some whose dry gluten is beyond these limits. Although consisting essentially of the proteids of the flour, the quantity of dry gluten does not correspond to that of the proteids calculated from the nitrogen percentage given in column 2 of Table I., but is usually much higher. It contains, besides proteids, small quantities of fat, fibre and other substances.

As regards the quality of the various samples a wide variation is also fundamentally exhibited in the percentages of nitrogen given in column 1, which range from 2·23

* Observations on flours. Balland; Journal of the Society of Chemical Industry, 1895, p. 379.

down to 1·15 per cent. It will be seen that, in calculating the proteids in column 2 from the nitrogen, 5·7 has been substituted for the old factor 6·25. This has been done in deference to the investigations of Osborne & Voorhees, and the practice of Prof. Snyder. Instead of 16, the old percentage of nitrogen which all vegetable proteids and animal albumenoids were assumed to contain, glutenin and gliadin, the chief nitrogenous constituents of wheat, contain respectively 17·49 and 17·66 per cent. The corresponding factors for converting the nitrogen into the proteids would be 5·72 and 5·66. In his recent paper on the determination of gliadin* Professor Snyder adopts 5·7 as the factor for the total proteids, which practice it will be convenient to follow in regard to all the different proteids of wheaten flour. From column 2 it will be seen that the wheat proteids contained in the purchased samples vary from 12·71 down to 6·56 per cent, which means that some flours contain twice as much as do others of these valuable flesh and blood forming substances. Among the Montreal standards the proteids range from 10·69 to 7·34 per cent, and it appears that, out of the 75 collected samples, 16 have percentages outside of these limits. Ten are above 10·69 per cent in wheat proteids and six are below 7·34. It will be seen later that some of these have been subjected to a closer chemical examination.

The names given to the Montreal standards must not be taken as affording any indication of the origin of the wheats which yielded the flours. These may come from the winter-grown grain of Ontario, or the hard varieties of Manitoba or may be from mixtures of both. Neither is there anything in the designations of the purchased samples to show from what variety of wheat they are derived. It appears that there is no such thing in these modern times as grinding the whole of any particular lot of grain into flour, shorts and bran. Much more frequently flour is obtained from a mixture of different varieties of wheat, and different grades of flour may be obtained from the one mixture. The art of milling has been revolutionized and its operations are difficult to follow.

It has already been mentioned and will be seen from Table I that the percentage of dry gluten is invariably higher than that of the wheat proteids. This is not surprising, for an average sample of dry gluten consisting of a number of cakes from different flours ground up together was found to contain only 12·40 per cent of nitrogen which corresponds to 70·68 per cent of wheat proteids, or what Jago has called "true gluten." If in the gluten test there were no loss of nitrogenous substances the ratio of proteids to dry gluten would therefore be about 1 : 1·43. This figure is actually reached in the case of "Strong Bakers'" among the Montreal standards and in two brands among the flours made by the Lake of the Woods Milling Co., as will be seen on consulting column 1 of Table I. Among the samples taken in the open market this ratio varies from 1 : 0·82, but it would be wrong to assume that the lower a flour is in the of proteids, the lower will be the relative quantity of dry gluten which the ...s. There are flours entered in the table in which the percentage of wheat p... ...s about 8 and the proportion of these to dry gluten is 1 : 1·39. On the other hand there are samples with about 11 per cent true gluten in which the ratio in question is as 1 is to 1·12. This ratio would appear however to be of value for indicating the physical character of the gluten in a flour, independently altogether of its percentage. The following quotation from †Jago will help to explain this matter. 'The value of estimations of true gluten as a check on those of crude gluten has already been indicated, but they have also an additional importance. Suppose, for example, two flours each yield 35 per cent of wet gluten. One is hard, elastic and springy, while the other is soft and flabby, and causes the washing water to become 'lathery'. It will at once be said that the former is the higher quality gluten of the two, and quite correctly; but, further, the results would be entered that each yielded the same quantity of gluten. This latter deduction is not all the truth, for in the former case hardness of the gluten will have permitted most of the starch to be entirely eliminated with the least possible loss of real gluten constituents. In the second instance the gluten will have begun to wash away while yet there is a considerable quantity of starch remaining.' It would,

*Science and Art of Breadmaking, 1895, p. 514. †Journal of the American Chemical Society, xxvi, p. 26.

therefore, seem reasonable to conclude that the higher the proportion of dry gluten to the wheat proteids or true gluten, the greater is the "strength" of the flour, the firmer the gluten and the less its liability to lose proteids in the washing.

Of late years some authorities have come to the conclusion that a determination of the gliadin in flour is one of much importance. As long ago as 1898, Dr. Emile Fleurent* wrote thus on the subject:—'The gluten of wheaten flour consists of a mixture of two principal products, the one glutenin, a pulverulent matter; the other gliadin, a viscous sticky flowing substance. It is according to the relative proportions in which these two substances enter into the constitution of different glutens that the latter owe their greater or lesser degree of elasticity and the irregular manner in which they behave during the process of fermentation and baking. A gluten very rich in glutenin is dry and short, it does not rise easily and gives after baking a compact mass; a gluten too rich in gliadin behaves well during fermentation because it is soft and yielding, but, in baking the gliadin dissolves before coagulating, the gaseous products escape, the dough spreads itself and collapses forming a scarcely porous mass and giving the appearance of badly raised bread.' Allen* states that "so far as known, wheat is the only seed the flour of which yields a tough elastic gluten-mass on treatment with water. It is the gliadin which imparts to wheat-flour the property of forming a stiff, elastic dough, capable of retaining vesicles of gas, and thus producing a light and porous loaf.' Not only from a scientific point of view has a determination of the gliadin in wheaten flour been thought desirable but practical millers in the United States have deemed the matter to be worthy of attention and have endeavoured to ascertain the percentage of this proteid in the wheat they purchase and the flours they manufacture. Reference has already been made to Prof. Snyder's process for this purpose. On the other hand doubts have been expressed as to the utility of such a determination, and, in a very recent article on flour†, Hans Stein, a millowner in Silesia remarks that Fleurents method of separating gluten into its constituents had led to no comprehensible results. Nevertheless from the point of view of the ordinary miller and consumer it seems desirable to attempt the estimation of gliadin and to make closer analyses of wheaten flour for the purpose of ascertaining the essential differences in the qualities of the various flours found on the market, and the value of the names attached to the samples which are each year put forward as standards by the representatives of the grain trade.

It was found impossible to subject all the samples collected to this closer examination but a selection was made from among the samples described in Table I, and the results of their analysis are given in Table II, most of the work connected with which was done by Miss S. E. Wright. The headings in this table explain themselves for the most part, but it seems necessary to describe briefly the manner of operating, and explain how the results tabled under Alcohol Extract were obtained. In order thoroughly to expose the particles of flour to the action of the various solvents, it was distributed through crysotile fibre (Canadian asbestos) placed in so-called Macfarlane tubes which had previously been furnished with a filtering bed. The tube used has a total depth of 75 mm. of which 15 mm. are occupied by the tubulature at the bottom. The body of the tube is 60 mm. long with an outside diameter of 40 mm. A small piece of fine wire gauze is placed over the tubulature and upon this a small quantity of crysolite fibre. Over this a fine filtering bed is laid by pouring into the tube, placed over the water pump, a small quantity of pulp made of hornblendic asbestos, similar to that used for the Gooch crucible. The rest of the tube is filled up with crysotile fibre, through which the flour submitted to analysis is distributed. After drying and extracting with petrolic ether, the tubes are treated in the extraction apparatus with alcohol of 60 per cent by volume. In this as in the fat extraction, the solvent is boiled on a plate heated electrically, and thus all danger from the breaking of a flask and the inflammability of the solvents avoided. On boiling the 60 per cent alcohol in the lower flask it returns from the condenser of a strength varying from 80 to 85 per cent by volume and percolates the tubes. The extraction is completed in seven hours, but it has some-

* Manuel d'Analyse Chimique, p 310.

* Organic Analysis IV, p 75. † Zeitschrift für Untersuchung der Nahrungs und genussmittel, 1904, p 730.

times been found convenient to start it at night and allow it to continue till morning unattended, which can be done without danger. Two tubes are extracted together each containing 2½ grammes, and, by drying and weighing these, the loss sustained by the flour is ascertained. The extract from these 5 grammes is deprived of its alcohol, and then divided into equal parts, one of which is used for determining the nitrogen by the Kjeldahl method, and the other for the estimation of the sugars. The sum of these determinations subtracted from the loss sustained by the flour gives the amount of non-nitrogenous substances extracted by the alcohol. The gliadin in the alcohol extract is ascertained on multiplying its nitrogen by 5·7. On deducting the gliadin from the total proteids the quantity present is ascertained of glutenin and other proteids insoluble in alcohol. From the relative quantities of total proteids and gliadin the figures given in the last column are obtained. How far this percentage of gliadin in the total proteids has any practical value cannot at present be decided. Among some of the collected flours it is as low as 28 per cent, but it has to be remembered that some of these were selected for closer examination because of their abnormal characters in other respects.

It may be stated that the average sample of dried gluten referred to above was subjected to the same examination as the samples in Table II and gave the following results :—

	Per-centage.
Total nitrogen	
" proteids (N + 5·7)	12·40
Moisture	70·68
Fat	3·68
Alcohol extract, containing—	0·36
Reducing sugar stated as dextrose	0·43
Sugar after inversion stated as sucrose	0·41
Gliadin (N of alcohol extract x 5·7)	5·52
Non-nitrogenous substances	7·92
Water extract	2·72
Glutenin and other proteids insoluble in alcohol	65·15
Total ash	2·72
Starch and fibre (by difference)	11·09
	100·00

These results were confirmed by an experiment made on crude or wet gluten. From this it appears that dry gluten contains on the average only 70·68 p.c. of proteids and that of these only 5·52 parts are soluble in alcohol. Since the proteids in wheat flour contain from 32 to 58 p.c. of gliadin or alcohol soluble proteid, it would appear that in the gluten test a considerable percentage must be carried away by the water. If the proteids in the dry gluten operated on had contained say 45 p.c. of gliadin then 31·95 p.c. of the gluten should have been extracted by alcohol ; whereas the total alcohol extract is only 14·28 and of this only 5·52 is gliadin. It may, however, be the case, as has been maintained by other observers, that gluten as such does not preexist in flour, or that its constituents enter into a state of more intimate combination under the influence of water when the flour comes to be made into dough.

The present report is to be regarded as the first contribution from this laboratory on the analysis of flour. Unfortunately I am at present unable to say with certainty in what respects all the results now submitted coincide with or illustrate points in the miller's practical experience. I hope, however, that this report, if published, may attract the attention of practical men, and that I may hereafter have an opportunity of consulting with them and possibly of reaching more definite conclusions.

I have the honour to be, Sir, your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

INSPECTION OF WHEATEN FLOUR—

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher as given by Vendor.
				Quantity.	Price.	
1903.	*Halifax District.*			Lbs.	Cts.	
Jan. 27	Splendid Brand. ..	20422	D. Wood, Windsor, N.S.	4½	15	Delong & Lamen, Boston, Mass.
" 27	.....	20424	Graham & Co., Windsor.	.... ..	.....	Flavelle Milling Co., London, Ont.
" 27	.....	20426	Murphy & DeMont, Windsor.	.....	.....	Wolverston Milling Co., Ont.
" 27	Sunbeam	20432	Brown & Graham, Halifax.	.....	.. .	Not stated.....
" 27	.....	20434	R. T. Forristall, Halifax.	....	14	Ratz Bros., Ont.....
" 27	Golden Crown.. . .	20438	M. J. Hopgood " ..	.....	... .	Wood Bros., Ont.. ..
" 27	Halifax.....	20440	Burgess & Quinn " ..	.....	.....	Kent Milling Co., Ont.. .
" 27	Queen City	20442	H. W. Wentzell & Co., Halifax.	..... .	....	A. Campbell, Toronto Junction.
	Prince Edward Island District.					
" 26	Wheat Flour....	24402	Bur & Goff, Charlottetown.	1½	5	Tilson & Co..... .. ..
" 27	"	24406	Brace & McKay, Summerside.	.....	4	Brock Milling Co.. ...
	New Brunswick District.					
Jan. 23	Wheat Flour— 'Golden Star'.....	23807	W. F. Campbell, 16 Germain St., St. John.	3	10	Jas. Goldie, Waterloo, Ont.
" 23	'Royal Household'.	23808	J. F. Shaw, cor. Waterloo and Golding Sts., St. John.	1½	6	Ogilvie Milling Co., Montreal.
" 28	Family flour— 'White Satin'.....	23813	The (2) Barkers, Ltd., 287 Main St.. Moncton.	1½	10	Jas. Cullen, Woodstock. Ont.
" 28	'Five Roses'..... (Pastry Flour)	23814	John O'Neil, Main St., Moncton, N.B.	1½	10	Lake of the Wood Milling Co., Keewatin.
Feb. 4	Home Trade.. . . (Pastry Flour)	23818	Hughes & Maxwelle. King St., St. Stephen, N.B.	1½	10	Rolph Smith & Co., Toronto, Ont.
" 5	Harvest Moon.... . (Pastry Flour)	23821	John McKnight, Regent St., Fredericton.	....	.....	A. F. Randolph & Sons, Fredericton.
	Quebec District.					
Jan. 25	Wheat Flour...	23651	Aug. Beausoleil, Terrebonne.	1½	5	H. P. Labelle, Montreal.
" 26	"	23653	J. J. Sounis, Joliette..	1½	5	The Alexander Brown Milling Co.
" 27	"	23659	Paquette Frères, Berthierville.	1½	6	Z. Boulanger, Berthierville.

TABULATED STATEMENT, I.

Results of Examination.												
		Gluten.			Bolting.							
1 Total Nitrogen.	2 Wheat Proteids N × 5·7.	3 Crude.	4 Dry.	5 Water in crude.	6 Coarser than No. 10.	7 Between 10 and 12.	8 Finer than 12.	9 Acidity, stated as Lactic Acid.	10 Total Ash.	11 Ratio of Proteids to Dry Gluten.	No. of Sample.	Name of Analyst.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
1·68	9·58	29·50	11·33	66·96	0·19	1·32	98·27	0·108	0.44	1:1·23	20422	J. G. A. Valin.
1·89	10·77	24·14	·84	63·3	0·15	12·49	78·68	0·094	0·26	1:0·82	20424	" W starch only · Lemoine.
1·40	7·98	23·11	7·86	65·98	0·20	6·50	87·01	0·101	0 68	1:0·98	20426	J. G. A. Valin; w·· starch only; A. Lemoine.
1·48	8·44	29 99	11·40	61 92	0·68	6 76	86·72	0·072	0·52	1:1·35	20432	J. G. A. Valin.
1·61	9·17	34·57	13·01	62·36	0·07	7·20	85·54	0·072	0·36	1:1·41	20434	"
1·47	8·38	23·31	8·34	64·22	0·08	12·83	80·08	0·108	0·40	1:0·99	20436	" wheat starch only; A. Lemoine.
1·54	8·78	28·29	9·85	65·01	0·27	6·26	84·52	0·115	0·48	1:1·12	20440	" "
1·54	8·78	28·93	11·08	64·17	0·17	9·89	80·92	0·130	0 84	1:1·26	20442	J G. A. Valin.
1·47	8·37	25·68	8·40	67·29	0·16	0·27	97·32	0·101	0·11	1:1·01	24402	Miss E. Davidson; wheat starch only, A. Lemoine.
1·40	7·98	26·54	8·92	66 39	0·24	1·00	97·72	0·129	0·11	1:1·12	24406	" "
1·15	6·56	23·67	8·62	63·59	0·32	2·51	96·43	0·108	0 11	1:1·31	·407	" "
1·88	10·72	38·07	12·70	66·64	0·36	6·35	92·37	0·122	0·05	1:1·18	23808	Miss E. Davidson.
1·40	7·98	28·32	9·52	66·38	0·08	4·0	96	0·123	0	1:1 19	23813	" wheat starch only; A. Lemoine.
1·71	9·75	33.59	11·97	64·33	0·76	12·00	86·00	0·094	0·16	1:1·23	23814	Miss E. Davidson.
1·55	8·84	29·07	9·74	66·49	0·08	3·84	95·60	0 108	0·14	1:1·10	23818	" wheat starch only; A. Lemoine.
1·55	8·84	29·37	9·55	67·48	0·18	4·61	92·40	0 101	0·10	1:1·08	23821	" "
1·51	8·60	25·72	10·21	60·30	0·10	2·02	96·02	0·158	0·52	1:1·18	23651	J. G A. Valin; wheat starch only; A. Lemoine.
1·15	6·56	19·56	6·60	66·25	0·04	1·04	98·54	0·108	0 02	1:1·00	23653	" "
1·43	8·15	27·45	9·90	63·93	0·04	14·40	84·96	0·194	0·08	1:1·21	23669	J. G. A. Valin.

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost. Quantity.	Cost. Value.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1904.	*Quebec District*—Con.			Lbs.	Cts.	
Jan. 27	Wheat Flour.....	23661	L. J. Giroux & Cie.....	1½	5	Z. Boulanger, Berthierville.
" 28	"	23663	Thos. Bournival, Trois Rivières.	1½	3	David Murphy, Montreal
" 29	"	23670	L. Gingras, 304 Richilieu, Quebec.	.....	9	Poitras & Paradis, Que..
" 29	"	23672	S. Hamel, 106 D'Aiguillon St., Que.	.....	5	J. B. Renaud et Cie., Quebec.
" 29	"	23675	Mrs. F. Coveny, 2 St. Patrick St., Que.	.....	5	D. Z. Drolet, Quebec....
" 29	Stockwell's Patent....	23677	H. G. Kell, 80 St. Augustin.	.....	.....	.....
Feb. 4	"	23679	E. Lafontaine, Drummondville.	1½	4	Lake of the Woods Milling Co., Montreal.
" 4	"	23683	Oscar Piché, Drummondville.	.....	5	E. Lafontaine, Drummondville.
" 5	"	23684	Deners & Lorange, Notre Dame of St. Hyacinthe	.....	4	S. Papillon, Notre Dame of St. Hyacinthe.
" 5	" ...	23685	Gustave Jeannotte, St. Joseph de St. Hyacinthe.	3	13	Viau Frères, St. Hyacinthe.
	Montreal District.					
	Wheat flour—					
Jan. 10	'Champion'.....	23184	A. Fournier, 1789 St. Catherine St.	2	6	.....
" 20	'Ocean Brand'.....	23185	C. E. Authier, 1758 St. Catherine St.	1½	6	.....
" 20	'Patent'.....	23186	A. Mercier, 498 Dorchester St.	.....	5	.....
" 20	'First Prize'.....	23187	L. G. Thouin, 487 Lagauchetierre St.	2	6	.....
" 21	.....	23188	M. F. Lafortune, 116 St. Maurice St.	1½	6	Laporte, Martin & Co...
" 21	'Champion'.....	23189	Pilons & Meilleur, 114 St. Maurice St.	.....	5	.....
" 21	.....	23190	A. Lamy, 2021 Notre Dam St.	.....	.....	Magor Bros. & Co.. ....
" 21	.....	23191	Joseph Deneau, 53 Juror St.	.....	.....	Howe, McIntyre & Co ..
" 22	.....	23192	A. Massicotte & Co., 1472 St. Catherine St.	.....	6	C. Roy, Montreal. ...
" 22	Eagle Brand.	23193	T. Bergeron, 1522 St. Catherine St	.....	.....	.....
" 22	'White Bread' Brand.	23194	C. Coderre, 1358 Notre Dame St.	.....	.....	.....
22	'Bijou'.....	23195	G. St. Pierre, 1350 Notre Dame St.	.....	.....	.....

TABULATED STATEMENT, I—*Continued.*

Results of Examination.											Number of Sample.	Observations.
		Gluten.			Bolting.							
1 Total Nitrogen.	2 Wheat Proteids N × 5·7.	3 Crude.	4 Dry.	5 Water in Crude.	6 Coarser than No. 10.	7 Between 10 and 12.	8 Finer than 12.	9 Acidity, stated as Lactic Acid.	10 Total Ash.	11 Ratio of Proteids to Dry Gluten.		
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
1·61	9·17	27·28	11·27	59·43	0·04	1·28	98·57	0·100	0·30	1:1·22	23661	J. G. A. Valin.
1·41	8·04	24·64	8·87	64·00	0·02	3·10	94·13	0·130	0·10	1:1·10	23663	" wheat starch only; A. Lemoine.
1·40	7·98	25·30	9·34	60·30	0·08	4·30	94·20	0·122	0·46	1.1·17	23670	" "
1·53	8·72	27·42	10·40	62·07	0·02	1·68	97·82	0·158	0·32	1:1·19	23672	" "
1·47	8·38	27·27	9·32	65·82	0·01	1·25	98·16	0·137	0·10	1:1·11	23675	" "
1·51	8·60	25·92	9·97	61·52	0·00	1·00	98·32	0·072	0·40	1:1·15	23677	" "
1·55	8·84	28·50	11·26	60·49	0·00	3·52	95·57	0·158	0·60	1:1·27	23679	J. G. A. Valin.
1·40	7·98	24·72	11·08	59·59	0·08	2·75	96·44	0·100	0·10	1:1·38	23683	"
2·07	11·80	31·48	12·83	59·24	0·46	13·68	85·72	0·120	0·12	1:1·08	23684	" wheat starch only; A. Lemoine.
.....	.....	.....	.....	.....	.....	...	. ..	.....	.....	... .	23685	This sample was not tested, being a self-raising flour.
1·316	7·50	28·08	9·98	.....	0·02	0·91	98·82	0·158	0·36	1:1·33	23184	Miss S. E. Wright.
1·365	7·78	29·45	10·85	.....	0·08	1·84	97·48	0·122	0·44	1:1·39	23185	"
1·351	7·70	25·20	8·61	.....	0·03	2·93	96·77	1·130	0·12	1:1·12	23186	" wheat starch only, A. Lemoine.
1·386	7·90	26·77	10·05	... .	0·60	6·32	92·55	0·137	0·22	1:1·26	23187	Miss S. E. Wright.
1·40	7·98	23·56	7·84	66·7	0·12	2·95	undet.	0.101	0·40	1:0·98	23188	Miss E. Davidson; wheat starch only; A. Lemoine.
1·62	9·24	31·58	10·49	66·7	0·05	1·71	"	0·129	0·28	1:1·13	23189	" "
1·51	8·61	32·99	9·94	69·8	0·04	2·60	"	0·129	0·50	1:1·15	23190	" "
1·61	9·18	29·10	9·70	66·6	0·04	2·61	"	0·101	0·45	1:1·06	23191	" "
1·86	10·60	33·48	11·83	65·7	0·07	7·04	"	0·245	0·85	1:1·11	23192	" "
1·51	8·61	28·58	8·80	69·2	0·06	1·46	"	0·108	0·40	1:1·02	23193	" "
1·54	8·78	29·13	9·78	66·4	0·06	1·18	"	0·101	0·43	1:1·11	23194	" "
1·55	8·84	29·85	9·85	67·0	0·04	0·56	"	0·165	0·45	1:1·12	23195	" "

INSPECTION OF WHEATEN FLOUR—

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost. Quantity.	Cost. Price.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1904.	*Kingston District.*			Lbs.	Cts.	
Jan. 28	Pastry flour	25008	Peter Glavey, 37 York St., Ottawa.	1½	6	
" 28	'Gem'	25009	H. O. Richer, 31 York St., Ottawa.		5	
" 28	"	25010	P. L. Foisy, 297 Dalhousie St., Ottawa.		6	McEvoy & Son
" 29	'C' Brand	25011	A. D. Adams, King St., Brockville.		5	Jas. Cummings, Lyn, Ont.
" 29	'A' "	25012	Wm. Rhodes, King St., Brockville.		4	" "
" 29	Hungarian	25013	T. Brown & Co., King St., Brockville.		5	Ogilvie Milling Co.
" 29	Hunts Beet	25014	" "			Hunt Bros., London.
	Toronto District.					
Feb. 2	Elgin Brand	25030	James Irvine, 552 Queen St. West, Toronto.	1½	5	John Campbell, St. Thomas.
" 2	Monarch	25031	" "	1½	5	Arch. Campbell, Toronto.
" 2	Jubilee	25032	J. Bond, 559 Queen St. West, Toronto.	1½	5	Citizen Milling Co.
" 3	Eagle Brand	25033	A. Janatta & Co., 400 Queen St. W., Toronto.	1½	5	Fairless Milling Co.
" 3	Golden Cream	25034	J. Summer, 306 Queen St. West, Toronto.	1½	5	
" 3	Gold Medal	25035	D. Sutherland, 295 King St. East, Hamilton.	1½	5	Lake & Bailey
" 3	White Rose	25036	F. H. Blain, 87 John St., Hamilton.	1½	5	John Thompson
" 3	Gold Medal	25037	" "	1½	5	Lake & Bailey
	London District.					
Jan. 23	Crest	22186	A. G. Ault, Seaforth	1	3	Seaforth Milling Co., Seaforth.
" 27	'Juliet'	22190	John Byers, Stratford, Ont.	1	3	Stratford Milling Co.
" 28	'Daily Bread'	22192	Webber & Co., Berlin	1	3	Shirk & Snider, Bridgeport, Ont.
" 28	'Maple Leaf'	22196	J. A. McCray, Guelph	1	3	James Goldie, Guelph
" 29	"	22199	Armstrong Bros., Fergus.	1	3	Grand Valley Mills
Feb. 6	"	22202	H. Levins, Seaforth	1	3	H. F. McAllister, Ethel, Ont.
" 6	Three Star	22205	T. J. Vidian, Goderich	1	3	Goderich Milling Co.
	Winnipeg District.					
Feb. 9	Flour	23924	Metcalf & Mitchell, Brandon.	1½	5	Ogilvie Milling Co.
" 10	"	23928	M. R. Shurman, Virden.			Oak Lake Milling Co.

TABULATED STATEMENT, I—*Continued.*

Results of Examination.												
		Gluten.			Bolting.							
Total Nitrogen. 1	Wheat Proteids N × 5·7. 2	Crude. 3	Dry. 4	Water in crude. 5	Coarser than No. 10. 6	Between 10 and 12. 7	Finer than 12. 8	Acidity, stated as Lactic Acid. 9	Total Ash. 10	Ratio of Proteids to Dry Gluten. 11	Number of Sample.	Observations.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
2·23	12·71	42·26	15·86	62·4	0·08	8·00	90·00	0·115	0·67	1:1·25	25008	Miss E. Davidson.
2·21	12·60	43·94	15·18	65·5	0·05	2·85	95·68	0·173	0·67	1:1·20	25009	"
1·75	9·98	34·15	13·08	61·43	0·01	7·32	92·74	0·201	0·54	1:1·31	25010	"
1·73	9·86	36·28	12·67	65·08	0·01	7·22	92·37	0·144	0·42	1:1·28	25011	"
1·43	9·15	31·07	10·29	66·88	0·28	5·28	94·36	0·122	0·42	1:1·26	25012	"
1·75	9·98	37·07	13·94	62·39	0·01	15·64	84·33	0·144	0·32	1:1·39	25013	"
1·63	9·29	33·75	12·79	62·10	0·02	20·44	79·60	0·165	0·52	1:1·37	25014	"
1·34	7·64	30·44	10·30	66·16	0·02	2·96	96·60	0·122	0·64	1:1·34	25030	Miss E. Davidson.
1·33	7·58	20·51	8·76	57.29	0·02	0·42	99·25	0·115	0·58	1:1·16	25031	" wheat starch only; A. Lemoine.
1·40	7·98	29·13	9·96	65·81	0·05	16·64	82·60	0·115	0·48	1:1·25	25032	Miss E. Davidson.
1·26	7·18	22·25	7·38	66·83	0·00	0·75	98·93	0·130	0·64	1:1·03	25033	Alph. Lemoine; no foreign starch.
1·33	7·58	21·24	7·38	65·24	0.02	1·70	97·84	0·100	0·38	1:0·97	25034	" "
1·40	7·08	22·94	7·88	65·60	0·00	1·46	98·18	0·129	0·50	1:0·98	25035	" "
1·19	6·78	20·06	8·44	57·93	0·00	0·44	99·14	0·115	0·48	1:1·24	25036	" "
1·33	7·58	27·47	9 00	67·23	0·00	2·03	97·90	0·108	0·48	1:1·19	25037	" "
1·49	8·49	29·18	9·19	68·50	0.00	0·88	98·89	0·108	0·44	1:1·08	22186	Alph. Lemoine; wheat starch only.
1·44	8.20	28·74	9·33	71·46	0·00	0·82	98·89	0·100	0·48	1:1·37	22190	" "
1·47	8 37	31·12	10·36	66·70	0·00	1·00	98·87	0·108	0·42	1:1·24	22192	Alph. Lemoine; wheat starch only.
1·55	8·86	27·22	9·99	63·29	0·04	5·04	94·56	0·115	0·44	1:1·13	22195	Miss E. Davidson; wheat starch only.
1·67	9·50	33·29	11·82	64·49	0·01	3·28	96·80	0·130	0·50	1:1·24	22199	Miss E. Davidson.
1·57	8·94	31·71	11·39	64·08	0·02	0·68	99·00	0·108	0·42	1:1·17	22202	"
1·97	11·25	40·97	14·89	63·66	0·00	4·44	95·60	0·137	0·38	1:1·32	22205	"
2·02	11·49	42·88	14 81	65.54	0·00	10·16	89·82	0·122	0·42	1:1·29	23924	Miss E. Davidson.
1·93	11·01	34·44	12·34	64·16	0·01	3·58	96·12	0·101	0·36	1:1·12	23928	" wheat starch only; A. Lemoine.

INSPECTION OF WHEATEN FLOUR—

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost. Quantity.	Cost. Price.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1903.	*Winnipeg District*—Con.			Lbs.	Cts.	
Feb. 12	Flour.	23930	Matheson Bros., Winnipeg.			Ogilvie Milling Co..
" 12	"	23933	W. E. Innis, Winnipeg..			Lake of the Woods Milling Co.
	Calgary District.					
Feb. 10	Wheat flour	21777	H. A. Thompson, Strathcona, Alta	1½	5	Edmonton Milling Co., Edmonton
" 10	"	21780	Larue & Picard, Edmonton, Alta	1½	5	The Dowling Milling Co., Edmonton
	British Columbia District.					
Feb. 2	Wheat flour	24921	W. Findlay, Vancouver.	4½	0 15	Hudson Bay Co., Man..
" 5	"	24930	I. A. Edgett & Co., Vancouver..	4½	0 10	Ogilvie, Man.
" 5	"	29431	Dominion Grocery Co., Vancouver..	4½	0 25	D. McLean, Moosejaw Mills
" 8	"	24932	C. G. [illegible]rner, Vanconver	4½	0 15	Columbia Flouring Mills, Ltd., Enderby, B.C.
" 8	"	24933	J. F. May "	4½	0 15	Portland Flouring Mills, Portland, Oregon
" 8	"	24934	E. H. McMillan "	4½	0 25	Lake of the the Woods Milling Co., Keewatin
	Standard samples for the year 1903, obtained from Montreal Board of Trade.					
	Strong baker's					
	Patent spring					
	Superfine					
	Fine					
	Extra					
	Straight roller					
	Patent winter					
	Samples from Lake of the Woods Milling Co.—					
	Medora					
	Strong bakers					
	Five Roses					
	Patent					

TABULATED STATEMENT I—*Concluded.*

Results of Examination.												
		Gluten.			Bolting.							
Total Nitrogen. 1	Wheat Proteids, N × 5·7. 2	Crude. 3	Dry. 4	Water in crude. 5	Coarser than No. 10. 6	Between 10 and 12. 7	Finer than 12. 8	Acidity, stated as Lactic Acid. 9	Total Ash. 10	Ratio of Proteids, to Dry Gluten. 11	No. of Sample.	Name of Analyst.
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
1·96	11·17	39·57	14·41	63·58	0·01	12·88	87·04	0·144	0·50	1:1·29	23930	Miss E. Davi[illegible]
1·88	10·69	36·00	12·97	63·97	0·01	1·67	98·29	0·101	0·40	1:1·21	23933	"
1·652	9·41	39·31	13·27	66·24	0·01	6·73	92·91	0·216	0·68	1:1·41	21777	Miss E. Davidson.
1·630	9·29	29·85	10·52	64·74	0·14	2·12	96·60	0·151	0·48	1:1·13	21780	"
1·680	9·58	35·12	12·62	64·06	0·00	3·94	96·01	0·108	0·46	1:1·31	24921	"
1·969	11·17	44·79	15·70	64·94	0·08	9·70	90·20	0·144	0·48	1:1·40	24930	"
1·036	5·91	22·50	7·79	65·38	0·01	0·89	98·69	0·115	0·46	1:1·32	24931	"
1·740	9·92	39·86	13·32	66·58	0·02	0·36	99·27	0·122	0·42	1:1·34	24932	"
1·050	5·98	20·93	7·39	64·69	0·01	1·82	97·70	0·163	0·46	1:1·24	24933	"
1·666	9·50	32·96	11·88	63·95	0·01	7·76	91·58	0·101	0·32	1:1·25	24934	"
1·876	10·69	41·27	15·64	62·1	1·63	11·13	85·80	0·173	0·[illegible]	1:1·46		
1·841	10·49	37·29	13·20	64·6	1·76	14·81	82·94	....	0·16	1:1·26		
1·834	10·45	32·26	12·02	62·7	0·28	1·73	96·22	..	0·82	1:1·15		
1·792	10·21	31·93	12·52	60·6	4·08	15·62	80·20	.	0·[illegible]	1:1·22		
1·687	9·62	34·90	12·92	62·9	6·08	5·48	93·01	.....	0.52	1:1·34		
1·386	7·90	24·90	8·86	60·4	0·04	4·07	95·21	.....	0·10	1:1·12		
1·288	7·34	22·32	8·08	63·7	0·08	5·31	93·58	.....	0·18	1:1·10		
2·149	12·24	43·83	16·71	61·8	0·03	5·27	94·56	0·245	0·30	1:1·36		
2·016	11·49	42·01	16·82	59·9	0·02	2·79	95·68	0·194	0·36	1:1·46		
1·827	10·41	36·91	13·64	63·0	0·03	10·56	89·28	0·137	0·16	1:1·31		
1·743	9·94	41·57	17·42	60·9	0·04	4·63	95·12	0·144	0·16	1:1·75		

TABLE II.—Results of the Analyses of Certain Samples of Wheaten Flour.

	No. of Sample.	Total Proteids N × 5·7.	Moisture.	Fat.	Extracted by Alcohol.				Extract by Water after Alcohol.	Glutenin and other Proteids insol. in Alcohol.	Total Ash.	Starch and Fibre by difference.	Percentage Gliadin in total Proteids.
					Reducing Sugar or Dextrose.	Sugar after inversion as Sucrose.	Non-Nitrogenous substances.	Gliadin.					
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Standard Flours from Board of Trade, Montreal													
Strong Bakers		10·69	8·64	0·76	0·08	0·85	3·58	5·65	0.48	5·04	0·68	74·24	52·85
Patent Spring		10·49	8·60	1·90	0.12	1·80	2.16	5·84	1·75	4·65	0 16	73 61	55.67
Superfine		10·45	8·68	0·92	0 58	1·78	1·04	3 36	5 48	7·09	0·82	70·25	32 15
Fine		10·21	7 52	1·00	0·43	3·84	1 50	4 39	3·36	5·82	0·54	61·60	42 99
Extra		9·62	8 84	0·74	0·31	1 18	0·63	4·56	3·92	5·06	0·52	74 24	47·40
Straight Roller		7 90	8·88	0·30	0·66	0 11	1·98	4·50	2·32	4·38	0·10	78·77	56·96
Patent Winter		7·34	8·16	0·30	0.23	1·11	0·00	4·28	2·68	3 88	0·18	79·18	58·31
Samples from Lake of the Woods Milling Co., Montreal—													
Medora		12·24	10·20	0·80	0·12	1·99	2·56	5·52	0·92	6 72	0·30	70 87	50·09
Strong Bakers		11·49	8.64	0·86	0·04	1 68	2 79	5·65	0·32	5 84	0 36	73·82	49·17
Five Roses		10·41	12·20	1 94	0·08	0·77	4·60	4·96	0·40	5·45	0·16	69 44	47·64
Patent		11·17	10·40	0·54	0·29	1·13	2 28	5·58	3·32	5·59	0·16	70 71	49·42
Samples collected in the open market as shown in Table I—													
Graham & Co., Windsor, N.S.	20424	10·77	9·32	0·84	0·19	0·31	1·38	3·99	1·92	6 78	0·26	65·01	37·04
Murphy & Demont, "	20426	7·98	9·42	0·88	0·31	0 52	1·48	4·16	2·16	3 82	0·68	76·77	52 13
W. F. Campbell, St John, N.B.	23807	6.56	9·60	0.66	0·27	1·24	0·00	3·57	3·56	2·99	0·11	78·00	54·42
J. F. Shaw, "	23808	10·72	9·72	0·64	0·46	0·26	2·21	4·39	0·86	6·23	0·05	75·18	40 95
J. J. Soumis, Joliette, P.Q.	23653	6·56	8·51	0·80	0·27	1·33	1·48	2·68	1·60	3 88	0·02	79·40	40·85
Demers & Lorange, St. Hyacinthe	23684	11·80	9·48	1·40	0·60	0·24	0·94	5·70	1·00	C·10	0·12	74·42	48 35
Peter Glavey, Ottawa	25008	12·71	9·96	0·60	0·46	0·08	1·50	5·24	2·68	7·47	0·67	71.34	41·23
H. O. Richer, "	25009	12·66	7·84	0·58	0·35	1·21	3 79	3·35	3·72	9.25	0·67	69·04	28·33
A Janatta & Co., Toronto	25033	7·18	10·92	0·64	0·41	1·87	0·00	3·16	3·84	4·02	0·54	74·50	44·01
F. H. Blain, Hamilton	25036	6·78	9·88	0·36	0·35	0·35	0·94	2·52	2·28	4 26	0·48	78·58	37·17
T. G. Vidian, Goderich	22205	11·25	11·08	0·14	0·31	0·74	2·98	4·63	4·16	6·62	0·38	68·96	41·16
Metcalfe & Mitchell, Brandon, Manitoba	23924	11·49	10·26	0·32	1·43	0·38	2·03	3·36	·30	8·13	0·42	73·67	29·24
M. R. Shurman, Virden, Man.	23928	11·01	10·32	0·80	0·39	0·06	0·19	3·36	1·32	7·65	·36	75·55	30·52