but turned off steam when he thought the tank sufficiently heated. This meant that sometimes the whey was overheated, so that the whey albumen was coagulated, as on day of my visit, and on other days it was insufficiently heated, as must have been the case previous to my visit, as the acidity of whey in tank on my arrival, at 7 a. m., registered 1.42 per cent. lactic acid (with usual alkali test).

At the other two factories (C— in Leeds Co. and Hastings Co. factories) the whey tanks were elevated, the former uncovered and the latter covered. At this Leeds Co. factory the whey was skimmed, being elevated first by an ejector into a storage vat, the temperature rising to 120 to 124 degrees F. After skimming, it was then elevated by an ejector into the whey tank, the temperature rising to 134 to 140 degrees F. Heating was them completed by turning steam into tank, but the temperature to which finally elevated was confessedly never taken by thermometer. At the Hastings Co. factory the whey was elevated by pump, and heated by steam pipe. In factories where whey has to be elevated before pasteurization, elevation by the ejector has the advantage of at once raising the temperature of the whey well above the growing point of its contained bacteria, and, of course, less steam is then required to complete the heating.

TEMPERATURE OF PASTEURIZATION AND HEAT RETENTION IN WHEY TANKS.

At all the factories the temperature aimed at was 155 to 158 degrees F., but at only two of them was this controlled by the thermometer (M— in Leeds Co., and Hastings Co. factories). The temperatures recorded when steam was turned off ran from 153 degrees F. to 160 degrees F. (but at the Northumberland Co. factory the whey left over in tank in morning was heated up about 10 a. m. to over 175 degrees F.). The covered tanks, partially underground, retained the heat best, the covered elevated tanks ranking next, and the uncovered elevated lowest. This is well brought out in Table I.

TABLE I.—TEMPERATURE OF WHEY IN TANKS FOLLOWING PASTEURIZATION.

Factory.	Highest temp. recorded.	Temp. 1 hr. after past'n.	Temp. 2 hrs. after past'n.	Temp. 4 hrs. after past'n.	Temp. of whey going into patrons' cans for morning.	Min. and max. air temp recorded.	Whey Tanks.
M— Factory, Leeds Co.	°F.	°F.	°F.	°F.	°F.		
First day	153	149	144	137	120	68—76	Wooden tank; mostly underground; covered by whey-house; some slimy deposit on sides; not recently cleaned.
Second day	155	151	147	140	122	62—68	
C— Factory, Leeds Co.	157	152	147		100	66—74	Wooden tank; elevated; uncovered; cleaned partially on day of visit.
Hastings Co. Factory	160*	158	153		116	62—75	Wooden tank; elevated; covered; some slimy deposit on sides; not recently cleaned.
Northumberland Co. Factory	160*	156	150		95†	64—68	Wooden tank; half underground; well covered; some slimy deposit on sides; not recently cleaned.

*Whey albumin coagulated. †Due to running in cold water.

TABLE II.—NUMBERS OF BACTERIA PER EACH C. C.—PASTEURIZED AND NON-PASTEURIZED WHEY.

1 Factory.	2 Whey as drawn from vat (time of dipping).	3 Whey when 1 hr. after heating completed.	4 Whey when 2 hrs. after heat'g completed.	5 Whey at time of dipping, drawn into sterile jar, kept till fol. m'g at air temp.	6 Remarks.
C— Factory, Leeds Co.					
First day	19,800,000	7,500	600	110,000,000	(The moderately large numbers of bacteria present in whey as it went into patrons' cans (Col. 5), due to entrance of wash-water and whey drippings after temperature of tank has fallen.
Second day	11,000,000	150,000	200,000	12,000,000	
M— Factory, Leeds Co.	53,600,000	1,500	700	532,840,000	(Fairly satisfactory.
C— Factory, Leeds Co.	10,500,000	1,000	1,000	112,000,000	(Best results of series.
Hastings Co. Factory	49,000,000	800	80	440,000,000	(The large number of bacteria in whey when it went into farmers' cans, due to running in of cold water, cooling tank to point where bacteria could develop.
Northumberland Co. Factory	49,000,000	800	60	4,500,000,000	(Samples taken from whey tank of a factory adjoining one of above factories where pasteurization was not carried on.
M— Factory, Leeds Co.	19,320,000	Not pasteurized		260,000,000	

EFFECTS ON BACTERIAL CONTENTS OF PASTEURIZATION.

At none of the factories visited did pasteurization actually sterilize the whey; that is, bacterial growths could always be obtained from whey at all periods up to the time it entered patrons' cans. But, as can be seen in Table II., the heating destroyed over 99 per cent. of the contained bacteria, including the usual acid-forming and gas-producing varieties (B. acidi lactici, and B. lactis aerogenes), which make up nearly the entire bacterial content of the various unpasteurized wheys. The bacteria that escaped destruction were certain sarcinæ and spore-bearing bacilli, while a few spore-bearing yeasts were at times noted, and molds constantly. The contrast between the bacterial contents of the pasteurized whey going into patrons' cans, and the non-pasteurized whey kept in a sterile jar over night, at air temperature, is very marked (columns 5 and 6 of Table II). The figures in the latter column would fairly accurately indicate the numbers of bacteria going home in patrons' cans from a well-kept whey tank where whey was not pasteurized. In "The Farmer's Advocate" for May 6th, 1909, W. M. Waddell reports some observations made during February and March, 1909, at Ontario Agricultural College, on pasteurization of whey. He found that pasteurization at the temperatures reached in the factories I have examined, gave sterile whey. His results can, no doubt, be secured under the best conditions, where attention is paid to cleanliness in all details, but certainly cannot be obtained under ordinary factory conditions, where one (who knows how) can find many weak links in the chain of cleanliness.

ACIDITY OF WHEY AS TEST OF EFFICIENCY OF PASTEURIZATION.

The acidity of the whey, as it goes into farmers' cans, should afford a fair index of the efficacy of the pasteurization. In Table III. will be found a record of the acidity of wheys at varying periods. The ready destruction of the acid-producing bacteria by the heating means, of course, that acid will not later develop, so that when a high acidity is found it means either heating at too low a temperature, or the entrance of material carrying acid-forming bacteria at a time when temperature has fallen sufficiently low to permit of their retaining their vitality and growing when temperature falls to a point where this is possible (below 108 degrees F.). Of course, Monday morning's whey will often show a higher acidity than later in the week, but, apart from this, an acidity of over .30 lactic acid (as indicated by usual alkali test) means some failure in the process.

TABLE III.—ACIDITY OF WHEY.

Factory.	Whey as drawn from vat at time of dipping.	Whey when heating completed.	Whey 1 hour after heating completed.	Whey 2 hours after heating completed	Whey as it went into farmers' cans following morning	Whey at time of dipping, kept in sterile jar over night.	Remarks.
M— Factory, Leeds Co.							
First day	.19	.19	.19	.20	.25	.18	(Increased acidity of morning's whey, due to drippings from curd.
Second day	.17	.19	.195	.20	.28	.42	
C— Factory, Leeds Co.	.19	.27	.27	.27	.27	.55	(Increased acidity after pasteurization, due to retained whey in tank.
Hastings Co. Factory	**.20**	**.30**	**.30**	.30	.34	.19	" " "
Northumberland Co Factory	.17	**.22**	**.22**	.32	.35	.58	(The whey left behind in tank (only a small amount) had an acidity of 1.42 on morning of my arrival.

SOME CONCLUSIONS.

1. Heating in bulk of whey to 155 to 158 degrees F. destroys over 99 per cent. of the bacteria, but under ordinary factory conditions never sterilizes the whey, as certain sarcinæ, spore-bearing bacilli and molds can be grown from whey so treated. But these bacteria do not increase in the whey tank unless the temperature falls below the germinating point (108 degrees F., and under).

2. Heating to 155 degrees F. gives as good results as higher temperatures, and, to avoid coagulation of the whey albumin, and thus destroying the uniformity of the whey, the temperature should not go above 158 degrees F.

3. The thermometer should be the means employed to test the temperature, not the length of time steam is turned on the tank, or other methods found in use in some factories.

4. In a properly-constructed, covered tank, in our summer season, the whey will retain sufficient heat to go into the patrons' cans following morning at 115 to 122 degrees F.

5. The acidity of whey when going into patrons' cans affords a good indication of the efficacy of the pasteurization, and ought not to rise over .30 lactic acid.

6. No washings, water or other matter should be added to whey tank after heating is completed.

7. Carelessness or indifference is as deeply ingrained in cheesemakers as in the general community.

At the directors' meeting of the Eastern Ontario Dairymen's Convention, held in Toronto, G. G. Publow, R. G. Murphy and G. A. Putnam, Supt. of Dairy Instruction, were appointed a committee to arrange for the holding of district dairy meetings again in Eastern Ontario. It is intended to hold 16 of these at representative points, the nature of the meeting in each case depending upon the special needs of the particular