

the highest on record, averaging around 21 cents per pound. The instructors made 349 full-day visits and 452 call visits to the factories; 98 of the patrons were also visited. Mr. Hens reported that the quality of cheese was well maintained throughout the season, with the exception of that manufactured during two weeks in July, when there were a few defective cheese owing to warm weather conditions. Some of the makers had a little difficulty with the rennet substitutes. Mr. Hens found that the pure rennet gave the best results, but while the present shortage continues rennet substitutes have to be used and he advised that care be taken when using substitutes not to "set" the milk too sweet or too ripe. Under the first mentioned condition, the result would be abnormally slow coagulation, soft curds, and high fat loss in the whey. If the milk is too ripe there is danger of the cheese being coarse in texture.

During the season, 2,705 sediment tests were made. Thirteen of the factories have ice-cooled curing rooms, and the same number had septic tanks for the disposal of sewage. Thirty-two of the factories paid for milk by test, which was ten more than the previous year; 59 pasteurized the whey; 5 made whey butter; 1 made casein, and 80 turned the cheese in hoops. Fewer patrons were found guilty of delivering deteriorated milk to the cheese factories than in the past years. However, twenty-four pleaded guilty and were fined. Between November 1, 1916, and October 31, 1917, Mr. Hens and the instructors attended 77 factory meetings, at which there was a total attendance of 4,229.

Further effort was made to secure information regarding the fat content of the milk delivered by the patrons to the various cheese factories. This required a good deal of extra work on account of the factorymen and instructors. The results of 8,857 tests showed a variation in the percentage of fat in milk from 2.6 per cent. to 5 per cent. There were 102 samples of 2.6 per cent. milk; 1,222 of 3 per cent.; 1,682 of 3.2 per cent.; this was the largest number of samples of the same test and it varied from there to one sample testing 4.9, and two samples 5 per cent.

There were 127 creameries and 98 cream-buying stations in operation last year. The creamery instructors made 291 full-day visits and 89 call visits, besides 124 special visits to the cream-buying stations. During the year one new creamery was built, but two were closed. The estimates indicate a decrease of about twelve per cent. in the output of butter as compared with 1916. However, the prices were the highest in record. In 1916 the Western Ontario creameries made 21,952,948 pounds of butter. Owing to the comparatively cool season the quality of butter manufactured was considered good. If anything, the cream was delivered in better condition than in former years. The creameries had 38,982 patrons and the average per cent. of fat in the cream delivered was 29. A large number of samples of butter were examined for moisture content and 652 of the samples contained 14.75 per cent., and 67 samples over 16 per cent. moisture. The average amount of salt used and retained in the butter was 5.1 per cent. and 3.15 per cent., respectively. Thirty-two of the creameries pasteurized the cream all on part of the time; this is an increase of seven over the previous year. A cooler was used in 66 creameries and a pure culture was used by nine. Only eight creameries graded the cream for churning, and but one paid for the cream by grade. This is a very small percentage but it is a start and undoubtedly ere long the majority of the creameries will realize the benefit derived from buying cream on grade and selling butter on grade.

Further work was done in an endeavor to determine the practicability of grading cream by sample. The instructors accompanied the cream hauler over certain routes, took notes and graded various lots of cream supplied by the producer. Samples were taken by the hauler in the ordinary way. On arrival at the creamery these samples were graded by the buttermaker and the instructor without referring to the previous grade of the cream made by the instructor at the farm. Seventy-eight of the 101 samples taken graded first; 23 samples, second, and one graded third. Practically 85 per cent. of the samples were placed at the creamery in the same grade in which the cream was graded at the farm. Some of the conclusions drawn from the experiments were that if reasonable precautions were taken in keeping the sample bottles clean and the cream samples cool during transit, there is every reason to believe that under Ontario conditions the grading may be done closely enough by sample for all practical purposes.

The system of grading butter which was followed last year was outlined by Mr. Hens, and it was believed that the grading plan was practical under Canadian conditions provided it received the support of creamerymen and dealers. Besides grading the butter of the creameries engaged in the grading service, samples of butter from August and September made from a number of creameries were forwarded to the grading commission, and, while a large percentage scored fairly high, there was lack of uniformity in the moisture and salt content of the butter. Uniformity of flavor, moisture, salt, etc., is essential if Ontario butter is to attain to the position it deserves.

Pepsin as a Coagulant.

The scarcity of rennet has compelled a number of cheese factories to use pepsin as a coagulant. It was with doubts as to the practicability of pepsin that many made the change last spring. However, the quality of cheese has apparently maintained the high standard formerly set. Geo. H. Barr, Chief of the Dairy Division, gave an account of experiments which had been carried on during the past season with pepsin, and he found that as good cheese could be made with pepsin as with rennet extract but that as a rule there was a greater loss of fat in the whey. Experiments have been carried

on to determine the percentage fat in the whey when "setting" milk at different temperatures and using different quantities of the coagulating material. It was found that setting milk at a temperature slightly under 86 degrees, with a sufficient quantity of pepsin to coagulate the milk ready to cut in less than thirty minutes, gave practically as good results in the whey as when rennet extract was used. Mr. Barr advised using enough pepsin to coagulate the milk ready to cut in about twenty-five minutes, and that cutting should not be commenced until the curds would break clean over the finger. The speaker believed that it required greater skill on the part of the cheesemaker to make cheese successfully with pepsin than with rennet extract, but if the milk was set at the proper temperature and the curd handled properly immediately after cutting, there need be no greater loss of fat in the whey than if the rennet extract were used. A number of different brands of pepsin have been experimented with, with satisfactory results, but the speaker advised cheesemakers that there was danger in using any brand of coagulant that had not been carefully tested.

The Effects of War on the Dairy Industry.

J. A. Ruddick, Dairy Commissioner, dealt with a number of problems affecting the dairy industry under the present abnormal conditions. He explained the work of the Cheese Commission, and clearly showed that if it had not been for the work of the Commission cheese patrons and cheesemakers might have been a good deal worse off than they are to-day. Mr. Ruddick's address on the work of the Cheese Commission was given in the report of the Eastern Ontario Dairymen's Convention, which appeared in the January 17 issue of "The Farmer's Advocate." In commenting on the rennet supply, Mr. Ruddick advised cheesemakers to be content with sufficient coagulating material to carry them for a few weeks at a time and not to stock up for the season. If this is done, it is believed there will be no difficulty in meeting all the requirements. It is a source of gratification that pepsin can be used as a substitute without deteriorating the quality of the cheese. However, the supply is none too plentiful. The speaker cautioned cheesemakers to "under no circumstance use any brand of coagulant unless they know that it has been thoroughly tested by some competent authority. We have made it as plain as possible to all vendors of coagulants or substitutes for rennet that the Dairy Branch is ready to stand between the cheesemakers and any irresponsible dealers to see that no inferior article is foisted on the industry, and that we will always be ready to make careful tests of any new coagulant which may be offered for sale, and to take steps to prevent its sale if it proves to be unsatisfactory. Every effort should be made to help out the situation by saving the stomachs of calves which are slaughtered at the age when their stomachs are useful for this purpose. The local manufacturers of rennet extract are prepared to take all that are offered. As near as I can determine, there is no occasion for alarm over this matter, but we should not neglect any source of supply in sight. The substitution of pepsin for rennet was effected with so little trouble, and without any of the factories experiencing any real shortage, that it is doubtful if it is generally realized how near the cheese industry was to a serious interruption. Without pepsin 75 per cent. of the factories would now be closed."

Another problem which the war has brought about is that of shortage of "tinned" sheets for making dairy apparatus and utensils. These have been procured in the past from the United Kingdom, but in the interest of the supply of munitions the export of all such material is prohibited except under license. Mr. Ruddick reported that the stock of "tinned" sheets in Canada has become practically exhausted. Every effort has been made to get a sufficient quantity to meet the requirements of the dairy industry in this country for the next season but without any marked results. The situation in regard to steel in the United Kingdom is very serious, and it looks as though Canadians may have to do without this material. It is even very difficult to secure it from the United States; consequently, the speaker advised the conservation as far as possible of vats and milk cans and suggested that any factory having spare cheese vats or milk cans which are not needed for the coming season's make, let the fact be known so that others in need of such may be able to secure them. In discussing this question at the close of the address, a manufacturer of dairy utensils believed that copper could be used in place of tin. This would come more expensive at the start but as it would not deteriorate as fast as the tin, it would be cheaper in the end. The possibility of using small tin plate or even wooden vats was discussed.

Mr. Ruddick dwelt at some length on the condensed milk industry and explained why condenseries were able to pay more for milk than the cheese factories. The speaker believed that some of the complaints in regard to what was considered to be unfair competition, in which patrons of cheese factories were placed, were based on a false assumption. Mr. Ruddick stated "that the difference in price is not due to the fact that the price of cheese is limited, but because the demand for condensed milk is so great that no matter how high the price of cheese went the condenseries would be able to exceed it and get the milk just the same. Of course, the obvious reply is that condensed milk should have been dealt with in the same manner that cheese was; that is reasonable, but there are difficulties in the way. Some of them apparent, perhaps, others not so well known to the public at large. The trade in condensed milk, in its international aspect, is quite different from that of cheese. The United Kingdom is practically the world's market for cheese. We sell fully 99 per cent. of our surplus in that market, and New Zealand has no other

outlet. Every country with an export cheese trade looks to old England as her chief if not her only customer. In the case of condensed milk it is quite different. We have been exporting about one-half of our output to the United States, only about one-third to the United Kingdom, and the remainder to some 25 different countries. The difficulties of control are obvious. You may be sure the matter has not been overlooked, for I happen to know that it has been, and no doubt is yet, under consideration.

"I do not suppose that there is any kick coming from those milk producers who are so fortunately situated as to be able to take advantage of the high price being paid for milk at the condenseries, and it would be a sort of 'dog in the manger' policy for the patrons of cheese factories to object, seeing that control of condensed milk prices would not give them any more for their cheese. It is the owners of cheese factories who are hardest hit and have a grievance if any one has. There is this to be said, however, if the demand for condensed milk is to be a permanent one, then the passing of the cheese factory in certain districts is a matter of evolution and is bound to be upsetting to some interests as evolution always is. The manufacture of cheese is only a means to an end, that end being the profitable use of milk. If a better means is offered to reach the same end, and the right thing to do ordinarily is to take advantage of it. There is an element of doubt, however, in the present case, for it is more than probable that the demand for condensed milk will fall off after the war, and in that event some of the milk now going to the condenseries will revert to the cheese factory or some other outlet. If that occurs the disorganization of the cheese factories which is now going on will be a serious disadvantage.

"There is another aspect of the situation which is of importance in the present circumstance, and that is the lack of by-products from condensed milk for stock raising. It is possible that the value of the skim-milk and whey is somewhat overlooked when comparing returns for the milk alone. There is still another thing to be considered, and it is this, that when the condensed milk business monopolizes any particular territory the necessity for paying a premium to draw the milk from the cheese factory or the creamery will cease to exist. I am not prepared to say that the milk condenseries will take advantage of such a situation, should it arise, but experience teaches us that it generally happens that way. These are some of the things which should be considered by those who are tempted to desert the old cheese factory."

The Farm Survey.

An account of the farm survey held in Peel County last year was given by A. Leitch, of Ontario Agricultural College. This was a very interesting address, and the deduction arrived at from the information secured in the survey was to the effect that a number of farmers are working for less than hired men's wages. This survey was conducted for the purpose of ascertaining the factors which make for success or failure in farm operations. Average farm conditions prevailed in the district selected, and the information secured showed that farming is not as lucrative a business as some city folk have been prone to believe. Small farms with heavy overhead expenses, poor stock and infertile land are factors which tend to keep the returns low. Mr. Leitch defined labor income as "what is left of the farm income after the paying of running expenses of the farm, allowing reasonable amount for unpaid members of the family and paying for interest on investment." Out of this labor income the family must be clothed and fed and other sundry expenses met. While over a hundred farms were included in the survey, the figures were only tabulated for sixty-seven at the time of the meeting. The following table shows the size of farms, capital invested and the labor income from the same:

No. of farms	Size of farms	Capital invested	Labor income
32	Under 85	\$ 6,770	\$ 408
15	86 to 100	9,135	811
14	101 to 150	13,535	1,074
16	151 to 240	15,680	1,619

From above it will be seen that the small farms give the smallest labor income. This can be partially accounted for by the fact that more money would be invested in implements, horse-power, etc., in comparison with the larger farm. Poor stock is also a factor which tends to keep the income low. The survey showed that on fifteen farms of an average size of 102 acres where crops below average were harvested and poor live stock was kept the labor income was \$366; while on twelve farms, of the average size of 116 acres, where the crops were good and good stock was kept, the labor income was \$1,305. Mr. Leitch considered that the survey has been satisfactory and plans are being made to extend the work into Oxford County in the near future so that a study might be made of the dairyman's problem.

Increased Crop Production.

Dr. C. A. Zavitz, of the Ontario Agricultural College, outlined methods of increasing crop yields without necessarily increasing the labor involved. Better seed, more thorough cultivation, underdrainage, increased fertility and rotation of crops were mentioned as factors tending to increased yields. The speaker emphasized the fact that it was more necessary now than ever before to have the best seed that can be procured for this spring's seeding. Culling out mediocre varieties and using those which have proven the best was strongly