

that it should be no difficult task to keep a room down to 65 degrees. Besides having the walls, ceiling and floors properly insulated, the doors and windows should be double and fit tightly. The liberal use of building paper and matched lumber is rather to be used than plaster, which is easily chipped and cracked. The sub-earth duct was recommended, as was also the use of ice. Fifty tons of ice well saved will do a 100-ton cheese factory all summer. The Professor estimated that \$125 will insulate an old curing room if in fair condition. This will save a pound per cheese shrinkage, and help the flavor. This may save \$400 loss in a season. In spring and autumn, use a screen around the stove in the center of the room to distribute the heat evenly over the room. Just here the Professor referred to the intention of the Department of Agriculture to introduce the illustration station idea to the extent of putting two big factories in each of the Provinces of Ontario and Quebec into proper condition, so that the cheese can be made and cured at the proper temperature. There will also be, in connection with these factories, curing rooms in which the temperature cannot be rightly controlled, similar to most of those found throughout the country. It is the intention to compare the results of the two rooms by sending the cheese cured in either to the British market, and to publish the prices received as soon as they are known. In this way it is hoped a lesson will be learned that will stir up factorymen to the advantages of having their curing rooms as they should be.

During the discussion which followed this address, a member recommended a cooling duct from the bottom of the well. Instead of conducting the pipe underground, in the ordinary way, it is taken down the well and up into the curing room. The outer end of the pipe extends several feet above the ground, and is fitted with a cowl to catch the wind, causing a draft which cools as it passes down and up the well. By that system he was able, last summer, to hold the temperature of the curing room from 55 to 65 degrees in the hottest weather.

Hon. Sydney Fisher, in an address, which was listened to with much interest, referred to the growing preference in England for things Canadian. As they try our dairy and other agricultural products, they show their satisfaction by sending for more, and in this way our exports to the Old Land have greatly increased. By reason of this ever-increasing export trade we are enabled to see better times. It has brought our farmers much more cash. (Just here we might refer to a point made by Principal Grant, of Queen's University, during his speech at the banquet given the convention by the City of Kingston, where he pointed out that Canada is not doing the square thing with England in buying so little of her manufactures in return for their reception of our food products.) Hon. Mr. Fisher mentioned that some complaint is being made in England regarding our cheese. This, he believed, would increase rather than diminish, except greater care be taken regarding the milk received, and in curing the cheese. Referring to the refrigerator car and ship service, it was pointed out that butter is now landed in England in as perfect condition as when it leaves the Canadian factory, even as far west as the Northwest Territories. Expansion of our butter and bacon trade was recommended, but development of the cheese industry must be confined to improvement rather than expansion. Our bacon industry, which goes hand in hand with dairying, is doubling up rapidly. In 1896, \$4,000,000 worth was exported, and in 1898, \$8,000,000 worth was shipped. As our bacon suits the English consumer, the Dominion Minister of Agriculture is strongly of the belief that in two years more our output of bacon to the British markets will again be doubled or equal to the export of our cheese.

Reports of Inspectors.—Messrs. G. G. Publow, L. A. Zufelt, G. H. Bensley, Hugh Howey, J. A. Kerr, and R. W. Ward read reports of their season's work of inspection of the factories in their allotted districts. Mr. Publow tested 6,341 samples of milk, and found it necessary to prosecute 39 patrons for tampering with their milk. He found an improvement over former years in the style and finish of cheese. Principal faults were bad flavor and looseness in make. He was not able to spend as much time with some makers as he should. The troubles were found to be largely due to bad condition of milk. Harsh texture and weak body were due to improper methods in manufacture.

Mr. Zufelt found an improvement in most sections. Makers too often had to shoulder losses not due them. Too often the milk was kept over night in the midst of impure air. Better care of milk would do much to lessen troubles. Found cheese shipped from factories too green. More inspection and instruction is needed in many districts. He found there was a falling off in adulteration of milk.

Mr. Bensley found out of 7,500 samples of milk tested only 18 had been tampered with. Many curing rooms were found defective in his district. Makers are not sufficiently careful in the condition of milk received.

Mr. Howey spent 131 days in giving instruction. He found 19 samples of adulterated milk. He sounded a note of warning to makers to reject milk that is not right.

Mr. Kerr gave instruction on 131 days, and found over 40 cases of adulterated milk. He also reported an increase of factories using the Babcock Test in paying for milk. Too much bad flavored milk is received at factories. A decided improvement was noted in the cleanliness and condition of factories; still many are unsuitable for best work.

Mr. Ward found 61 adulterated samples of milk. Competent makers are too often handicapped by bad flavored milk coming in. He found the existence of a lack of sympathy and co-operation between adjoining factories. He recommended that every factory have a territory of its own, so that patrons could not change about for some cause due to their own neglect. Complaints were made of too many drawing home whey in milk cans.

Buttermaking.—Mr. Marker, Government Superintendent of Northwest Creameries, in a pointed address touched upon many important points in good buttermaking. He referred to the importance of a buttermaker being well qualified with theoretical and practical knowledge of his business. He should also be a man with some individuality and prestige, so that advice will be taken by the patrons from him. He should impart information for the benefit of his patrons and the welfare of the butter trade. Referring to the methods of improving dairy herds, it was pointed out that in Denmark patrons combine and engage a man to test their cows by the scales and Babcock tester. In this way the poor individuals are located and weeded out. The patrons of a district also combine in purchasing a first-class dairy-bred bull for the service of all their cows. This line of co-operation is worthy of serious consideration.

In creamery work, ripening the cream is of greatest importance. Pasteurizing and the use of fermentation starters were highly recommended. A good quality of starter is necessary or else evil may be perpetuated. Mr. Marker claimed that a buttermaker should be a good judge of butter, that he may detect troubles and understand how to locate and correct them. He advised practicing with score card and butter trier. Flavor is governed in ripening the cream, and texture is influenced by churning and working. All buttermilk should be washed out of the butter, and it is better to lift the butter out of the wash water than draw off the water, so that the curdy particles in the bottom, if there be any, may not be incorporated in the butter. The cream vat should be covered to prevent the top surface of the cream becoming toughened.

Address by Dr. Mills, President of Ontario Agricultural College.—A pithy speech was made by Dr. Mills, in which he made a strong plea for more practical education. Our girls ought to be trained with a view to preparing them to fulfill their domestic functions in an intelligent manner. The changing of a number of our collegiate institutes and high schools into technical high schools was strongly recommended, that boys' and girls' hands be educated as well as their heads.

Addressing the makers of cheese and butter, he recommended all to take advantage of the free instruction given in our dairy schools. Four to six weeks, or even longer, would be well spent getting practical and correct knowledge about cheese and butter making. As a rule, the men who know most are most anxious to learn, and know-alls seldom advance. Men who expect to attain to any degree of advancement should pay some attention to their English education, that whatever is said or done by them will not suggest illiteracy which may be taken for ignorance. Stress was laid upon being and looking clean while in the factory. Men should grow beards or shave often enough to look clean. They should keep their finger nails and teeth clean, and should not have their breaths befouled by smoking or chewing tobacco. Prof. Mills claimed that a smoker or chewer should have no place in a factory where food products are being prepared. Have order in the factory and around it, then advice to patrons concerning better care of their milk will have some effect. Disorder is twin sister to dirt. The speaker advised patrons not to entrust milk in the hands of poor makers, but get good men and pay them well.

The convention suffered materially from the inability of several of the advertised speakers to be present through ill health. Ex-Governor Hoard, Prof. Saunders, and Hon. John Dryden were all expected, but failed to appear. There was also a deplorable lack of discussion upon the practical work of dairying on the farm and in the factory. Many of the addresses given, while good, were too general to be productive of much real advantage to the Association.

Officers for '99.—President, D. Derbyshire, Brockville; 1st Vice-President, J. McTavish, Van Camp; 2nd Vice-President, L. L. Gallegher, Harrowsmith. Directors: Wm. Eager, Morrisburg; J. R. Dargavil, Elgin; Jas. Whitton, Williams' Corners; J. B. Carlaw, Warkworth; and Henry Wade, Toronto. Auditors: M. Bird, Stirling, and F. W. Benton, Belleville. Secretary, R. G. Murphy, Elgin.

Care for the Birds.

To the Editor FARMER'S ADVOCATE:

DEAR SIR,—I would be much obliged to you if you would give this letter a place in your valuable journal. I wish to ask the farmers to assist us in preserving some of our game birds, viz., quail, which are one of the best insectivorous birds we have; they live on insects alone. Now they are becoming scarce, I would ask our friends to give them food or shelter; they will eat bread crumbs, small wheat, etc., at this time of the year. I also would ask them to remember our little meadow larks, which are being killed by a shameless lot of sportsmen. I remain, yours, etc., C. S. RACEY.

Deputy Game and Fish Warden.
Halton Co., Ont., Jan. 14, 1899.

GARDEN AND ORCHARD.

Plant Breeding.—II.

SOME PRINCIPLES BEARING ON THE AMELIORATION OF FRUITS.

BY JOHN CRAIG, PROFESSOR OF HORTICULTURE, IOWA AGRICULTURAL COLLEGE.

My object in broaching this subject again is to touch upon or possibly suggest some profitable lines for experiments. The work of the experimenter is likely to remain in obscurity unless the results he obtains are of practical value and meet a public demand. Each year fruit-growing is becoming more and more a specialized industry, and for that reason the sphere of the station horticulturist is constantly widening, and with this constant unfolding new lines of research offer themselves. In this way we may, in a measure, escape from the hackneyed variety test into the field of original investigation.

We grow fruits for home consumption and for public consumption—here are the primary elements of the amateur and commercial grower. But we must differentiate further in the case of the commercial grower. It is necessary that he should grow such fruits as he can sell. At this point it will be desirable for him to decide upon the kind of market to which he intends to offer his products. He should remember that at the present day there are two classes before the commercial grower—first, the open world's market which handles staples; and second, the special or personal market which demands quality instead of quantity. This latter market is but poorly supplied. Its demands are exacting, but the profits should be proportionately greater than in the world's market, where quantity and only mediocre quality are considered. Fine quality and handsome appearance are essential attributes to the fruit product that would cater to the demands of the special market, but does not attractive appearance play an important part also in selling fruits in the world's market? Fruit-growers know that with a given variety high color denotes good quality, or, in other words, degree of coloration in the variety may be accepted as indication of its quality. Now, fine coloration with good quality mark satisfactory adaptation of the individual to its surroundings, and suggest good cultural methods. Here, then, is an important field for the station horticulturist and for horticultural societies. It is not sufficient that a variety should live and bear fruit, but if "perfectly adapted" it will live more comfortably and bear better fruit there than anywhere else. Most fruits will grow more vigorously and bear better fruit in certain areas than in others. Sometimes these areas are quite circumscribed and limited in extent. For instance, the Gravenstein has found a peculiarly congenial home in the Annapolis and Gaspareaux valleys of Nova Scotia; the Fameuse probably gives handsomer and better fruit when grown on the Island of Montreal than anywhere else; the Niagara grapes of the Chautauqua region in New York are noted; while the Ben Davis of the Ozark region in Missouri is a vast improvement on the Ben Davis of the East. As a rule, varieties succeed best at or near the place of their origination, and next best where the conditions surrounding their birthplace are most closely approximated. But if we cannot produce fruit of sufficiently good quality and cheap enough to enable us to compete with other localities, we have the alternative of dropping out of the race or of developing varieties more perfectly adapted to the conditions which prevail. If left to herself, with a reasonable amount of raw material, nature will do this without man's interference; but her methods are necessarily slow, and man, the gardener, must co-operate with his intelligence in order to expedite matters. This brings us back again to the subject of plant breeding, and we have before us an immensely complex subject, but one of intense interest to the fruit-grower. Let us look at it from the practical side. In using the term plant breeding, fruit-growers are apt to look upon it as analogous to animal breeding in the surety and constancy of the result attending the practice. Plants cannot be bred with the same precision of results as can animals, because we have in a plant an essentially different organism to deal with. In the case of breeding animals we have two definite personal individuals; a plant, on the other hand, is made up of a composite organism, the unit of which is a bud. In the plant both sexes are usually present in the flower, and cross fertilization is not necessary to the production of a new individual; whereas in animals, the sexes being separated, union is necessary to the production of offspring. The plant is modified by environment because it is stationary in a given situation and must fit itself to circumstances or perish. It will therefore be seen that these organisms are essentially different, and the results obtained from a similar course of treatment must be expected to be widely different. A notion prevails to some extent that in plant breeding it is only necessary to unite two plants having the desired characters and the offspring will combine in itself the best of both,—and there you are. As a matter of fact, this is but the beginning of the plant breeder's work. It is possible that he may be so fortunate as to secure something valuable as a result of the first cross, but generally he considers that he has by this cross introduced and emphasized the elements of variation, through which agency he hopes to attain the desired end. Having obtained