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THIS war has brought into a clear light the need of productive agriculture. Armies, navies and air forces in wartime, even more than commerce, manufacture and every other activity in peacetime, depend upon the bounty of the earth.

There has been great progress in agriculture, "since the first poor crooked stick was drawn across the wondering earth". That was in the Neolithic age 10,000 years ago, but more advancement has been made during the past two centuries than in all the preceding thousands of years. Farming is a complicated business today. The same basic problems as afflicted the first cultivator — the need for sun, rain and fertile soil in the right measures — still exist on every farm, but in addition there are riddles associated with urbanization, price, distribution and comparative standards of living. An encyclopedic definition of agriculture mentions merely preparing the soil, sowing seed, removing the crop, and the raising and feeding of cattle and other live stock. In today's practice, the farmer's worries start earlier and continue later than these operations.

This complexity of farm life is increasingly recognized by urban dwellers, who are taking greater interest than ever before in agricultural conditions. Persons who draw their livelihood from industry realize that a large prosperous rural population would provide the basis for widening national prosperity through enlarged outlets for the products of urban factories. Many of these urban dwellers visit farming country in spring and see gardens of young vegetables, or in fall, to admire the wide fields of grain. They are overcome with a longing for a kind of peaceful life which appears ideal to people accustomed to the high tempo and complicated standards of urban society. But when these city people enquire into the facts of rural life, they find that the troubles of city experience are simple compared with those that must be faced in farming. They discover, indeed, that they are becoming more and more involved in shouldering a share of the farm load, instead of being able to enter the wide open spaces and drop part of the urban burden. The farm problem refuses to stay on the farm, because the prosperity of agriculture is so vital to the whole nation.

Canada's Farm Lands

In all Canada there are 3½ million square miles of land, and only 550,000 square miles are "potential agricultural land", according to the Canada Year Book. It is a fallacy, as was pointed out in our Monthly Letter of January, to accept low population density per square mile as prima facie evidence of great absorptive capacity. Other factors, such as physical environment, climate, topography, location, and sociological surroundings must be considered. Canada's "great open spaces" reduce, under the merely physical test of land adaptability, to half a million square miles, of which 211,000 are already in use.

Reduced to its simplest terms, a farm is a chemical plant, developed by capital represented by land, machinery and live stock. This establishment takes a few raw materials, and, by processes which no one fully understands, turns out ham and eggs, wheat, spinach, milk, butter, cheese, potatoes, beefsteaks, and the other foods which enter into the needs of the human organism and cater to its palate. To measure the productivity of soil has been a major assignment of laboratories maintained by the Dominion and by Provinces, because many failures in farm settlement are due to the placing of eager colonists upon land that is worn out or rocky, or poorly situated.

Canadian Development

Canada is a young country, and its land has not been tilled with the same intensity or for the same length of time as that of European countries. The first clearing of land for agriculture took place near Port Royal, N.S., in July, 1606, so this Letter is being published about the 335th anniversary of that great event. When Cartier visited Hochelaga (later the city of Montreal) in 1535, he found extensive fields around the present site of the Head Office of The Royal Bank of Canada planted to corn, and the Indians were growing beans, peas, and cucumbers in natural clearings. It is of passing interest that the earliest public notice of farm lands open for settlement appeared in 1632, offering opportunity for colonization on the St. John River in New Brunswick.

It was under circumstances such as these that the size of early Canadian farms was largely determined. Each generation had to plan how much land it should clear and cultivate. In later days, with bald prairie to work, the standard size was set at 160 acres. Still later, in a reign of machinery and railways, many quarter section farms proved to be too small for profitable production. At the same time, the ambition of farmers has often led them to take more land than they could properly manage. Economic authorities say many a farmer would gain by applying his capital and labour to a smaller area. Abandoned farms bear

witness to over-expansion as much as to exhaustion of the land, while other farms, still in use, are producing only a fraction of their potential capacity.

Cultivation

The subject of cultivation is one of real seriousness. Soil is not mere dead matter, submissive to treatment or mistreatment with impunity. Chemically, it contains elements which must be present in certain proportions for the support of vegetation, and physically it is made up of material which supplies the principal plant food. These attributes are amenable, within limits, to modification by capital and labour. In a demonstration at Rothamsted experimental station in England, one plot has been used for wheat every year for a century without fertilization, and last year it yielded 26 bushels to the acre. Another plot at the same station, properly fertilized, raised 50 bushels to the acre. There does not seem to be any doubt that worn-out land, under scientific culture, can be reclaimed and made as fertile as ever, and the productivity of naturally good soil increased. Some may point to lack of capital as a handicap to adoption of better methods, but the work of agricultural schools shows that there is opportunity for improvement without large cash outlay, and that much could be done to increase productivity by elimination of wasteful and inefficient methods and unsuitable seed varieties. With farming developing into an exact science, the farmer can no longer depend upon his intuitive knowledge. He needs guidance in treating unbalanced soil, in developing crops which will meet the varying seasons in different parts of Canada, and in preparing and marketing his product. This counsel is given freely by Agricultural Colleges and by the Dominion and Provincial Departments of Agriculture. Acceptance of it, and practice in it, will enable farmers to cut production costs through increase in per acre yield, and give a measure of insurance against loss from crop failure.

Nature is slow to anger, and there is still time to arrest the consequence of single cropping, neglect of fertilization, and other sins of omission and commission. Man must add his judgment to the selectiveness of nature, and to the capability of nature he must add science, labour and investment. This judgment involves, as well as a decision when to start intensive culture, a knowledge of when to stop, because there is a law of diminishing returns. After a certain point is reached the application of new labour and capital fails to cause a proportionate increase in the yield. If the farmer puts on additional loads of fertilizer or employs additional men, he may raise the total harvest, but the return per unit of capital and labour will be less. Every farm has its own maximum of development, and the farmer who would be successful must use all the scientific aids of the colleges and experimental stations, as well as his own native intelligence, to reach that peak. The man on a farm producing 12 bushels of wheat per acre has not a chance if the economy is geared to a yield of 20 bushels. Suppose the price to be the same, $1.25 per bushel, and the cost to be the same, $14.54 per acre, then the farm yielding 20 bushels will give a net profit of $10.46 per acre; a 16-bushel farm will give just about half, $5.46, while the profit from a 12-bushel farm will be only 46 cents an acre. If the yield drops to 10 bushels there is a net loss of $2.04 an acre, and at 8 bushels the loss is $4.54. These figures are purely arbitrary, for purposes of mathematical illustration, and do not lay claim to any resemblance to the cost of raising wheat. The same principles would apply to any other crops.

Field Crops

Canada's most spectacular advance, probably, has been in grain, which held out the economic attraction of providing a crop of world-wide food importance greater than was necessary for the family need. Under changing conditions, it became economical to grow crops to be fed on farms and sold as live stock, milk, bacon, and eggs. It is estimated that nearly 600 million bushels of wheat will be fed to animals on this continent during this crop year, while civilian and home military requirements of Canada and the United States may total only 580 million bushels. On the basis of our pre-war bread consumption, it would take Canadians about 13 years to get rid of the amount of wheat that live stock will consume this year.

In 1608 the whole Canadian grain crop went into six or seven barrels; in 1943 the payments to prairie farmers for grain, exclusive of subsidies and assistances, was $333 million, and the estimated carryover of wheat at July 31st will be 413 million bushels. Wheat is the king of Canadian crops. According to the Statistical Year Book of the League of Nations, the 1941–42 crop in Canada amounted to 28 bushels per capita, in Australia 24 bushels, in Argentina 17 bushels, and in the United States 7 bushels.

Live Stock

Domestic animals bred for farm purposes have become of increasing interest to farmers. In the first quarter of 1944, the output of live stock and live stock products reached very high levels, while dairying, a distinct branch of agriculture, has advanced greatly. The semi-annual survey of the Dominion Bureau of Statistics revealed at December 1, 1943, the following increases in live stock numbers in comparison with the same date in 1939: hogs 99 per cent,poultry 32 per cent, cattle 16 per cent, sheep 3 per cent. The number of hogs has shown a continual increase since the first census, and the latest estimate is 9½ million. Many farmers, upon venturing into hog-raising, deplore the "loss" in feed. Even under the very best practice, only about one-sixth of the ingoing corn stays on the hog as usable human food, and the average efficiency is much less than that. Other live stock are even worse: good calves return one part in 12 of the food given them, and the best full grown beeves only one part in 30.

Other Farm Products

Horticulture is a distinct and highly scientific branch of agriculture, embracing the growing, improving and utilizing of fruits, vegetables and trees for food and for ornamentation. No significant amount of fruit and vegetables finds its way into industrial uses in Canada, practically all being used as food, either fresh or processed. While potatoes are a staple in the diet of farm families, and nearly all farms grow at least enough for their own consumption, there is rivalry between provinces for the honour of producing the best commercial potatoes. One member of parliament from a western constituency told the House of Commons recently that if the west ever went in for

growing potatoes on a big scale it would drive the eastern product off the market, because of size and quality. Nevertheless, the Maritimes maintain their reputation for fine potatoes, supported by high export demand in ordinary times.

Canada consumes, under ordinary circumstances, about 450 million pounds of fats a year, exclusive of butter, and about 55 per cent is home-grown. Oil seeds constitute an important crop group, forming the basis of a substantial processing industry. They provide the base for shortening, salad oils, soap, paint, linoleum, lubricants, and a host of other commodities either in whole or in part. Canada's principal oil-bearing crop is flaxseed, which supplies linseed oil as well as fibre.

Soybeans and sunflowers have been engaging attention. The former enter into an amazing array of things — oil, sugar, fertilizer, cattle food, vitamin B, and scores of plastics. The objective for sunflowers in 1944 is 50,000 acres, sufficient to keep two crushing plants in operation, supplying high quality edible oil and protein oil suitable for stock feed.

The area growing tobacco has been increasing steadily, and in 1942 reached a total of 79,000 acres, all but 360 acres of which was in Quebec and Ontario.

The Farmer

So much for the products of the farm; now for a glance at the persons who produce them. Nearly all our farms were family enterprises in early days, using the services of adult and adolescent members of the family and providing for their needs out of the farm produce. But Canada has reached a point where such self-sufficiency, even if possible, is no longer desirable. The world of today offers many things which cannot be made on the farm, and if the farmer wants them he must have cash crops or else spend part of his time running the farm and part away from it earning cash in supplementary occupations. While self-sufficiency may be preferable to insufficiency, and while it may be better to live on submarginal lands rather than in city slums, no farmer should feel that he is limited to what he is able to do today, because all science is trying to help him realize something greater.

Of course, farmers differ greatly in ability, just like men in cities. Some have greater knowledge than others of soil and climate. Some are more thrifty, more energetic, more foresighted. There are marginal men as well as marginal lands and marginal industries, the kind of men, in whatever line of activity, who seldom make more than a living and never accumulate a bank account. To make a success of farming, a man must organize his holding so as to achieve the greatest efficiency. He must keep sufficient records to locate and correct losing ventures, and expand and make the most of the profitable features. He must know something of many sciences, and a great deal about some, and he must add to what he learns a wealth of commonsense. He must be able to put into practice the lessons provided by the Agricultural College or Department. He must study market trends and become enough of a mechanic to keep the farm machinery in running order. He must develop a philosophy capable of coping with troubles arising from labour, insects, weather, drought, flood and war. He must not copy slavishly the plans that work well for his neighbours, because his farm has peculiarities of its own, and it is a sign of immaturity to think that everything currently popular is really good.

Farm Improvement

One factor contributing to dissatisfaction with farm life is the absence of amenities. Many farms well equipped with modern production tools still lack running water, electric lights and bathrooms. Farmers have been so intensely absorbed in the struggle to produce commodities that they have not had time or inclination to think of comfort. Today, however, farmers' children, especially their daughters, know something about the ease and luxuries of city life, and are insisting upon more comfort and beauty in their farm homes. No one knows better than the farmer that there is a great difference between what is physically desirable and what is economically feasible, but many farm homes could be benefited, without great expense, by devoting an occasional day to sprucing up and improvement. Women have a very special problem when they live on farms. They are home-makers engaged in productive work. If any women in the world deserve electrification, running water and other simplifiers of housework, the farm women do.

Marketing

Having produced, the farmer must sell, but even such a simple statement is complicated by the fact that the farmer is both a producer and a consumer. Many of the people to whom the interests of the farmer are supposed to be opposed are in truth dependent upon his prosperity to maintain their employment, while, on the other hand, the farmer cannot go too far in demanding price concessions without running the risk of reducing his market and depleting his income. Every farmer must address himself first of all to producing commodities of the quality and kind desired by people in the place where they are to be sold, and regulating the flow to accommodate those markets. Diversification of farming is not in itself a guarantee of success, but only such diversification as leads into production of paying crops acceptable to consumers.

With farmers producing a great deal more than the domestic market can absorb, expansion and prosperity of agriculture can be attained only through the greatest development of export fields. During the pre-war years 1925–39, 72 per cent of the cheese produced was exported, 65 per cent of the wheat, 44 per cent of the apples, and 28 per cent of the concentrated milk. The need for such external sales will not be lessened in the post-war years, for the simple reason that Canada's population is not likely to increase rapidly to the point where it could absorb all Canada's surplus farm produce.

Some farmers have inveighed against the regulations governing export goods, but years of experience have shown that the bother and cost of grading are more than offset by widened markets and greater acceptability. It is estimated, for instance, that the live grading system, combined with educational work, has made for hog producers in Canada during the past several years from $10 to $12 million a year. In addition, grading has the effect of improving as well as

selecting. From 1930 to 1939 the percentage of hogs ranked "select bacon" increased from 15 per cent to 30 per cent, while the pounds of beef graded red and blue increased by 137 per cent.

Farm Income

All of the foregoing — cultivation, economics, management, marketing, and so on — enter into the main problem of the farmer, which is precisely that of any city dweller: improvement of standard of living. This boils down in both cases to obtaining high gross returns relative to expenses. Farming is not the conservative, non-gambling business it is often thought: every crop and every head of live stock is playing for stakes, with plenty of odds against the winning. Even the best farmer cannot offset the effect of drought, blown land, or fluctuating markets. But some farmers proved, during the depression, that much can be accomplished by keeping down costs, by raising only good animals, by using the right seed, and by careful consideration of markets.

Some ask why the farmer who does his own work is not as much entitled to a minimum return as the labourer is, but the truth is that the regulation of farm prices is exceptionally complicated because of the variation in goods, the method of production, the bounty of the soil, and the shifting market condition. Some governments have attempted a solution by guaranteeing prices for farm products, which means in effect that the government becomes the owner of the produce and must assume the responsibility for storing and selling it. The Governor of the Bank of Canada said recently to the Banking and Commerce Committee: ". . . price control continued long enough must lead to government ownership." The next step is to dictate what shall be grown and in what quantity, and farmers, of all enterprisers, are tenacious of their independence as to make it difficult for them to accept such regulation.

Complaint has developed in recent years that farmers do not receive their "fair share" of the national income. It is logical that the portion going to farmers should have been decreasing since colonial days, because at first all the national income came from agriculture, there being no other industry in the country. Gradually, the settlers achieved time off from their farming to devote to other pursuits, and they progressed, generation by generation, to make more elaborate goods and supply additional services. With developing methods of agriculture, a smaller proportion of the population was required on farms to feed all the people on an increasingly better standard. Such advancement cannot be frozen. Few will deny that the majority of farmers live on a higher plane than they did a score of years ago, and infinitely better than twenty years before that. Their cash income is now a third higher than the 1926-29 average, until a little while ago regarded as the peak of hope for farmers, and it is more than double the 1935-39 average. The increase of farm cash income to a new high level of $1,397,000,000 in 1943 was at least as much attributable to place, time and commodity utility as to rises in prices.

Some farmers, and a few farm representatives, have spoken in favour of inflation, an exhilarating experience which, however, leaves an exceedingly bad taste as an aftermath. Bigger cheques make the recipients feel better and encourage them to increase production and expand holdings of land and live stock. The trouble comes when the demand which caused the inflation ends, as all war-created demand does end. To avert runaway inflation, the Canadian government has adopted war measures of control and subsidy. Substantial subsidies and trading losses, financed out of public money, stand between higher prices to farm producers and the cost of living. From August 1939 to April 1944 the index of farm products prices increased 78 per cent, while in the same period the cost of living index went up only 18.2 per cent.

Industrial Development

There are new and expanding uses in view for agricultural raw materials, because science is transmuting crops into the basic commodities of industry. The raw material of some of our oldest and largest industries is exclusively of agricultural origin, but it is only comparatively recently that cultivation of crops particularly for industry, as against utilization of farm waste, has been seriously developed. The basic economic idea to keep in mind is that the substitution of one material for another means progress only if the new material is cheaper, more abundant or more beneficial than the one it displaces. Organization of small factories in agricultural districts to use local raw materials and employ local workers may not end all agricultural worries, but it should prove helpful in maintaining a more balanced and prosperous economy, if carried out in tune with solution of other problems.

Post-War Prospects

For their work in the war, farmers deserve the finest medals Canada can design, and their contribution toward rehabilitation of the unhappy victims of Germany in continental Europe will be equally significant. Whatever developments there may be mechanistically or technologically, farming will continue all over the world much as it is carried out today. Using new tools and methods, the farmer will still remain close to the soil. He will enjoy many of the advancements made in other fields, such as those which ameliorate the hardships of isolation, but his work, fundamentally, will remain unaltered.

In Britain, with 40,000 skilled agricultural workers in the armed services, the acreage under plough has been increased by 50 per cent. Canada's record is good, too, but Canadians have no room for self-complacency. This is an agricultural country, it is boasted, yet in the year 1938-39 the farm output of England and Wales was only 11 per cent short of that of the whole Dominion*. With its intensified production, its spreading acres of arable land, and its applications of new methods in a way that has brought success to productive efforts and prosperity to farmers, Britain provides an example that can be appreciated only through war, great opener of men's minds.

*England and Wales:	$1,038,496,500
Canada:	$1,170,943,000

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