FACTORS OF SIGNIFICANCE IN THE DEVELOPMENT OF EUROPEAN AGRICULTURE[1]

THE unmistakable signs of recovery in evidence in most of the European countries encourage the hope that normal conditions and relations will be reestablished within a very few years. It is not to be expected that all these will reflect the situation as it existed before the war. There has been too much change in political boundaries and alignments to permit the return to the exact pre-war agricultural conditions. There have been important social as well as economic changes which, in their turn, are certain to react on the future progress of European agriculture.

Even a cursory study of trends and tendencies in European farming will readily emphasize the importance of certain factors. Among these we should note land and its uses, crops and crop areas, live stock and crop protection. The preparation of more finished agricultural commodities from crop and live stock products must also be included among the major factors. Likewise, we must give heed to cooperation, taxation and tariffs, transportation, markets, research and education and social rural organization.

Many of the large land holdings have been divided and are still being divided into smaller units. Generations of experience and the shifting currents of economic and social life led to the acceptance of large farms as a vital part in the agriculture of European countries. The large estates both in western and eastern Europe were, on the whole, well managed. A number of them were, in fact, experiment stations where intelligent direction was being given to methods of soil improvement, the use of chemical fertilizers, the selection and breeding of superior types of plants and animals and the use of labor-saving devices. The social consciousness which the Armistice brought to many people in Europe soon made itself felt in the demand for a more equitable distribution of the land. Rising taxes, increasing labor costs and legislation not always free from bias has forced and is still forcing the subdivision of the larger estates. The new owners of the smaller units are not always well enough provided with working capital and with the business skill and forethought to allow them to obtain the same returns per acre that were easily secured by the former owners. There is, no doubt, a distinct social gain in the restoration of much of the land to the peasantry and to the landless classes who are anxious to live on the land. There is an undoubted economic loss because of the lessened effectiveness with which the smaller units of land are being used. But whatever the merits of the case, one must accept the situation as it is and must anticipate the development of a greater degree of cohesiveness among the owners of the smaller areas in order that suitable organization and cooperation might offset the disadvantages that are inherent in smaller holdings.

Much thought is being given in Europe to land problems both as to national policies of land ownership as well as to the financing of agricultural enterprises. Not the least suggestive of the recent publications on land problems in Europe is the report of the British Liberal Land Committee. This report is not only full of interesting facts and figures, but it also attempts to develop a philosophy of land ownership and use that may have a far reaching effect. It is argued by the authors of the report that the title of the land is vested in the state and that this has never been alienated nor should it be alienated for the good of the nation as a whole. It is argued further that the possessor of the land should be allowed to remain undisturbed in his possession as long as he uses the land properly and performs his duty to the nation fully by protecting the soil against deterioration and exacting from it sufficiently high returns.

The redistribution of the land as it has occurred both in western and eastern Europe has created many new problems in taxation, housing, transportation, schooling, etc. It has raised questions which are still to be answered as to production levels, crop rotations, the maintenance of live stock, forestry problems, and the standards of living in the rural home. Other questions have come to the fore because of the adjustment in land holdings, and have made necessary much new legislation. Land hunger is being reflected not alone in the subdivision of the larger holdings, but also in the reclamation of areas formerly regarded as of little promise for crop production. The natural development in the use of the land would leave to the last soils that are very sandy and possess a slight water-holding power. It would also ignore very heavy tenacious clay soils whose drainage becomes difficult. Similarly, peat soils whose water table is quite near the surface would also be regarded as very costly to reclaim. But the pressure for land will sooner or later compel the reclamation of such areas. In fact, we find this condition to exist in western Europe, particularly in Denmark, Germany, Italy and elsewhere. By bringing under cultivation areas not hitherto used for agricultural purposes the need for imported food may be made less acute for a time at least. More effective methods of soil treatment,

[1] Address delivered at the annual dinner of Section O—Agriculture—and Affiliated Societies at the Philadelphia meeting of the Association for the Advancement of Science. It was given in lieu of the address of the retiring vice-president, Professor Charles V. Piper, who died earlier in the year.

particularly in the use of chemical fertilizers, is also aimed toward the same end.

CROPS AND LIVE STOCK

A comparison of crop yields of pre-war and post-war periods will show that there is a definite tendency toward the reestablishment of pre-war production. Nevertheless, the production of wheat is still smaller in volume in nearly all the European countries than it was prior to 1914. There has been a very marked falling off in the production of rye. It is claimed by European economists that the populations of western Europe are showing a more decided preference for wheat bread than they did in pre-war periods. It would seem, therefore, that the relative shrinkage in the area devoted to the production of rye represents a more or less permanent feature of cereal farming in Europe. Other crops like barley, oats and flax have not yet reached pre-war levels when total yields are considered. On the other hand, crops like potatoes and sugar beets have shown a more marked return to former yields. In some of the European countries the yields of potatoes are even now greater than they were before 1914. It would be but natural to expect that with the increase in the number of small holdings the owners should devote themselves to the growing of crops which would produce a larger quantity of human food per acre. Potatoes, sugar beets and miscellaneous vegetables lend themselves more readily than do cereals to the maintenance of a relatively large population on any given area. With the wider use of chemical fertilizers, particularly of the cheapening of nitrogenous fertilizers, we should expect an intensification in the production of crops and higher production levels at least in western Europe. Ultimately, higher levels of production will become manifest also in eastern Europe.

But, with the development of more intensive methods of soil treatment, there must come also other adjustments. The carrying capacity of pastures, the more systematic growing of soiling crops, the importation of concentrates, the housing of the animals and the production and marketing of live stock products are certain to be a notable factor in the agricultural progress of Europe in the next decade. Already we see a marked increase in the number of dairy animals, an increase far in excess of pre-war numbers in some of the European countries. This is also true of poultry. On the other hand, sheep and beef cattle are holding their own in but few places, and swine are far from having regained their pre-war importance. There is a marked tendency to develop better types of live stock in order that there might be a greater production of milk, mutton, veal, pork, eggs, etc., per animal unit.

PLANT AND ANIMAL PROTECTION

The toll levied by fungi, bacteria and other micro-organisms is at all times quite heavy. Methods of plant protection in vogue in pre-war days were but partly effective. There is evident now a more determined effort to lessen the losses due to blights, mildews, rusts and other afflictions of cultivated crops. The seed treatment with organic mercury compounds, the use of fungicidal dusts and sprays is becoming more wide-spread. In the same way more serious thought is being given to measures for lessening the damage done by economic insects. However, the ravages of plant diseases and of insects are very costly to European farmers. The same may also be said of certain diseases of live stock. Foot and mouth disease is exceedingly annoying as well as costly. Anthrax, tuberculosis, pleuropneumonia, foot rot among sheep, intestinal parasites of all sorts are reducing production in a serious way. The flocks and the herds are increasing again in size. Even in Russia one finds a striking increase in the number of farm animals. The assumption is justified that a more concentrated effort is near at hand toward the combatting of the very large losses occasioned by the present inadequate protection of crops and animals.

OTHER SIGNIFICANT TENDENCIES

The proper distribution of labor has always been a serious problem in European farming. The large estates managed to find employment for many men and women both in the forests and in the manufacturing enterprises that are dependent on agricultural raw materials for their success. The subdivision of the large estates has created new problems by way of employment. European governments are face to face with rather serious questions. In some measure these are being answered by the initiation of the programs of land reclamation, road building, forest planting, etc. Taking past experience as a guide, we must assume that cooperation among the smaller producers will have the effect that it has had in Denmark, providing employment for farmers when they are not actually engaged in planting, tilling or harvesting their crops. Dairy establishments, nurseries, canning factories, tanneries and many other industries of a rural and semi-rural character are coming to play a significant rôle in European agriculture.

If time permitted, I might refer in some detail to other factors that seem to stand out as of great significance. Cooperation has been mentioned in passing, but the day of cooperation in European agriculture, and for that matter in the agriculture of other countries, has just begun. The factor of taxation is one of major importance, no doubt. All the European governments are struggling with the question of

equitable distribution of tax burdens. To what extent agriculture may be properly asked to bear a larger or smaller part of the tax burden is an unanswered question in most of the European countries. We do know that tariffs are, in a number of instances, used to protect or virtually to subsidize domestic production of food. The industrial elements in the population are naturally inclined to protest against high tariffs on agricultural commodities, for these tend to increase the cost of living. Both the employers and employees of the industries recognize this fact.

The transportation of agricultural commodities is passing through rather interesting readjustments. Despite the high cost of motor fuel, transportation by truck is, in a measure, doing for European farmers what it has done for farmers in the United States. Gradually but steadily the average distance between producer and consumer is growing longer. There is less intimate contact than there has been between the farmer and the purchaser of his products. The services of the middleman must, of necessity, become relatively more important as the distance between the producer and consumer is increased. We must likewise consider roads, freight rates, storage and local distribution as a part of the modern program of agricultural marketing.

Finally, we may note that agricultural research in Europe as well as agricultural education are very much out of keeping with the needs of a progressive agriculture. With few notable exceptions, agricultural research in Europe is supported in a niggardly way. Moreover, the experiment stations have not the intimate contact with the farmers that the American experiment stations have developed. The level of education among the owners of large farms is high enough. On the other hand, the level of education among the small farmers is again, with some notable examples, too low to permit of the most effective use of inventions and discoveries. European governments are obviously aware of this fact but very often find themselves unable to apply the remedy because of lack of financial resources. In some instances greater resources for agricultural research and education could be made available if the political leaders could be made to realize that the support of agricultural schools, colleges and experiment stations is justified in the returns which sooner or later come because of more efficient production, greater contentment, higher economic levels and better social relations in the rural communities.

JACOB G. LIPMAN

NEW JERSEY AGRICULTURAL EXPERIMENT STATION

FRENCH INSTRUCTION AND RESEARCH IN BIOLOGY

THE young Frenchman comes to the university with a mature mind, well drilled in the fundamentals of general culture and with a set purpose to his studies. The "Baccalauréat," which he has just completed, is equivalent to the first two years' work in an American university of the highest grade, and to the bachelor's degree from a smaller American college. Biology, then, is taught in France not so much with the purpose of giving a general idea of the subject to great numbers of students, as with the view of training intensively a few young men and women as biologists or teachers of biology.

The "Licence," which is the first university title to be acquired by a student after the "Baccalauréat," is composed of three "Certificats" in as many subjects. For prospective teachers of biology in the Lycées, these "Certificats" must be in zoology, botany and geology. For future biologists, additional "Certificats" in chemistry, physiology and physics are recommended. The student in biology also usually spends some time, before his "Licence," at one of the several marine biological stations, where he studies marine invertebrates, and where he comes in close contact with research workers in biology from all over the world.

A "Certificat" consists of the combined teaching of two or three professors in the same subject. The full professors give only lectures on special subjects; the "Maîtres de Conférences," corresponding to the American associate professors, cover an entire subject during the year. Thus, during the academic year 1925–1926 in Paris, M. Paul Wintrebert, professor of comparative anatomy and histology, gave a series of lectures on the vertebrate skeleton, while M. François Picart, maître de conférences in embryology, covered the whole field of invertebrate and vertebrate embryology. The instructors do, on the whole, very little formal teaching, and the student is expected and even required to glean for himself out of text-books whatever of importance in a subject is not taken up by the professor or maître de conférences. He is liable to be examined on any part of his subject in the series of examinations which occur at the end of the academic year. While the laboratory work, which is in the hands of a "chef de trauvaux" or a "préparateur," is compulsory, attendance at any of the lectures is not required, and no examinations are usually given during the year.

If, at the end of his "Licence" the young biologist wishes to work either for a "diplôme d'études supérieures" or for a doctorate, both of which imply original research work, he chooses the laboratory in which he wishes to carry on his investigation, and