THE WAR AND AGRICULTURE

SOME LESSONS TO BE DERIVED THEREFROM

BY

NAGENDRA NATH GANGULEE, B.Sc.
(ILL., U.S.A.)

Member of the American Agronomy Society, National Geographic Society, Illinois Corn Growers' Association, Birbhum Agricultural Association.

Author of "Agricultural Improvement in India" (in Bengali)

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TO

THE EDITORS OF THE INDIAN PRESS WHO CAN CONSTANTLY AND IMPRESSIVELY EXPLAIN TO THE PEOPLE THE NEEDS OF THE NATION AND URGE THEM TO RESPOND

Believe in the "Patriotism of [illegible]

"The most decisive line of defense must be our farms, our gardens and our orchards."—*J. H. C.*

PREFACE

This small brochure does not offer a complete analysis of the agricultural situation caused by the war throughout the world, but attempts, in general, to present some of the significant phases of the agricultural problems brought to our notice during the present war, and, in particular, to sketch briefly the lessons which the shears of war have laid bare to us.

Two of these articles originally appeared in *The Modern Review*. Though they all have been revised, and other chapters are entirely rewritten in the light of all available information, they have the limitations of magazine articles.

During the stress and strain of war the importance of a well-considered, definite Government policy for the improvement of agriculture in India has been as clear as sunlight, and it is hoped that Government will not overlook it while framing the Reconstruction policies of the Empire. Public opinion in India must also

realise that India has vast resources, but one of the basic principles of national prosperity lies in the soil.

My best thanks are due to Mr. G. F. Shirras, Director of Statistics, for giving me the statistical figures quoted, and to the Editor of *The Modern Review* for permission to reprint the articles published in that Journal.

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NAGENDRA NATH GANGULEE

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CHAPTER I

THE WAR AND AGRICULTURE

The International Agricultural Institute of Rome estimated, in 1917, the total yield of wheat in Denmark, Spain, France, Ireland, Italy, Norway, the Netherlands, Sweden, Switzerland, Canada, the United States, India, Japan, Algeria, Egypt, Tunis, Argentina, Australia and New Zealand to be at 27·7 per cent below the yield of 1916. Since then the situation has not changed and the inhabitants of the European continent are confronted with famine conditions. Prices of nearly all things continue to rise and it becomes more and more difficult to obtain the prime necessaries of life. Many millions of men have been withdrawn from productive labour, particularly from agriculture, and consequently much land is out of cultivation. Many farms were left without stock, seed or agricultural implements, without anyone to cultivate them.

Then, there was disorganisation of transport. Grain which had been brought to the stations could not be conveyed to the places where it was wanted. Industrial concerns were

brought to a standstill through lack of coal and other materials. The result of all these economic disturbances is, that to-day the continent of Europe is a chaos of riot and bloodshed.

The tragic situation which is developing on the continent was foreseen by economists many years ago. One of the prominent Russian bankers, M. Bloch, after many years' devoted study of modern weapons of war and the effects which would be produced by their use, came to the definite conclusion that Armageddon would be "accompanied by the entire dislocation of all industry and severing of all sources of supply by which alone the community is able to bear that crushing burden of the armed peace". He pointed out that "it will be a multiplication of expenditure simultaneously accompanied by a diminution of the sources by which that expenditure can be met. That is the future for war—not fighting, but famine; not the slaying of men, but the bankruptcy of nations and the breaking up of the whole social organisation of nations." This was written by the Russian economist twenty years ago, and to-day we are becoming familiar with the events he foresaw. In 1900, on the initiative of the late Mr. Stead, an abridgment of M. Bloch's remarkable book[1] was published in England. This interesting treatise contains a prefatory conversation

[1] *Modern Weapons and Modern War*, Grant Richards.

between the author and Mr. Stead. I quote here a portion of their conversation in which M. Bloch puts aside all arguments based on experience of past wars. He says :

Consider for one moment what nations were a hundred years ago and what they are to-day. In those days, before railways, telegraphs, steamships, etc., were invented, each nation was more or less a homogeneous, self-contained, self-sufficing unit. Europe was built in a series of watertight compartments. Each country sufficed for its own needs, grew its own wheat, fattened its own cattle, supplied itself for its own needs within its own frontiers. All that is changed; with the exception of Russia and Austria there is not one country in Europe which is not absolutely dependent for its beef and its bread supplies on beyond the frontiers.

Every year the interdependence of nations upon each other for the necessaries of life is greater than it ever was before. Germany is dependent upon Russia for two and a half months' supply of wheat in every year. That supply would, of course, be immediately cut off if Russia and Germany went to war; and a similar state of things prevails between other nations in relation to their commodities. Hence the first thing that war would do would be to deprive the Powers that made it of all opportunity of benefiting by the products of the nations against whom they were fighting.

"Yes," Mr. Stead objected, "but the world is wide, and would it not be possible to obtain food enough and to spare from neutral nations?"

"That assumes," said M. Bloch, "first, that the machinery of supply and distribution remains unaffected by war. Secondly that the capacity for paying for supplies remains unimpaired. Neither of those things is true."

Those who have followed the tragic history of the present war cannot deny the truth of

M. Bloch's prophecy. The machinery of supply and distribution has indeed been seriously damaged, and the most urgent of all problems is the problem of furnishing armies and population with adequate supplies of food. Not only the nations at war, but also neutrals, have been subjected to economic constriction.

In these days of industrialism no nation can live by itself. Every country is dependent, to a greater or less degree, on its neighbour. But the present war has brought home to the industrial countries the danger of *undue* dependence on imported foodstuffs. Politicians now realise that agriculture, if neglected, affects vitally every phase of the national existence of a country, and that any measure which contributes to the prosperity of agriculture should be regarded "as an integral part of a general system of national defence". It is hoped that the tendency of economical development after the war will be to induce more and more every nation to rely chiefly upon a home production of all the chief necessaries of life. This will give to agriculture the new character of intensive culture by which the limits of agricultural production can be widened to a great extent.

I believe in the possibilities of agriculture, and thoroughly endorse the views of Prince Kropotkin who says:

> There is not one nation in the world which, being armed with the present powers of agriculture, could not

grow on its cultivable area all the food and most of the raw materials derived from agriculture which are required for its population, even if the requirements of that population were rapidly increased as they certainly ought to be.

Wisdom consists in learning from experience, and the experience gained in this war should teach us the danger of neglecting agriculture. The two sister arts of Agriculture and Industry cannot remain as estranged as they are now. The industrial nations are bound to revert to agriculture; for they have realised that the best interests of industry are in complete harmony with the best interests of agriculture.

Agriculture is the mainstay of the people of India. The annual value of the agricultural produce of British India alone, has been lately estimated at £1,000,000,000, that is, fifteen hundred crores of rupees. She occupies a unique position among nations as an exporter of agricultural produce, and consequently her importance in the post-war trade programme cannot be overestimated. The Imperial Government now realise that "the country which will be in the strongest economic position in the future will be the country that will have the greatest relative advantage in the production—not of munitions, not of ships, not of manufactures, but of agricultural produce". Therefore, as an Imperial necessity, the Government of India may revise its agricultural policy, and the bourgeois class, remembering that

India is the essential provider of raw materials, may endorse it for "the welfare of India".

It requires no imagination to find out that the present position of agriculture in India is unsatisfactory. A radical change in Government policy is necessary to effect any substantial improvement in the conditions which have hitherto prevailed. In the light of new experience gained during the war, is it not a justifiable demand to ask the Government of India to adopt a liberal policy for the improvement of the agriculture of this vast country?

The possibilities of scientific agriculture have been demonstrated in India. We find that if only one or two of the improvements suggested by the State Departments of Agriculture can be effected, the income of our peasantry will be increased by over 400 crores of rupees. If such is the potentiality of Indian agriculture, ought not the Government to adopt rapid and drastic methods of regenerating agriculture in order to meet the double purpose of providing ample food in the country and of meeting the demands of the Empire.

But the essential problem will remain unsolved until the Indian cultivator learns how to make land productive, which can never be without education. The future of India is with the peasant, and the future of the peasant is with the *School*.

CHAPTER II

INCREASED FOOD PRODUCTION FROM SOIL

It seems that the fundamental key-note of the international crisis to-day is the food problem. Military strategists, practical politicians and statesmen all realise the importance of increasing the production of crops, and their eyes are now beginning to be opened to the true significance of scientific agriculture. Not long ago I read a remark made by an eminent strategist, that the recent collapse of the Italian army was largely due to the lack of food supplies, the harvest of the year 1916 having been far below the normal. Thus it becomes clear that all the machinery of war, explosives and great skill in army manœuvre, are of no avail if the supply of food is inadequate. Therefore the problem of increased food production from soils is now being treated as a vital problem.

Land is perhaps the most difficult raw material in the world; to obtain increased production from soils, the farmer must not only have capital and machinery, but he must be

given the facilities and advantages of the organisation of production; that is, the methods of agriculture must be revised in the light of modern knowledge and requirements, so that the land may bring forth her increase.

Efforts to increase the agricultural preparedness of England began soon after the war broke out. For no Government can neglect to face the fundamental fact that "as armies march on their stomachs, so too, in this war of nations, the whole people who are in the war, fight on their stomachs". Since the British nation was dependent for its food on "outside," the agriculture of the country was much neglected.

Soon after the commencement of the present war, three committees[1] were appointed to consider the food supply problem of Great Britain. Committees were asked to find out schemes by which agricultural regeneration could be successfully effected in the country. So the chief recommendations of these committees should be interesting as well as instructive to students of agriculture and rural economics.

The recommendations can be grouped under four different heads:

1. *Crops, Manures and Methods of Cultivation.*—The Committees recommended the breaking up of grass land and its conversion to tillage

[1] One for England, another for Scotland and the third for Ireland.

as soon as practicable. It was suggested that farmers should receive a bonus of £2 per acre on all grass land that they put under arable cultivation—the payment to be spread over four years in order to ensure that the land was kept in good cultivation. France has recently decided to take this step to encourage farmers to extend the area of cultivation, and the bonus offered by the Government amounts to 6s. 9d. per acre.

The cultivation of improved varieties of crops and the use of high class seeds should be encouraged by the Bureaux of Agriculture. To facilitate farm work, the extended use of motor tractors and various labour-saving machines was recommended. As to the use of artificial manures, the committees urged that exports of sulphate of ammonia and basic slag should be controlled. Here, the committees put their fingers on the right solution of the problem of increased production. The annual normal output of sulphate of ammonia in Great Britain is over 400,000 tons; more than half of this is taken by foreign countries. If the total wheat area of the country cannot absorb the exports of this useful manure, its use can be advantageously extended to other crops. I quote Professor Somerville's estimate of the increased yield that may be obtained by its use.

At a moderate estimate, a cwt. of sulphate of ammonia will produce 4 bushels of wheat, 6 of oats, a

ton of roots and half a ton of potatoes, or a quarter of a ton of hay. In terms of wheat, 250,000 tons (amount exported) of this manure would produce 2½ million quarters, and this would mean an addition of more than 30 per cent to our present home-grown supplies.

Basic slag can be used on pasture with much profit. The annual export of this manure is about 40,000 tons, but this quantity can be easily utilised by 160,000 acres of the permanent pasture of the country.

Five cwts. of basic slag will, on a moderate estimate, produce 100 lbs. of meat in five years, so that the 40,000 tons spread on British fields would produce 16 million lbs. of meat, or 3,200,000 lbs. annually for five years.

The broad fact, therefore, emerges from these considerations, that in order to increase the productivity of British soil, the extended use of artificial manures should be advocated and exports of fertilisers should be stopped.

Let me pass on to the other recommendations of the committees.

2. *Live Stock.*—The Committees noted that pig keeping in Great Britain was decreasing, but, it being an animal capable of rapid increase and quick maturity, they were in favour of extending pig breeding.

Attempts to procure highly nutritive substances for live stock were commended. The committees were of opinion that restrictions

put on the export of feeding stuffs produced in the country should be continued after the war.

3. *Estate Management.*—Under this head the committees made several recommendations. The relaxation of restrictive covenants in leases in respect of cropping; the granting of special facilities to tenants in regard to killing rabbits and foxes, the encouragement of the destruction of rats, sparrows, rooks, etc., the encouragement (even compulsion) by landlords of their tenants in the direction of better farming; the grazing[1] of deer forests by sheep and cattle; the discouragement of artificial game rearing—these were the principal items emphasised by the committees.

4. *Advice and Guidance.*—The Committees were of opinion that agencies for disseminating agricultural knowledge should be efficient and active. They should supply information and practical advice with regard to seeds, manures, cultivation, etc. Government through co-operative societies should advance loans for the purchase of implements and manures, and everything should be done to foster the spirit of co-operation among small farmers.

So much, then, for the recommendations of the committees. They are very suggestive, and

[1] Deer forest covers about 3½ million acres. This would furnish grazing for 350,000 head of sheep, which might yield annually about a million pounds of wool and three million pounds of meat.

if the British nation directs its efforts towards putting these suggestions into practice, the food production of the country could no doubt be maintained at a high level. As the basis of agricultural progress is education of the farmers, the members of the committees strongly advocated the extension of opportunities for the spread of liberal education among the rural population. Farmers must know how to apply science to agriculture; they must safeguard themselves against the dangers inherent in the application of artificial manures, and for this, knowledge in agricultural chemistry is necessary. They must understand the economic fluctuations of the country and adjust themselves to new conditions. Above all, only by education will they realise that great national responsibilities rest on them, in that they handle "the prime agent of production".

In the course of these recommendations, we find that State Aid becomes necessary to encourage farmers to better cultivation. The Home Government is now willing to give a bonus on the conversion of grass land to tillage, and by restrictions in exporting feeding-stuffs and artificial manures the farmer's interest has been protected. It was also suggested that a minimum price for farm produce should be guaranteed, and the Government proposes to make the minimum wage 25s. weekly, during the period in which prices are guaranteed. Mr. Lloyd

George, in speaking before the House of Commons, said :

> Farmers need not apprehend that the State will in future be indifferent to the importance of their industry. Whatever may befall, no Government can ever again neglect agriculture. The war has taught us that the preservation of this essential industry is as important a part of national defence as the maintenance of the Army and Navy.

Now that that State has come forward to rescue British agriculture and protect farmers' interests, we can rest assured that the stimulus thus given will help to improve agriculture within a short period. Government can no longer shut its eyes to the economic necessity of increasing food production in the British Isles, and to assist the country to approach this goal, the Government must provide for (1) the education of the farmer, (2) fiscal protection, (3) financial help through co-operative credit societies.

The recommendations of the committees have been accepted by the Government, and no time has been lost in mobilising the farmers of the country with a view to "speed the production of food-crops". But the character of the agricultural organisations was such, that quick response from the farming population could not be expected. Government had then to resort to legislation, but mere legislation without effective rural organisations could not achieve the desired end. As late as August,

1916, a committee was formed "with the object of reporting on the methods of effecting increased production of food supplies". Every possible pressure was brought to bear on intensive methods of cultivation; the available sources of manures were zealously guarded, the large areas of waste land are being reclaimed, and the cultivators are supplied with seeds, machinery and necessary artificials. It is reported that the number of tractors placed by the Food Protection Department at the disposal of the farmers of England and Wales now approaches three thousand. Every day the demand is increasing and the authorities attempt to meet the demand as best they can.

The productivity of agriculture depends on the quality of the soil, seed, manure and labour available. Of these, agricultural machinery and implements, seed and manure are comparatively easily obtainable; but the greatest difficulty lies in the supply of labour. If we compare the number of persons employed in agriculture in the United Kingdom and Germany,[1] it becomes perfectly obvious that the doubling and trebling of British agricultural production requires the doubling and trebling of agricultural workers. It is known, to those familiar with the history

[1] Persons occupied in agriculture:
In Germany, in 1907 (62,000,000 inhabitants) 9,883,267.
In the United Kingdom, in 1901 (41,500,000 inhabitants) 2,265,868.

of British agriculture, that the difficulty of providing the necessary labour for the land is increased by the fact that the rural districts have become seriously underpopulated. Then, as soon as the war broke out, the demands of the army seriously depleted the supply of agricultural labour, and the problem became acute.

The employment of the labour-saving farm machinery and implements placed at the disposal of the farmer by the British Government, caused a certain amount of relief, and thus, through the active co-operation of the State, the farmer was able to meet, to a certain extent, the serious emergency that faced the food supply of the country.

To show that the doctrine of *laissez faire* is inimical to the development of agriculture and that there is urgent need for the adoption by the State of a considered Agricultural Policy for the introduction of modern methods of cultivation, I desire to give an account of the work done by the British Government to put labour-saving machinery at the disposal of the farmers. "At the beginning of 1917, there were only a few serviceable tractors and steam ploughs in the country. Moreover, the sources of supply were cut off, and even the richest farmers were unable to buy English-made machinery or the necessary motor fuel. As regards steam-tackle, there were in January,

1917, some 510 sets. But of these only 250 were in working order, because the farmers had been unable to get repairs done and had in many cases lost their skilled men. The Board of Agriculture managed to get about 210 of the 250 broken-down sets into operation, and brought back from the army 300 skilled men to drive them. But this machinery was totally inadequate to effect the tremendous increase that was necessary in the arable land of the country, and the Government decided to develop largely the supply of plough tractors.

The difficulty was great, because the engineering works of the country had been turned over to the manufacture of munitions and the shipping available for imports from America was limited. Again, the farmers, always a conservative class, regarded these mechanical novelties with some suspicion, though they became quickly converted to a belief in their utility and used them with great effect. The result was, that in April and May of 1917, a time of very pressing emergency, the Government was able to place a fleet of 666 tractors, all Government-owned or hired, at the disposal of the farmers. At the end of March, 1918, the number of Government tractors at work had risen to 3,000. These machines dealt at that season with 611,000 acres, while the steam tackle accounted for 1,000,000 acres.

In order to utilise the tractors to the utmost extent, it was necessary to organise a central control coupled with local arrangements for working them and keeping them in repair. These latter facilities were provided by the mechanics and repairing shops of the motor trade, which was really entrusted with the local management, under the control of the Food Production Department of the Board of Agriculture. Tractors were supplied to the various counties as they became available. In each county there was a Tractor representative who acted in concert with the Agricultural Executive Committee for the county and arranged where the tractors should go and what work they should do.

It was necessary that Government tractors should be available whenever they were required. They were, therefore, grouped in units of ten, each unit serving a wide district. Petrol, paraffin and grease had to be delivered daily in a light motor van. In certain cases of mechanical trouble a mechanic would have to be summoned from the headquarters of the unit, and from time to time a supervisor had to visit the tractor to see that the men were working and that the ploughing was satisfactory. Ploughing centres were organised, where 6,000 men as well as a large number of women were trained to plough. It

was found that women were very successful with the lighter type of tractor.

The tractor is, of course, not the only labour-saving instrument employed by the Government. Binders, combined mowers and reapers, harrows and many other implements were bought and owned by the Government and made available for the farmers. As a result of all these efforts, the arable area of the country was increased by some three million acres and the war problem of food production was practically solved. Although it is questionable whether the extended use of labour-saving farm machinery saves man-labour to as great an extent as is often suggested, it cannot be denied that its chief advantage is that it enables the farmer to get work done at the right time.

Now I pass on to the next important question of improved agriculture. Selection of pure stock of seeds is vitally important to ensure success in increased production. For the next year's harvest the Board of Agriculture is distributing wheat among the cultivators. To meet the problem of the shortage of seed potatoes, tubers for planting were cut into small sections and placed in boxes for sprouting. Several experiments were conducted with a view to economise the use of seeds.

The noticeable fact in the awakening of Great Britain to promote her agriculture is the willing co-operation of the large landholder. On

many estates he has formed a food production society, and through suitable agencies he disseminates agricultural knowledge among his tenants and impresses them with the vital importance of increasing the yield of crops. To familiarise the cultivators with advanced scientific farming and to investigate local agricultural problems, there is a demonstration farm. Better farm implements are introduced, selection of seed and economy in its use are taught, and arrangements are made for the purchase and distribution of manures. The British farmers know the art of agriculture as well as any farmer on the continent; the farm implements employed by them are better constructed than those used by continental cultivators; they can produce the best specimens of breeds of live stock; they are not unfamiliar with the farming methods of the present century; yet in England the production of food from the soil has decreased and her agricultural position is no longer satisfactory. I wish to emphasise the fact that in the course of the present struggle, England discovered her unstable economic conditions and realised that negligence on the part of the Government in the matter of food production would lead a whole people to disaster, however prodigious a growth of industry there might be.

I now turn to Germany. She was well prepared to face the food problem that might

arise in case of war, for "the chief industry of Germany," Mirabeau said a century ago, "is making war". Her statesmen advocated such an economic policy as would effect steady increase in the productivity of the German soil. Without further comments I take the liberty of quoting the views of Von Bülow as expressed in his book, *Imperial Germany*.

> I was persuaded that vigorous agriculture is *necessary* for us from the economic, but, above all, from the national and social points of view . . .
>
> As in time of war, industry is dependent on the buying power of agriculture, the productive power of agriculture is a vital question for the whole nation. There are parties and groups representing certain economic interests which demand that the Government shall place a very small duty on agricultural products from abroad, or even let them in duty-free, so that the price of comestibles, under the pressure of foreign competition, may be kept low, and thus the industrial workman's expenses of living may be reduced. *They want to base all economic policy on an imaginary permanent peace.*

Until late in the nineteenth century, German economists could not make up their minds as to the nature of the agricultural policy Germany should adopt. But she was determined to assist agriculture and aim at a large increase in food production. It was vitally important in her case, for, as Count Von Schwerin-Lowitz, the President of the German Agricultural Council, put it:

"Our position in the heart of Europe, surrounded by envious enemies, would have been

exactly parallel to that of a fortress reduced by hunger, or of a fortress which, in spite of all military power, was certain to be reduced by hunger in the end."

The position of the German agriculturist, about 1894, was very unsatisfactory, but the determined effort of German scientists and public-spirited men removed the difficulties which faced economic farming, and to-day, based on a better scientific understanding of the laws of nature and an effective co-operation of science and practice, German agriculture may well pride itself on the fact of its great achievement. I quote Lord Selbourne, the President of the Board of Agriculture and Fisheries, Great Britain, who, in a prefatory note to a Parliamentary Report on German agriculture, said:

> If agriculture had made no more progress in Germany than it has in the United Kingdom during the period 1895 to 1915, the German Empire would have been at the end of its food resources long before the end of the second year of the war.

and that, as a matter of fact, the war was being fought just as much on an agricultural as on a military organisation of the nation.

Let us now review the position of German agriculture during the war. Germany foresaw that in case of war her enemies would attempt a "tight blockade," and therefore success in the struggle depended largely upon the fact of

being able to make the country self-contained with respect to all the essential requisites of life.

Germany consumes a very large quantity of combined nitrogen in her agriculture. In 1913 the consumption amounted to 750,000 tons of Chilean nitrate, 35,000 tons of Norwegian nitrate, 46,000 tons of ammonium sulphate, and 30,000 tons of cyanamide.

Now the fertility of the soil is broadly speaking estimated by the measure of nitrogen it contains. Plants require nitrogen for their nourishment, which they obtain from the nitrogen constituents of the soil. The soil is supplied with combined nitrogen partly from decaying vegetable matter and partly from the waste products of animals, such as dung, urine, etc.; the rest has to be added either in the shape of oil cakes or in that of chemical manures, especially sodium nitrate and ammonium sulphate. The chief cause of the increased productivity of the German soil is in the increase in the use of artificial manures, and in case of war, if the supply were stopped, the production of crops would also be considerably reduced. Therefore, in her preparation for war, she made every effort to lay in a large stock of nitrates.

But the war was not to end soon, and the stock was exhausted within a year. The manner in which the difficulty has been overcome, and the danger of nitrogen starvation averted, is

described by Prof. Camille Martignon in the *Revue Général des Sciences*. His article[1] shows quite clearly that chemistry has saved Germany from a great disaster. Her chemists were at work to find out the methods of synthetising nitric acid, and under Government stimulus a large number of factories were started within a short time. I draw largely upon the article of Prof. Martignon in making the following extracts.

Soon after the battle of the Marne the production of artificial nitrates and of ammonium sulphate was much encouraged by the German Government, and it subsidised the well-known chemical firms—the Badische Aniline Company and Bayer & Co., to the extent of 30,000,000 marks, for the installation of factories to convert ammonia into nitric acid. In peace time 550,000 tons of ammonium sulphate were produced annually in Germany, but the amount was greatly reduced under war conditions, the annual output now being about 250,000 tons.

In the meantime, eminent German chemists were at work to find out a solution of the problem of converting the ammonium sulphate into nitric acid. A French chemist, Kuhlmann, had discovered that ammonia is oxidised to nitrogen peroxide when mixed with air and passed over

[1] See *Nature*, 8th March, 1917. Also *Agricultural Journal of India*, XII, 3.

warm, finely divided platinum. The reaction was employed on a commercial scale by a certain chemical firm. The noticeable fact is that by the end of 1915, the *Anhaltische Maschinenbau* Society of Berlin established thirty installations for the purpose of producing nitric acid, and these had a capacity of more than 100,000 tons of nitric acid per month.

Besides these, the Germans have established a factory where nitric acid is being prepared by the direct oxidation of nitrogen in the electric flame (the process is a modification of that of Birkeland and Eyde), and this has an annual output of 6,000 tons. The principal method adopted for the preparation of a combined nitrogen was the direct synthesis of ammonia. A celebrated German firm has established a factory with an annual output of 30,000 tons of synthetic ammonium sulphate. In April, 1914, the company increased its capital in order to raise the output to 130,000 tons, and after the battle of the Marne, when the Germans realised that the war was likely to be prolonged, it was *subsidised* by the German Government to increase the production to 300,000 tons.

Before the war the production of cyanamide in Germany was comparatively small, *but it has increased largely under Government stimulus.*

In the direction of the manufacture of manures, it was necessary to economise sulphuric acid, so ammonia was neutralised with

nitre cake and the resulting mixture of sodium and ammonium sulphates was mixed with superphosphate which was found to absorb gaseous ammonia, and although the calcium acid phosphate is thereby converted into the insoluble tricalcic phosphate, it is formed in an easily assimilable condition, and the product is found by experience to act both as a nitrogen and phosphorus manure.

Then, Germany has an enormous quantity of potash salts, which greatly benefit the vast tract of light soils in Germany.

Of course the extensive use of artificial manures in Germany has been possible because of her well organised system of scientific education in agriculture, and with what results let us see.

In spite of the rapid increase in population from 48 millions in 1888 and 51 millions in 1895, to 67 millions in 1913, the percentage of the total food supply grown within the country has not altered materially in recent years.

It has been estimated that on each hundred acres of cultivated land in Germany seventy-five persons can be properly fed. But science alone could not have done all this in so short a time. The most characteristic feature of German agriculture during the last few decades has been the formation of effective agricultural organisations and such suitable agencies as would bring science into the actual practice of

the farmer. As an illustration of German efficiency Lord Northcliffe writes: "German organisation is so careful that if there were only one potato left in Germany, each man and woman would get a seventy-millionth part of it." That is so. Even during war her agricultural organisations are bringing into cultivation each acre of land which may happen to come within her grasp. The following extracts from *The Atlantic Monthly*, November, 1917, speak for themselves:

> The food control in Germany has led Berlin to proceed with the greatest haste towards utilising the rich farming districts which the fortunes of war have placed within her grasp. Hundreds of experts with thousands of agricultural implements have been sent to Roumania, Servia, and Asia Minor. In this latter country two agricultural centres in particular have received attention. In the province of Adana cotton growing is being developed; on the plains of Anatolia, the intensive cultivation of grain is in progress. These energetic effectors have had a twofold result. The Turks will not revolt against German domination because of starvation, if for no other reasons; and by the reason of the increasing yield of Servian, Roumanian, and Turkish lands, more of which are continually being brought into service, the food supply of the Central Empire becomes more and more completely assured.

Look at Belgium. Here the Huns have destroyed everything under their iron grip, but they have not interfered with the Belgian Peasants' League (the *Boerenbond*). It is a very powerful agricultural organisation and has contributed much towards the expansion

and development of Belgian agriculture. Germans very soon realised how helpful it would be in guarding the interests of agriculture in Belgium. They co-operated therefore, simultaneously with their occupation of Belgium, with the *Boerenbond* to increase the productiveness of Belgian agriculture. The substance of the report of the General Secretary of the League for the year 1915 has been given in *The International Review of Agricultural Economics*. The *Review* says :

"Speaking generally it is true that everything founded by the *Boerenbond* before the war has survived, and moreover new plans have been realised. Thus, the General Secretary's report notes the organisation of four new agricultural guilds, one in the Province of Antwerp, two in Brabant and one in East Flanders. Means of communication had hardly been re-established, in the last month of 1914, when the League's inspectors began once more to travel about the country in order to visit the rural associations and to co-operate, in the words of the Report, "in reviving social and economic life in the rural districts". They were entrusted at the same time with the additional duty of collecting information and noting the most urgent needs, in order to enable a directing committee to organise committees for relief and nourishment everywhere. Further, as soon as it was possible,

the *Boerenbond*, in agreement with some influential personages in the agricultural world, undertook the defence of the interests of tillers of the soil and participated in the formation of an agricultural section of the National Committee for relief and nourishment which came into being at the end of December, 1914. Two of its administrators are members of this section and have taken a large part in all its work. The Co-operative Society of Agricultural Assistance, which aims at buying food for live stock and all supplies indispensable to agriculture, was founded towards the end of February, and a delegate of the *Boerenbond* is on its administrative council.

"Until the Agricultural Assistance Society should be able to maintain agriculture with foodstuffs, manures and primary material of every kind, the *Boerenbond* itself undertook to fulfil this task and to reduce to the minimum the difficulties which the agricultural world had to meet.

"The *Boerenbond*—or more accurately its counter for sale and purchase—bought in the first place, for the provinces of Antwerp and Brabant, the food for the live stock which German civil administration granted to agriculture at the first distribution in these two provinces, and remitted the food to agricultural sections. Had there been opportunity it would have been equally zealous to render this service

to other provinces. Soon afterwards it took over from the German civil administration a sufficiently important quantity of oil cakes, of which it afterwards made grants in accordance with the instructions of the National Agricultural Section.

"The League has taken a leading part in reconstruction work: aiding the peasants with small loans, and advising them as to methods of building. A special feature of this undertaking was the effort made to ensure the construction of more comfortable and more sanitary homes than those the rural population generally had hitherto possessed.

"A Commission was nominated, and it prepared in the two languages, French and Flemish, a small pamphlet, which was specially the work of Messrs. J. Giele, and C. Van den Abeele, and is called *Construction de l'habitation rurale et de ses dependences* (Construction of a rural dwelling and its dependencies). This is a collection, as concise as possible, of explanations and practical advice on the choice and use of materials, dimensions, distribution of space, airing and ventilation, means of obtaining good drinking water, of guarding against damp, etc. The pamphlet is written very simply so as to be within the comprehension of all.

"The problem of feeding the people was dealt with especially through a branch of the association known as the Farmwives' League.

Pamphlets were distributed, and numerous lectures given throughout the country on the economical use of foodstuffs.

"One of the association's most active branches has been indisputably the Central Credit Fund. The year 1915 was one of the most important years it has had since its foundation. Not only was the number of affiliated local funds increased by forty-four, but the savings deposits were more numerous than ever, and hundreds of new, small loans were made to cultivators in needy circumstances. Of 821 rural funds existing in Belgium at the end of 1915, 437 were affiliated to the Central Fund. At this date the number of the latter's subscribed shares was 8,987, they having increased by 420 since the preceding year. The capital in shares was thus brought up to 8,987,000 francs. The fund circulated in the year amounted to 63,009,921 francs, thus considerably surpassing their ordinary level. Twenty-one new credit accounts were opened for affiliated funds, the total credit thus accorded being for 368,550 francs, which brought the amount of credit in force on December 31, 1915, up to 4,904,450 francs. The total of the savings deposits was 22,723,841 francs, having increased by 6,202,311 francs since 1914 and by 6,613,469 since 1913, the last normal year. This considerable increase in the amount of savings deposits, in the second year of the war, is partly

explained by the fact that cultivators have had partially to realise their invested capital."[1]

Another great agricultural country that was finally dragged into the horrible mess of the European struggle, is the United States of America. The country was at peace, and enormous wealth was flowing into her lap through war trade and commerce. She has been for many years the reserve granary of the world: nations in emergency look to her for food. Therefore, when she had to plunge into the arena of the world-wide conflict, the problem of increasing farm production became a war necessity. The nation looked for guidance primarily to the Federal Department of Agriculture, which made a strong appeal to the farmers of the country, and the Government press, schools, and every public agency in the United States, are now engaged in campaigning for increased productivity of the land.

With the entry of the United States into the war, America faced problems of feeding her own people and also of helping to feed the people of other nations. Such was the demand for food; and to meet this, it was estimated by the United States Department of Agriculture that it will be necessary to plant about 67,700,000

[1] I take the above extracts and comments from the *American Review of Reviews*, in which the Report of the Secretary of the League has been noted.—AUTHOR.

acres of wheat, 5,600,000 acres of rye, 7,900,000 acres of barley, 45,200,000 acres of oats, and 111,500,000 acres of corn. This is an increase of nearly 5 per cent over the immense acreage of these cereals in 1917, and 22 per cent over the average annual acreage during the past ten years.

Thanks to the ingenious character of the National Agricultural organisations, within a short time the farmers of the nation generously responded to the appeals for increased food production. "Without any kind of delay," says Mr. Carl Vrooman, Assistant Secretary of Agriculture, "on the very day that war was declared an army of 6,000,000 farmers was mobilised. Two weeks after America's declaration of war, the Department of Agriculture had organised the farming forces of the entire country for a concerted drive towards greater food production."

Congress conceived and devised a programme of legislation, the essential part of which has now been enacted into law. A vast sum of money has been appropriated to increase the efficiency of the Department of Agriculture. A brief summary of the Act referred to above may be interesting to readers.

An agricultural Act, providing for national security and defence by stimulating agriculture and facilitating the distribution of agricultural products, was approved by Congress, on 10th

August, 1917. The Act authorises the Secretary of Agriculture, with the approval of the President, to ascertain all facts relating to the supply, consumption, cost and prices, manufacture and distribution, of all food materials, fertilisers, seeds, agricultural implements and machinery, and requires that any person interrogated by the Secretary or by one of his agents, on any matter relating thereto, shall within 30 days furnish to the best of his ability the information required, by producing all relevant books and documents in his possession under penalty of a fine not exceeding $1,000 or one year's imprisonment.

The Act further authorises the Secretary of Agriculture, in case of special need for seeds suitable for the production of food or food crops, to purchase or contract with persons to grow such seeds, to store them and to furnish them to farmers for cash, at cost, including the expense of packing and transportation. The President is authorised to direct any agency or organisation of the Government to co-operate with the Secretary of Agriculture in carrying out the purposes of this Act and to co-ordinate their activities so as to avoid any preventible loss or duplication of work. Further, for the purposes of the Act, until June, 1918, the following sums of money have been appropriated.

For the prevention, control and eradication of the diseases and pests of live stock, enlargement

of live stock production, and the conservation and utilisation of poultry, dairy and other animal products $885,000 (that is, about 27 lacs of rupees), for procuring, storing and furnishing seeds $2,500,000 (that is, more than seventy-five lacs).

For the prevention, control and eradication of insects and plant diseases injurious to agriculture, and the conservation and utilisation of plant products, $441,000 (that is, thirteen and a half lacs).

For gathering authoritative information, in connection with the demand for, and the production, supply, distribution and utilisation of food, extending and enlarging the market news service, and preventing waste of food in storage, in transit, or held for sale, advice concerning the market movement or distribution of perishable products, etc., $2,522,000 (that is, above seventy-six lacs).

For miscellaneous items, such as special work in crops estimating, aiding agencies in the various States in supplying farm labour; enlarging the informational work of the Department of Agriculture, and printing and distributing emergency leaflets, posters, and other publications requiring quick issue or large editions, $650,000 (that is, about twenty lacs). The degree of success already attained by the farmers in their determined effort to bring the above increase in the production of staple

crops and live stock is beyond all expectations. The yields in 1917 are as follows:

"3,191,000,000 bushels of corn, 657,797,000 of wheat, 1,580,000,000 of oats, 201,659,000 of barley, 56,000,000 of rye, 16,813,000 of buckwheat, 33,256,000 of rice, 73,380,000 of Kafir, 439,686,000 of potatoes, 84,727,000 of sweet potatoes, 15,957,000 of commercial beans, 42,606,000 of peaches, 11,419,000 of pears, 177,733,000 of apples, and 7,621,000 tons of sugar beets."

These figures in some cases are in excess of the average crop, and there is every reason to believe that the United States Department of Agriculture will succeed in doubling the present yield of staple crops. She is following the footsteps of Germany with regard to the use of nitrogen, and it has been calculated that if she applied nitrogen upon the German scale to American soil (equivalent to about 10,000,000 tons of Chilean saltpetre yearly), the value of the total crops would be increased to $1,000,000,000, that is, more than three hundred crores of rupees. Factories are being established to ensure the supply of nitrogen and potash, for which America had to depend on Germany, now being manufactured in the country. In California, Searless Lake, covering 25,000 acres, according to official record will yield an ample supply of potash. In 1916, the total output was 36,000 tons.

[1] *Science*, Vol. XLVI, No. 1,199.

While her manufacturing chemists are at work investigating the available sources of artificial manures, without which intensive agriculture cannot be carried on, the Department of Agriculture is taking every precaution so that there may be no serious drain on the fertility of the soil through "high pressure farming". The farmers are encouraged to increase the number of live stock and to practise strict economy in the care and use of farmyard manure.

To cultivate the increased acreage and to do it thoroughly, would necessitate an equal increase in the "man power" on the farms. Thousands of agricultural labourers had gone to the war and the country was short of labour; therefore, to maintain the average crop production of the country, it became necessary to replace "man power" by machine power. All the co-operative organisations are united in the effort to substitute "man power" by machinery.

This is, then, a brief account of the organised efforts of the three most prominent nations of the world, to increase productivity of the soil. Are there no lessons which the Government and the people of India may derive from this campaign of increased food production? Or is the yield of cereal crops of India destined to average eleven bushels only to the acre and no more?

The lessons to be learnt from the present agitation amongst the foremost nations of the world for producing "more food" are many. The war has taught us that no nation can afford to neglect her peasantry and indigenous agriculture. The secret of national strength lies in effective agricultural organisations. If a high standard of intelligent cultivation is to be attained it is the foremost duty of the State to pursue a well-organised agricultural policy; the State must educate the cultivator and offer him encouragement to utilise his knowledge in actual practice; the State must protect him against the usurer and furnish him with organised credit.

If England had pursued such a policy she would have had no anxiety to-day for her food supply. The resources of the Empire are vast, but the agricultural condition of India leaves ample room for improvement.

It should be known to our Government that the average cereal yield all over India stands at above eleven bushels per acre, as against thirty bushels in England. The question of increased food production in India is as vitally important as it is in the case of Great Britain. Those who are interested in agriculture are convinced that there is great need to increase the productivity of our soils—which falls far short of what it might be—by stimulating intensive cultivation and by bringing

under the plough vast areas of cultivable land. Dr. Mann calculates that if an increase of a single bushel per acre over the whole area under cereal crops can be obtained by us, the value accruing from that increase would suffice to pay the whole of the revenue at present needed by Government. It is admitted that without the introduction of scientific methods in agriculture increased food production cannot be guaranteed. While the problem of the twentieth century is to render cultivation more and more scientific, we are told in India by the late chief of the Imperial Agricultural Department that "Agriculture (in India), in short, has not reached the stage at which more scientific methods are felt to be necessary". Will Mr. Coventry, formerly Agricultural Adviser to the Government of India, tell us when that stage is expected to be reached in India and what steps are being taken by the Government to hasten its approach? If the spread of agricultural education is essential for the improvement of the condition of the Indian agriculturist, has the Government begun to realise the urgency of adopting some decided policy with regard to this question? If fiscal protection (as given to the agriculturist of Germany and the United States) is necessary, will Government extend it to the impoverished Indian peasantry? In order to increase agricultural production the farmers must be given a sufficient inducement to cultivate the land; their interests must be zealously guarded

by the State and the difficulties under which they labour should be removed without further delay. Readers must have noticed that high manuring is recommended by the Committees of Great Britain in order to secure large increase in production, and consequently they have urged stoppage of export of artificial fertilisers. Let us look at the figures of export of manures from India. We have to send to foreign countries about twenty-eight lacs of rupees worth of bones and bone-meal every year and about one crore and thirty-five lacs of rupees worth of oil-cakes. Besides these important manures, we export an immense quantity of oil-seeds. The value of non-essential oil-seeds exported from India in 1913-1914 was £17,000,000. Every impartial student of Indian economics realises that this tremendous drain of oil seeds and cakes involves an immense loss to the country. Will our Government give us protection at least in this respect, until we can keep pace with the march of the agricultural progress of the world?

There is another consideration which should encourage both the Government and the people of this country to organise a systematic campaign for increasing our food production. It seems that there is at present a considerable shortage of food supply all over the world and the situation is not likely to improve on account of growing labour trouble in European countries.

The destruction of productive agencies in the countries at war has been on such an immense scale that it will take some years before normal conditions are restored. In France the food raised last year was less than one-half of the average; in Germany, in spite of the sustained efforts of the Government, production from the soil has greatly fallen off. Therefore the country which has food and raw produce for sale will have an "insatiable market" and at very high prices. India's agricultural resources are vast and in her soil lies a potent source of wealth. Should we lose this opportunity of increasing India's national wealth?

Since the war broke out there has been a slight increase in the area under cultivation. As compared with the pre-war year, the area under food crops at the end of the last agricultural year, June, 1918, was 8 per cent more than in the pre-war year owing to the increase on account of war demands for wheat and gram. In regard to non-food crops, the increase in the same period was 5 per cent, chiefly on account of the demand for oil-seeds, indigo, and fodder crops. The *per capita* acreage of foreign countries is also of interest. The figures for the United States of America, Canada, the United Kingdom, France, and Germany before the war were as follows:

United States of America ...	2·97
Canada	5·98

United Kingdom	0·39
France	1·49
Germany	0·94

The figures for India before and at the end of the war were 1·02 and 1·10 respectively.

Now in the interests of the nation as a whole, it is necessary to remove all the disadvantages that stand in the way of the Indian cultivator. The fundamental principles underlying the methods of obtaining increased production from soil should be made known to the people, and the State should do everything in its power "to put brains and money into agriculture". Credit machinery must be developed; education must be made compulsory and based on broad conceptions; our manufacturing enterprises must stimulate increased production from the soil, and above all we must demand from our Government prompt action with regard to the adoption of a definite agricultural policy; we urge the Government to press forward the irrigation works which are under construction, and to adopt such a policy as would give an impetus to better cultivation of the land. "Money spent on irrigation is never lost. It not only adds to the resources of the people by increasing the yield of the land and reducing the pinch of scarcity, but it brings in more profit to the State than the railways. The percentage of net profit to capital outlay on productive works

of irrigation during the past four years has remained steady between five and six per cent; whereas the percentage of profit to capital outlay on the railways did not exceed 3·03 per cent at the best, and for the ensuing year it is estimated at 1·99 per cent only."[1]

It is believed that the excessive fragmentation of land, which handicaps the cultivator in the way of land improvement, should at once be removed and such laws be enacted by which subdivision of lands should be checked. If holdings were reasonably consolidated, economic farming would be possible and consequently the yield from our land would be greatly increased; and what a vastly changed India it would be if in the next ten years we could double our agricultural produce! The flow of wealth would then irrigate all our social and economic organisations, and the political progress of the country would receive a fresh impetus to vital growth. No service is of greater importance to this country at present than the attempt to improve the agricultural conditions of India. Rural life in India shows symptoms of decay and ruin, and before that evil assumes a gigantic form, let the Government and the people take steps to avert the impending danger, for as an Irishman remarked, *the best way to prevent what has happened is to stop it before it begins.*

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[1] Quoted from Rai Bahadur Shukal's Budget Speech, 1919.

CHAPTER III

FOOD CONSERVATION

Side by side with the uttermost effort to increase food production by intensive agriculture, the belligerent countries have had to adopt rigorous measures to conserve food supplies. From the accounts we read in the papers, about the meatless days, potatoless days, communal kitchens, the utilisation of kitchen refuse, the control of exports and imports, we get an idea of the grave situation in the countries at war. In England the fact that there is not enough food to go round according to the customary consumption of the people is clear, and the Government have now taken the responsibility of rationing the entire population. Lord Rhondda, the Food-controller, prescribes "four ounces of margarine per head weekly and one and one-half ounces of tea and one-half pound of sugar. Potatoes are to be used in the manufacture of bread to economise in the consumption of cereals." Yet the task is a difficult one. Even rigorous rationing cannot solve the problem, and the Government, in spite of various schemes of food control, is unable to satisfy the popular demand for a sufficient and

a fair distribution of necessary foods. Instead of restricting the supplies of tea, butter, sugar, bread, a comprehensive rationing system has been introduced in England.

It is now being preached all over England that people could eat less food than they do and get along just as well. Human physiologists are at work to "educate the public" in this direction, but the force of circumstances compels them to satisfy themselves with a much restricted diet. This may prove to be a blessing in disguise, for "stomach excess" has been one of the curses of the European standard of living. Well-to-do nations habitually over-eat. The fact that the British people indulge generally in over-eating may be seen by the colossal sale of pills, salts, etc., which are designed "to counteract the effects of over-indulgence in food and drink". People who eat sparingly do not find it necessary to clear their system. The present war teaches the lesson that food consumption in some European countries can be restricted without any difficulty.

The exigencies of the present time have led to various complicated methods of conserving the food supply, but one of the most important lessons of this war is that our dietary should consist of varieties of foods, and eccentricities of taste should not be allowed to complicate the problem of food supply in times of emergency.

Dr. David Fairchild, of the United States Department of Agriculture, in a paper on "*The Palate of Civilised Man and its Influence on Agriculture*," published in the *Journal of the Franklin Institute*, declares that the time has come for mankind to make a careful review of its likes and dislikes in food as a preliminary to instituting widespread dietary reforms. I am tempted to give the readers a brief summary of his paper, in which he deals at length with the astonishing diversity of opinion prevailing in different parts of the world as regard the edibility and the palatability of important foodstuffs. He shows that these eccentricities of taste are an economic factor of colossal importance. The net result is to promote famines and add vastly to the cost of living. Dr. David Fairchild, in order to sustain his thesis, refers to the food problem of the belligerent nations. He says:

"The war has thrown some relevant facts into high relief. Consider the corn situation to-day and its bearing upon the gigantic problem before us of feeding starving Europe. When I first heard the Belgians refused to eat corn[1] and that the Irish and English would eat anything else before they would touch it, my first impulse was to insist that they ought to be made to eat it. Edward Eyre Hunt, the author of *War Bread*, explained and made

[1] That is, maize.

it entirely clear to me that a shocked and outraged people, wrought up and nervous to a high degree as a result of the treatment they have received, is in no mental attitude to learn to like a new food. The task of education would have been too long and more expensive than the shifting of our own menu at home, and in the meantime it would have cost many thousands of lives. Resort was made to the use of different names for corn and concealment of it in war bread, with three parts of white flour. Sir Horace Plunkett informed me that unfortunately his people had grown up to look upon corn as hog and chicken food, and that this prejudice was extremely difficult to overcome, but that high prices would in time force them to eat it. Not to like a food which has been the staple of peoples for thousands of years and that to-day is produced by the thousand-million bushels and feeds hundreds of millions of people, seems to us, who like it, a strange, incomprehensible thing. Yet it is no stranger than that of the American people and their indifference to that other great cereal, rice, which is produced in larger amounts than any other cereal in the world and forms the staff of life of hundreds of millions of civilised peoples.

"It is said that Europe is dependent upon the wheat loaf, and the bakeries of its countries are ill-suited to utilise corn. We

are sometimes inclined to insist that they should break away from the exclusive use of the wheat loaf and learn to make corn bread and corn cakes—yet we have not yet learned how to cook rice properly, and complain of its insipid character: which must be an attitude hard for our Oriental neighbours to understand. This indifference towards rice, of which staple we even now consume only the insignificant quantity of seven pounds *per capita*, has led to the abandonment of the fertile rice fields of the Carolinas, and to-day efforts are being made to find some paying crop to take its place there, because our meagre demands have been met until very recently by the California and Texas rice areas, recently developed.

"Upon the prevalence of certain tastes in food depends the success or failure of millions of acres of farms and plantations, and changing tastes may involve the prosperity or the impoverishment of countless human beings; hence it is a startling thought that many food habits depend upon no more rational a basis than caprice and fashion.

"Can the fact be established that, in the past, fashion in foods, a liking for a food or a positive dislike, or a mere indifference towards it, has brought about the cultivation of the plant, checked or stopped its cultivation, or accelerated its widespread cultivation? If it can, there

will be no longer any doubt that the factor is important, and the question of its careful scientific investigation is one worthy of serious consideration by the scientific bureaux and laboratories of the country, and our great educational institutions as well.

"The origin of many cultivated plants dates back beyond the dawn of history, and many of them have become so almost universally grown that no traditions even are left to mark the struggle they had to gain popular favour. Others, again, are so new that they are at the present time fighting for a place on the menu.

"The wheat plant and the loaf of bread made from its kernels are universally liked. There is no race of people which does not like it. Yet it is a fact that the delicious hard bread of Spain and Russia, made from the durum wheat, a species distinct from our wheat, is not popular to-day in this country, and macaroni, the most popular form in which wheat is used in Italy, has until recently been little appreciated in America. These two facts hindered the development of the durum wheats when they were first introduced into this country in the nineties. If it had not been possible to export wheat to Italy for macaroni making, there is serious doubt whether we should now have had the vast fields of it in Kansas, Minnesota, and the Dakotas. Millers had to remake their mills in

order to grind the harder kernels, and bakers had to learn to mix it with softer wheats.

"The oat is cultivated successfully in Hokkaido, the north island of Japan, but not for human food. It is used for the purpose of feeding the cattle in that island, and is imported in the south islands for the use of military horses, whereas we devote over thirty million acres to its culture: oatmeal being a staple breakfast dish."

The striking illustrations cited by Dr. Fairchild suggest that peculiar tastes are largely c[illegible] goes on explaining th[illegible] as follows:

"Taste is the avenue of our contact with the world of chemical things; it is, after all, one of our five senses. Is it not worthy of all the study which can be given to it, and should not the education of the human palate become a matter of great importance and every effort be made to teach the value of a wide liking for everything that is good to eat?

"Think of the conservatoires of music where the sense of hearing of thousands of our youth is trained, and the academies of art where the sense of sight is cultivated, and then compare these with the schools of domestic economy and see what a gulf there is between them. How far we must yet go to put the cultivation of the American palate where it really belongs!"

The author then refers to the scientific basis of dietetic principles. He says:

"The consideration of food as fuel was a great step in advance in the food question, but the discovery of McCollum, that certain substances contained in butter-fat and the green leaves of plants are just as essential for a complete food as the proteins, fats, carbo-hydrates, and mineral constituents contained in grains, has opened a new door of possibility. The machinery for determining the comparative proto-plasma building and conserving value of food is rapidly being

reflect that the despised rat is being made one of the chief tools by means of which the food chemist is working them out. The human calorimeter, which amused the public at first, has come into prominence as one of the great tools of this generation. We are in a position such as we have never occupied before, to test the value of the food plants of the world.

"All these converging changes, it seems to me, indicate the present as a remarkable opportunity in which to consider whether the stone wall of taste is really a stone wall, or whether it is something which the reason of man can tear down—whether, in other words, the time has not arrived when we should cease insisting that our likes and dislikes in foods are nobody's business anyhow, and begin to realise in how

far this caprice of fashion will hinder the development of the agriculture of the future."

Since the outbreak of the war, attention has been devoted to restricting waste as much as possible and to finding various ways of utilising it. It has been estimated that the kitchen waste of the United States "totalled $700,000,000 a year," that is, more than two hundred and ten crores of rupees. Hundreds of tons of human food are wasted every day in Chicago, and corresponding amounts in every other city in the United States. The sources of this waste are:

1. Improper care of fruits and vegetables in stores.
2. Failure to dispose of them before they spoil.
3. Table and kitchen "left-overs".
4. Waste of products on the farm before they reach the markets.
5. Waste of products in transit from farm to market.

Barrels and boxes filled with decaying fruits and vegetables are now daily gathered [illegible] city garbage wagons from the rear of Chicago Commission houses and taken to the municipal reducing plant, where the fats are converted into glycerine, a small portion of the rest made

[1] *The American Review of Reviews*, November, 1917.

into tankage, and the balance destroyed. Between 400 and 500 tons of garbage is taken to the plant every day. It contains about 2 per cent of fats and 25 per cent of tankage. While this is a reduction of 35 per cent as compared with 1916, much of this waste of human food could be prevented if the produce were disposed of at reduced prices or given away before it is spoiled.[1]

The Department of Agriculture in co-operation with innumerable organisations has undertaken to reduce this waste, as much as possible. Information as to the use of wasted materials, and facilities for carrying out in actual practice the suggestions of the Federal Food Administrations, are freely given. Thus, the policy of restricting and utilising waste will train the people to economise food—a lesson no less important than the need of supporting national agriculture to increase the productivity of soils.

The food crisis has been much more acute in Central Europe than anywhere else, but the German Government strained every nerve to solve the problem of food economy through the co-operation of an army of chemists, physiologists and eminent physicians mobilised to "discover means of feeding the population satisfactorily". When fodder for live-stock became scarce, nine million pigs (35 per cent

[1] I am indebted for the above information to the series of pamphlets issued by the International Harvester Company of New Jersey (U.S.A.).

of the total number) and three million cows (27 per cent of the total number) were slaughtered during the first year of the war.[1]

German chemists carried on several experiments to manufacture suitable "war-bread". Rye is the grain commonly grown in Germany. The first effort was to bake bread with a mixed flour, 70 per cent of the starch of which was from wheat and 30 per cent from rye; later, 5 to 15 per cent of potato flour was added to it, in order to economise the quantity of wheat used; gradually the quantity of potato flour was raised from 20 to 35 per cent of the whole.

But this kind of bread became very unpopular; and the people complained of its coarseness and the difficulty in digesting it. So the German scientists continued in their search for proper human food substitutes, and early in 1915 it was reported that they had evolved a process by which bran is chemically (by hydrolysis) transformed into substances quite suitable for human food.

Then, as the use of bran became universal, the problem was to find something for live-stock in its place. Prof. Combe says, the German chemists got "artificial bran" for cows. I quote from the review of his book.

[1] Many of the facts presented here with regard to the solution of German food-problems are taken from an English review of the book—*Comment se nourrir en temps de guerre*—lately published by Dr. Combe of the University of Lausanne.

"The manufacture of war-bread left no residue of bran for the cattle to eat, and without the bran milch cows could not maintain the milk supply. An 'artificial bran' for the feeding of cattle was developed so that milch cows could be nourished, though not in their former numbers. The material for this was collected by carts every two days in the cities, and was made up of scraps of meat, grease, tendons, bones, cartileges, blood-vessels, fish-bones, viscera of fish and birds, wastes from fruits and vegetables, salads, peelings of fruits and potatoes, bread particles and decayed fruits and preserves. All these were collected, dessicated, sterilised to destroy all germs, and then pulverised. The gray powder so obtained was easily transported and kept excellently. As much as 2,500,000 tons of this material were made annually. The milk obtained from feeding on it was used exclusively as human food."

With regard to vegetables, various means have been adopted to preserve large quantities for an emergency. Potato is the most important of the vegetables and it is usually a cheap, starch-containing food. The loss in peeling (estimated to be fifteen per cent) was carefully avoided, and to preserve potatoes for future consumption three and a half million tons have been dried in Government dessicators in Germany, a year. All these instances clearly indicate the nature of industrial enterprises in

Germany. Her industrial organisation, supported by an army of chemists and physicists, is prompt in solving the present food problem of the country. As the supply of meat was greatly reduced, their attention was directed to the production of a "meat substitute," and after a series of experiments, they succeeded in obtaining what is known as "edible protein". Here is the account given by Dr. Combe.

"Another device used to produce edible protein as a substitute for meat, was the cultivation of yeast in a molasses solution to which ammonium sulphate was added and through which fine air bubbles were blown. Unlimited quantities of yeast could be obtained in this way at slight cost, and a third of an ounce of the dry yeast could be added to soups daily without ill effects. It was well absorbed and was taken on meatless days by all classes of society. Ordinary beer yeast cannot be used for human beings, since it gives a bad taste to food and retains an odour of bad beer. The yeast prepared as described above, when mixed with ground straw, was largely used as fodder for cattle."

The present war has given us lessons in many things, but the most significant and useful lesson is that of the importance of the economic strength gained by utilisation of the resources of one's own country. The application of chemical knowledge, chemical principles and

chemical experiences by German scientists, has contributed largely to the tiding-over of the grave war crisis in Germany. She realises that the strength of a nation lies not only in military organisations, in battleships, or in a large standing army, but in efficient industrial organisations and enterprises. With this object in view she built her economic structure; she now occupies the foremost place in most of the branches of chemical industries; in the matter of industrial chemistry the world looks to her for instruction and guidance.

Our hope is that both the public and the Government of India will learn this very important lesson from Germany and direct their efforts to the proper utilisation of India's vast resources.

During the present war, as the food crisis became rather acute, the question of restricting the use of cereals in the manufacture of spirituous liquors engaged the attention of the belligerent nations. It is now a war necessity. Long before the war began, the Kaiser is said to have declared that, in the next great war, that nation would win which used the least alcohol. This is indeed the motive that led Russia to abolish vodka, and France, absinthe. In England, Mr. Lloyd George heralded a campaign against alcohol, but the Government did not give the support that was necessary to ensure a complete victory. Before the war, she consumed

36,000,000 barrels of beer, ale and stout; and the Government reduced the quantity to 10,000,000. As soon as America entered the war, the question of prohibiting the brewing of grains was placed before the Federal Congress.

It is difficult to estimate the amount of grain consumed annually in the manufacture of alcoholic beverages by the different countries of the world. In England and the United States of America the bulk of the spirit produced is manufactured from grain. On November 29th, 1916, it was stated in the House of Commons that in the year ending September 30th, grain and sugar were used in brewing and distilling to the following extent:

	Tons
Barley ...	1,224,209
Other corn and grain	305,176
Rice and Maize ...	67,578
Sugar	119,999
Molasses ...	41,115
Total ...	1,758,068

Out of 17,000,000 tons of cereals annually consumed in the United States of America, a little less than two million tons are used for brewing. The figures from the United States of America are as follows:

Barley	...	102,861,528 bushels
Corn	...	44,743,016 ,,
Rye	...	7,262,580 ,,
Wheat	...	1,049,394 ,,

That is, in the United States of America nearly 156,000,000 bushels of grain are thus removed from the food supply in the production of an article dangerous for human consumption.

It may be interesting to treat this fact graphically, to draw popular attention. I quote from an article in *The World's Work*, July, 1917:

"4,000,000 people could live for 100 days on the rye now used for drinkables, 56,000,000 people could live for 100 days on the corn meal so used, 16,000,000 people could live for 100 days on the rice so used. 76,000,000 people could thus be kept from starvation for 100 days from these three cereals alone. That is, the population of England could subsist on these food supplies for nearly six months, and the population of France for nearly seven months."

Dr. A. E. Taylor, an American Professor of Economics, estimates that:

"After making allowance for all recovered food-substances, such as swill for animals, we use grain enough in the production of alcoholic beverages to give an army of 11,000,000 men a one-pound loaf of bread every day in the year. That is, our drinking habits consume, every twelve months, the equivalent of more

than 4,000,000,000 loaves of bread. As half a loaf per person is the usual daily allowance, this means that we waste in this fashion the yearly bread supply of 22,000,000 people."

The above figures need no comments, and readers will at once realise the enormous quantity of grain thus wasted from the standpoint of food, either for man or animal.

Let us treat these facts independently of moral considerations. The food-statisticians tell us that in ordinary times the world does not produce more food-stuffs than it consumes. In the face of this fact, war conditions have made the situation critical. The International Institute of Agriculture estimates that the world's food supply will be short by 130,000,000 bushels of grain. This shortage may continue for a considerable period after the war until normal cultivation is resumed. The effort to increase food production by intensive methods of agriculture will certainly improve the situation, but a large increase in the crop-yield cannot be suddenly brought about. Therefore, in the countries where the bulk of the spirits is now manufactured from grain, the need for prohibiting the brewing of grain is urgent. Referring to this question Dean Davenport, of the University of Illinois, writes:

"More than four-fifths of the consumption of alcohol serves no useful purpose in the arts

or sciences, and, at the best, caters to an appetite that takes bread from children and support from wives and mothers by the thousand.

"Wholly aside from all considerations of morals, the weakening effect of liquor upon thousands of its users, and the economic wreckage resulting from its use, the fact is that there is a world-shortage in grain approximately equal to the amount used for brewing. Its use for fermented liquors is the one great waste that can be prevented without the disturbance of any essential public interest. Not to prevent it, is to pursue a course little short of criminal negligence." (*Atlantic Monthly*, July, 1917.)

The utilisation of grain in the manufacture of alcoholic beverages means a serious draft on the necessary food for human consumption. About 100 years ago Germany used grain for the manufacture of alcohol, but now she depends largely on potatoes. In 1908-09, out of the total output of 93,612,200 gallons of alcohol, 75,222,400 gallons were manufactured from potatoes, the amount of the latter thus consumed being nearly 3,000,000 tons. Every year the proportion of potatoes to grain is increasing.

If the countries of progressive agriculture take care of their grain and other food crops, and restrict their use in the manufacture of

spirits, how much greater precautions India should take, I leave my readers to imagine. Here our crop yields are far below the average; agriculturally unprogressive, a large percentage of our population does not know what it is to have a full meal every day; and yet we are allowed to distil and consume 9,197,183 imperial gallons of country spirit.

Country spirit is usually prepared by distillation from the mahua flowers, molasses, fermented palm-juice and rice. How much grain is being utilised in India in brewing, no one seems to know. The Department of Statistics writes to me that "no information is available in this Department on those items of your letters regarding the grain used for the preparation of liquors". But the task of recording the fact is not a difficult one. In any other civilised country, its Government could place such information before the public, if such were wanted.

Let us suppose that one-third of the total country spirit is manufactured from grain. In that case, 766,432 maunds of grain would be necessary on the basis of ten seers of grain for each gallon of country spirit. That is, even at the rate of half a seer of grain per head, *per diem*, more than seven and a half lakhs of people could live for three months on the cereals thus used.

[1] Figures for 1916-17.

Country spirit is the main source of excise revenue, about two-thirds of the total receipts from liquors being derived from it. Therefore it is to the interest of the Government to extend its manufacture. The mahua flowers and molasses, from which a considerable quantity of country spirit is now obtained, may have to be utilised in the manufacture of industrial alcohol, and in that case the brewing of grain must necessarily be increased. But if, at the present stage of her economic life, India allows her grain to be brewed, I say she is gambling with Death.

As I write, the Report of the meeting of the Imperial Legislative Council held on 20th February, 1918, is published in the newspapers, and we find that a Resolution recommending the prohibition of the use of all alcoholic beverages is opposed by Government and is defeated. While the civilised Governments of the West are adopting the policy of prohibition, the Government of India congratulate themselves on the increased revenue from excise, and in a country where very large portions of the population are total abstainers, the consumption of alcoholic and intoxicating beverages is increasing fast. The increase of the population in British India during the ten years preceding the census of 1911, was only 5·5 per cent, and in a period of seven years (1905-1912) the consumption of country

spirit had increased by 5 per cent. The following statement, showing the quantity of imported liquors, may be interesting to the reader.

Year	Gallons imported	Net gallons consumed in the country.
1912-13	6,722,296	6,712,992
1913-14	6,785,971	6,777,382
1914-15	5,515,419	5,499,292
1915-16	4,825,824	4,785,948
1916-17	4,457,780	4,286,451

Of course a certain quantity of spirit is used as medicines, drugs, and chemicals. For instance, in the year 1916-17 nearly 388,806 gallons of spirits were devoted to purposes other than that of beverages. Deduct this amount from the total, and you obtain the net quantity of foreign liquor consumed in drinks; and adding to this total the gallons of country spirit produced, you get the enormous quantity of 13,094,828 gallons of alcoholic beverages consumed in India during the year 1916-17.

It is true that we must have alcohol for industrial purposes, and as it furnishes a cheap and excellent motive power for engines, its place in Industry is an important one. Every sane man would realise this, but at the same time the brewing of grain must be prohibited and

[1] Decrease is due to War.

less important materials should be used in its place.

Alcohol can be produced from a great variety of farm produce. It can even be made from spoiled crops and farm refuse, etc. If the manufacture of spirits required for industrial purposes can be carried on by the mutual co-operation of farmers and Government, it would certainly benefit agriculture. In Germany, farmers produce potatoes in their own fields and then cart them to a joint-owned distillery, where they are converted into alcohol in the winter months, while "the spent wash and residues, rich in nitrogenous matters, is utilised as a cattle-food on the farms". So, hand in hand with the production of alcohol there are carried on intensive methods of potato-cultivation and extensive breeding of farm animals. And then, with the increase in Animal Husbandry, a large quantity of manure becomes available for the continuous cultivation of crops.

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CHAPTER IV

FOOD DISTRIBUTION

We have seen that the belligerent countries do all they can to stimulate production on the one hand and rigorous conservation of food on the other. The need for such measures is obvious, for the Government of a belligerent nation must first of all see that its own people are adequately supplied with food and other necessities of life at *fair* prices, and also find sufficient food products for the army.

But, unless steps are taken to evolve such organisations by which equitable distribution of food is made possible, economic disturbances are bound to occur. Take the case of European Russia. She is pre-eminently an agricultural country; seven-eighths of the population are engaged in agricultural pursuits of one kind or another, 81 per cent of the people being officially listed as "peasants". The area devoted to cereal crops is enormous and there is no dearth of food; but owing to defective

distributive organisations the food scarcity is extremely acute. She is primarily a producer of raw materials, but her peasant is poor, debt-ridden and threatened with chronic starvation.

Ever since the outbreak of the war various proposals have been made for regulating and controlling the food supplies of the countries at war. The appointment of food commissioners, the introduction of flat prices and some such measures have been adopted, but they have failed to secure equitable distribution.

Of course, the problem of distribution is a difficult one and the different schools of economics quarrel over its solution. Those who are influenced by Socialism believe that no advantage accrues to the people from increased production, and their effort is directed towards remedying defects in the distributive agencies. But the fact is, increased production helps to bring about a more uniform distribution of products, and consequently no well-balanced economic scheme can eliminate from its programme the question of production. What we want to point out is this—that side by side with the attempts of production, the distributive agencies must be well organised, so that the economic balance will keep to its normal position. Control over distribution gives a large measure of control over production.

In India, the machinery of distribution is not only defective and foreign in its make, but absolutely under foreign control; and consequently when altered circumstances create new problems they utterly fail to prevent economic distress. When the need for taking measures to deal with the food situation became very urgent, the Government could not decide what changes should be made in the distributive organisations. In the meantime the country had been stripped almost bare of foodstuffs in order to meet the demands of the armies; the flood-gates of export trade were kept wide open, and the result was abnormal inflation of prices of the necessaries of life.

The first and foremost duty of the Government is to see that the people are kept alive and that they are able to maintain their families. Our rulers in Simla realised long ago that there would be famine in many parts of India; yet no definite step was taken to prohibit the export of foodstuffs from India. The net result is the food crisis all over the country. Even a casual observer may notice in the present-day rural economy that while a village may be actually growing twice or thrice the quantity of corn needed for the consumption of its inhabitants, a portion of these inhabitants may still be forced to live on one meal a day.

Export of rice, not in the husk, increased in January, 1919, as compared with the preceding

month, by 44 per cent in quantity and 41 per cent in value. The following table shows the exports of rice to the principal countries.

EXPORTS OF RICE, NOT IN THE HUSK

	December 1918	January 1919
	Tons	Tons
To United Kingdom ...	7,653	14,483
„ Ceylon ...	39,429	44,129
„ Straits Settlements...	16,762	42,681
„ Mauritius ...	7,164	279
„ Egypt ...	29,084	36,754
Total (including other countries) ...	114,434	164,868

Export of wheat, however, fell by 57 per cent—owing, perhaps, to the wisdom of Mr. Gubbay, the Food Commissioner, who realised the need of prohibiting exports of wheat when there were clear indications of famine in many parts of India.

Recent cloth famine in many parts of India, especially in Bengal, further illustrates how acute distress is caused by exportation of the necessaries of life. Millions of cwts. of cotton and cotton yarn are exported annually to foreign markets. The figures showing the amounts of exports are quoted below.

EXPORTS OF RAW COTTON

	1915-16 cwts.	1916-17 cwts.
United Kingdom ...	833,628	801,132
France ...	205,457	264,940
Spain ...	237,025	253,963
Italy ...	1,124,106	966,391
China ...	38,435	336,341
Japan ...	5,917,663	5,790,848
Other countries ...	152,653	91,226
Total ...	8,853,967	8,504,841

EXPORT OF COTTON YARN

	1915-16	1916-17
Total in terms of lbs.	60,232,000	160,417,000

The price of the cloth manufactured in India cannot remain steady at a normal rate unless the price of raw cotton remains fixed and all speculation in the cotton market is stopped. But as there is shortage of cotton throughout the world, the price of raw cotton will have every tendency to rise and the temptation for speculation will naturally be too great.

The only step that Government can take, while there is the cloth famine in India, is to control speculation in the cotton markets of India. To do this, exportation of raw cotton, cotton yarn or cotton goods by private enterprises must be prohibited. The Indian mills

will then be able to turn out larger stocks, and to a certain extent the problems arising from the cloth famine will be solved. The cloth merchants, taking advantage of the *speculation* in the export market, have been raising the price of cotton piece-goods till it gets beyond the reach of the impoverished villagers. Such profiteering has been possible owing to the lack of control in the export trade.

The machinery of distribution cannot be scientific if "profiteering" is made possible. Anyone familiar with the economic phenomenon caused by war, both in India and abroad, would understand the true significance of the need for radical change in the existing organisations for distribution. In referring to this important question a writer in *The Atlantic Monthly*[1] says:

> If stimulated production is to act as the long bar of the lever, if rigorous conservation is to be its weight, we must also have the necessary fulcrum, equitable distribution, before the device can become economically operative.

Such a device is essentially necessary for the restoration of peace in the world. During the war the labourers saw that the capitalists were making the most of the war situation, and how stupendous a profiteering to fleece the people of the country was allowed by existing distributive agencies. This resulted in serious discontent among the working classes.

[1] August, 1917.

In my opinion the widespread labour unrest of to-day is the culminating point of an historical evolution. For long, labourers suffered at the hands of a few capitalists; for long, they protested against the existing régime of inequality and iniquity, against the accumulation of wealth in the hands of a few, while the producers of wealth were plunged in endless misery. The working man to-day is aware of his power, and the State must realise this fact.

The real grievance of the labouring class is based upon those cases where advantage is taken of war conditions, with the result that capitalists in many trades are thriving on high prices. Even the art of book-keeping, manipulation and skilled accountancy, could not conceal the high figures of profits.

The Economist of January 12th, commenting on the summary of the latest reports of the three hundred and eighty industrial companies (which comprise a considerable variety of prominent businesses), says that "they yield an *average* increase of over 10½ per cent in profit above the amount of the previous year". In some cases the profit shows an increase of nearly 50 per cent. For example, let us examine the figures of the brewing trade. (Quoted from *The Nation* of February 9, 1918.)

After three years of war, at the opening of which its very existence was challenged by Mr. George as the worst enemy that Britain had to fight, this trade stands firmer and more prosperous than ever, its increased profits

for the year ranking higher than that of any other purely British manufacture. *The Daily Chronicle*, in a recent analysis of the brewing situation, claims to show, by the analysis of the report of eighty-six companies during the last six years, that they present an increase of nearly 50 per cent in profits during the three war years' over the three pre-war years' average. And this, in spite of liberal allowances for depreciation, repairs, and renewals, serving to keep down the rise in revenue. A number of breweries, which stood in a weak and failing situation before the war, have now been restored to financial health. Here, for instance, is the improvement for certain well known firms, as measured by this test of gross profits:

	1913-14	1917
	£	£
Allsopp's	68,100	239,700
Ind, Coope & Co. ...	94,100	204,700
Watney, Coomb, Reid's	904,200	1,112,900
Salt & Co.	30,300 (1911-12)	91,100

Of the whole number of eighty-four brewery companies, we are informed that twenty-seven are paying the highest rate of ordinary dividends during the whole of their career, while many others give the best returns for ten, twelve, or fourteen years.

Besides the industry referred to above, in other great branches of profitable production the companies are also making enormous profits; no amount of effort on the part of the Government can control the gangs of middlemen who are squeezing huge profits from the various war-contracts. Banks, we are told, are thriving upon the financial conditions brought about by war. A writer in *The Nation* of February 9, 1918, referring to the case of the banks in England, says:

> But most conspicuous of all is the case of the banks, who are thriving upon the bad and cowardly war-finance

of the Government. For it is that public finance which is primarily responsible for the increased volume of money which flows as additional deposits into the coffers of the banks, for the high money rates which can be got for its use, and for the large quantities of bank-made credit advanced at high interest to the Government in the shape of War-Loan and Treasury Bills, which in their turn, swell continually the flow of currency, and help to feed the banks with profit. One excellent index of the enhanced prosperity of the banks is the enlargement of deposits from 740 millions in 1913 to 1,265 millions in 1917. This increase has been continuous during the war, last year's figure being 196 millions, or 18½ per cent higher than in the year 1916.

Turning now to the situation in India, we find that all sorts of war-profiteering is evidently rife amongst our traders. Producers cannot make much profit as they are not organised into a body, and cannot therefore take advantage of the situation caused by war. But let us see what jute mill-owners did. Here is an example illustrative of the fact that the persons who make their pile out of the jute trade are the baparis, brokers and mill-owners, not the jute growers.

The estimate of the phenomenal prosperity of the jute mills has lately been published by the Department of Statistics. The estimate is based on the detailed analysis of the published accounts of forty-two companies. To obtain uniformity in compilation of the data, as far as practicable, the forty-two mills have been regarded as one mill.

In all cases the profits were shown after deduction of Indian Income-tax and Super-tax,

because the amount of the tax paid is not always shown separately in the balance sheets, but lumped with other items of expenditure under the head of "manufacturing and other expenses". In the case of Sterling Companies, the British Income-tax and the British Excess Duty has been deducted as well as the Indian Income-tax and Super-tax. The profits are shown before and after deduction of interest on debentures. Some companies have paid off their debentures, others are paying off these, while others again have created debenture redemption funds out of surplus profits. Debenture interest is not shown separately in all the published accounts, but the amounts were ascertained as correctly as possible. No allowance has been made for depreciation, as no uniform practice of writing off depreciation is followed by the jute mills in Bengal.

The results of the analysis of accounts are summarised in the following table:

Profits of Jute Mill Companies after deduction of Income-Tax, Super-Tax, and also, in the case of Sterling Companies, Excess Profits Duty:

	1914	1915	1916	1917
	£	£	£	£
1. Total Profits	932,000	4,820,000	6,309,000	4,831,000
" " (Index Nos.)	(100)	(491)	(643)	(492)
2. Debenture interest	159,000	159,000	154,000	142,000
3. Net Profits (subject to depreciation)	823,000	4,661,000	6,155,000	4,689,000
Net Profits (subject to depreciation) (Index Nos.)	(100)	(566)	(748)	(570)
4. Ratio of net profits (No. 3) to paid-up capital	10	58	75	53

The explanation of such an increased profit is not obscure. When war was declared against Germany and Austria, the free export of raw jute from Bengal was practically stopped. The result was that the price came down with a run from Rs. 14 to Rs. 6 per maund. This was a golden opportunity for the jute manufacturers who had large contracts with the Government to supply sand bags; they formed themselves into a trust with a view to keeping down the prices; the result was that the mill-owners could turn out gunnies and sandbags at a low cost and consequently the phenomenal profit indicated above could be earned by them. But many of the jute cultivators were ruined and large tracts of jute fields went out of cultivation.

How this state of things can be remedied, it is difficult to suggest. In such a vast agricultural country as India the machinery of distribution must be so organised that it can cope with the pressure brought to bear on it from outside.

It has been remarked that now there are two clear courses open to us if we are to be able to face the acute economic crisis of the country. One is to make the system of Government control perfect, and another to leave the full responsibility to the natural tendency of

[2] For the statement showing the prices of jute, raw and manufactured, please see Appendix A.

trade. Let us examine how far the suggestions may solve the problems.

The system of Government control has been tried both in India and abroad. We know, from the accounts we get, that Government interference with regard to the food control during war was not altogether successful. The people discovered that in spite of Government control, profiteers could take a mean advantage of the situation.

It is urged that the Government should fix the prices of important commodities. But to fix maximum prices according to some arbitrary rule, is at any time likely to produce some economic disturbances. Prof. Edwin Cannan points out in *The Economic Journal* the reason why artificial checks on distribution or supply may create an extremely dangerous situation. He says:

> For if, at any point in the series of business processes, the profit to the business man is inadequate, or is less than he could get by putting the stuff to some other uncontrolled or preferential use, a blockage in the flow of such food to the consumer is brought about. Everybody knows that foolish price-fixing has been largely responsible first for the potato famine, and later for the shortage of milk, butter, and bacon. Theoretically, no doubt it seems possible for a Government department to convert a business system normally run by profiteering into one run by adequate "commissions," checking at each stage by cost-taking the amount of profits needed to evoke efficient service. Practically, it is impossible, in view of the dependence of business men at each stage of the

operation upon constant changes in wages, supply of labour and materials, and so forth.

The State control of the market is a matter on which there is much diversity of opinion; but from the experience gained by such action one is almost convinced that it is futile to control prices unless the Government have at its disposal supplies in sufficient quantity to influence the market. In speaking before the Mysore Legislative Council, the Acting Dewan, Mr. A. R. Banerjee, referred to the problem of food control and quoted instances from an article from *The American Economic Review* for March, 1918, to show that the Government can effectually control the market *only* when it owns stocks in sufficient quantity. I give the extract he quotes from the *Review*:

> Secretary Houston's reason for recommending that the Government be given authority to deal with foodstuffs in case of emergency, was evidently his belief that it might be necessary in order to provide an effective method for maintaining any minimum or maximum prices which might be fixed by the Government. This opinion was shared by Mr. Hoover, who asserted in his testimony before the Senate Committee on Agriculture and Forestry on the 8th May, 1917, that a maximum price has proved a failure in Europe, except when the Government owned so much of a commodity that it could control the market. To illustrate, he stated that the French Government imported last year about 25 per cent of their bread stuffs requirements, and used that as a "club" to maintain the maximum prices, but in all commodities where there is no "club" of that character the maximum price is a total failure.

The food crisis became very serious in Russia. It is true that the pinch of hunger which precipitated the revolution in Petrograd was the result of disorganisation for which the Duma was partly responsible. When the cost of living was rising by leaps and bounds, it was decided to fix a maximum price for the sale of corn and wheat. The results of this step seem to have been most unhappy. The moment the price fixed became known, the peasants refused to sell food grains, and their export from the farming districts fell considerably. Thus when the shortage of grain in the market began to be seriously felt, the Minister of Agriculture, M. Rittich, made a prolonged tour through the arable districts of Russia, and from his observations he concluded that the maximum price was the real cause of the mischief. Government then realised that in such a food crisis, the only thing that matters is *sufficiency* of food, and that its price is of comparatively little importance. Government must have sufficient stock of its *own* to be able to control the market. Therefore, each agricultural district was called upon to furnish a definite quota of grain. This arrangement was not successful on account of the innumerable difficulties encountered in carrying out the collection of the food grains.

Curiously, the fixing of maximum prices of grain did not stimulate production. The farmer realised that, whereas the prices of all the

articles which he was obliged to purchase went on rising in accordance with the normal laws of supply and demand, he was asked to grow food grains for sale at an arbitrarily fixed rate.

The Government of India had their own experience in regard to the effort of controlling prices. It proved to be a failure; they found that it was not easy to check profiteering by such a system of price regulation.

It is suggested that licenses should be issued freely to importers who would sell the commodities direct to the consumers. But what proof is there that the license-holders would not take advantage of the license and profiteer?

It is urged that the Government control of exports will bring about equitable distribution of foodstuffs and other necessaries of life. While admitting that the absolute control over exports in our case is essentially necessary, it should be remembered that it cannot make up the inherent deficiencies in the machinery of our distributive agencies. By controlling exports and imports it may produce an "artificial glut" resulting in lowering of prices. But what remedy is there, if the dealers or producers store and retain their commodities until prices are greatly increased? In that case the Government "would play into the hands of the profiteer".

So much, then, with regard to Government control. Having failed to meet the situation,

the Government of India wanted to take off all control and let the ordinary system of competitive prices and purchases alone. It is true that "freely rising prices stimulate increased production and supply upon the one hand, and check unnecessary consumption on the other". But the difficulty is that the money incomes of the people have not risen to keep pace with prices; and this makes a *laissez faire* policy impracticable.

What, then, is to be done? Can there be no economic system for obtaining prices just, both to the producers and the consumers? Or must there be an eternal conflict between the two parties, resulting in chaos and economic disorder, as lately has been the case in Europe, especially in Russia?

If the people and the Government of a country co-operate in the right spirit, a system of equitable distribution of the necessaries of life can easily be evolved. We read accounts of such an organisation in Central Europe where it has been operative for years. The principles of the system have been recognised by the American Government, and a bill embodying its adaptation is now before the Federal Congress. In referring to the draft bill a writer in *The Atlantic Monthly* says:

> Under this system the Federal Government offers charters for the organisation of Chambers of Agriculture. These Chambers are of different grades. There are, first,

the township Chambers; second, the County Chambers; third, the State Chambers and fourth and finally, the National Chamber of Agriculture.

Whenever a farmer in a township obtains twenty names to a petition, he will be given a charter and can form a township Chamber of Agriculture.

Whenever four or more townships have been organised in a county, they can obtain a charter and elect their delegates, who form a County Chamber of Agriculture.

Whenever one-third of the counties in a State have been organised, they can obtain a charter and elect their delegates, who form a State Chamber of Agriculture.

Whenever twenty states have been organised they can obtain a charter and elect their delegates, who form the National Chamber of Agriculture.

I would beg the indulgence of the reader in explaining the operation of the system by an example. Suppose the jute growers of a certain village in Bengal combine and form a Chamber of Agriculture. The sale of jute will, of course, be undertaken by the Chamber. If prices offered to the farmers were far below what they expected, they would inform the Secretary of the District Chamber of Agriculture for instructions as to the prevailing prices of jute. In the event of the District prices being low, the case is put in the hands of the Secretary of the National Chamber who is in communication with all the provinces and with the foreign markets as well. As a result of such an organisation, jute finds its way to the place where it is most needed and therefore it

fetches reasonable prices to the producer and comparatively lower prices to the consumer.

The reader will at once see that there is nothing novel in the system. A group of organised merchants would adopt the very same scheme for the distribution of their commodities. The central idea of the Chambers of Agriculture is to *democratise* the distributive trade.

It may be argued that this Chamber of Agriculture referred to above may store the produce until prices are forced up. But this will not be possible for the farmers to do unless they are united in a sort of corporation, and this, of course, requires capital. And even if they had the necessary capital, the enhanced profit, which they would certainly make, would induce other farmers to grow the same product. In that case the price of the product would be kept down. The corporation system has proved itself to be uneconomical in the long run, for, by keeping down the prices, the cultivation of the farm products is discouraged[1] and by "storing tactics" it injures both the producer and the consumer.

[1] This is well illustrated by the present situation of the jute cultivation. "Sir C. C. McLeod, an authority on jute, tells us that the jute trade of the world in normal conditions requires a crop of 100 lakhs of bales. This means, on the usual calculation of 3 bales to an acre, 3,300,000 acres. The area cultivated in 1917-18 was 2,730,000 acres. *There is therefore a deficiency of 270,000 acres.* (The italics are mine.) This means that the jute trade will be face to face with a serious embarassment." . . . Quoted from *Business*, January, 1919.

My suggestion is that in every district there should be a Rural Chamber of Agriculture. The main purpose of such an organisation would be to systematise the purchase and sale of farm products. The activities of the Department of Agriculture in this country are largely static and ineffective because the link between the Departmental organisations and the farmers is almost absent. Clearly, before the Department can do any real good to the farming population, a link that may establish a relationship between them will have to be forged. Such a link is needed to put to dynamic uses the information and labour of the Departments of Agriculture.

It cannot be denied that the Department of Agriculture in India has hitherto looked to the interest of the commerical body organised as the Chamber of Commerce; while the farmer is kept ignorant of the market prices of his farm produce, the Chamber is furnished with the estimates of the yield of the crops such as jute, cotton and oil-seeds—the crops which have commercial value.

The crop forecasts help the middleman to speculate, and therefore commercial men have emphasised to the Industrial Commission the necessity for the prompt issue of accurate crop forecasts. But we must see if such an arrangement is beneficial to the cultivator.

Such organisations as the Rural Chamber of Commerce would certainly place the distribution of farm products on a practical and economical footing. Statistics relating to the production of foodstuffs and other crops will be collected by the Chambers through which the farmers will market their farm produce. The individual farmer will then obtain better prices. It will teach him the true art of buying and selling to his advantage; above all, it will help to eliminate the middleman from agriculture.

"Agriculture carries more middlemen on its back than any other industry. If it is to flourish as it could were the necessaries of life brought to the vast masses of our population at a price within the purchasing power, the middleman must be largely eliminated," says the Chairman of the Committee formed by the Fabian Society to inquire into land problems and rural development. The agricultural middleman is indeed a powerful person in our rural economy and unless his power is curbed, we shall fail to effect anything worth while attempting. It is his profit that is really responsible for a high proportion of the selling price of the farm produce as compared with the cost of production, but the markets have been so organised that the farmer does not get the benefit of the prevailing high prices. As an example of how a country can regenerate its agriculture within a comparatively short

space of time if the farmers, under the guidance of the State, can have complete control over all the business connected with their industry, I may just refer the readers to the growth of Danish Agriculture. The Danish farmers have no middlemen to pay; they find markets for their farm produce through the help of the co-operative organisations and reap the whole profits themselves. There is no reason why co-operation, which has enabled the Danish farmers to achieve such results, should not be developed in India; and unless this is done, the Indian cultivator will ever remain relegated to the position of a half-starved manual worker on his land.

What we need is a comprehensive scheme for the agricultural regeneration in India. The Indian peasantry need the benefit of suitable organisations and protection from the State. In face of the food crisis created by the recent war, will anyone be found to doubt that the policy of *laissez faire* is inimical to the improvement of Indian Agriculture?

Once again I refer to German Agriculture. The trend of her agricultural policy, during the last few decades, throws much light on the importance of effective agricultural organisations. The lessons to be learnt from the German Agricultural progress are many; there, technical methods and scientific co-operation have resulted in a high standard of intelligent

cultivation and "the State, far from pursuing a *laissez faire* policy, has long taken an active interest in its indigenous agriculture, and has assisted by means of fiscal and political expedients in stimulating the popular exertions to produce the desired end". The progressive character of German Agriculture is largely due to the State which first ensures the agriculturist a practical education and then offers him encouragement to make the most, industrially, of his knowledge.

In addition to the stimulus given to Agriculture by the State, there should be peoples' organisations to help the rural population of the country. The Rural Chamber of Agriculture, as suggested above, will be such a voluntary organised movement. In Ireland the problems of rural reconstruction have been undertaken by almost a similar organisation known as the Irish Agricultural Organisation Society, and its work has transformed the countryside of Ireland to a great extent.

The existence of such "non-official" institutions proves to be of immense help in times of emergency. During the recent war, the peoples' organisations co-operated with Government in facing the acute problems caused by agricultural depression. In Russia when the people lost all faith in the Government, the organisations known as Zemstvos saved the critical situation. Zemstvo is the local elective

assembly regulating the affairs of a district in Russia.

These Zemstvos are in much closer touch with the agricultural population than the bureaucracy could possibly be. Through their schools, hospitals, and visiting doctors they have won the confidence of the peasantry. They have taught the farmer the value of modern methods of farming. Seeds, manures and agricultural implements are supplied by these corporations who know how to persuade the peasants to utilise them. The Zemstvo is spread like a net over the whole face of Russia; and in the midst of the revolution, this organisation has taken over a task of supreme difficulty—the task of solving the problem of the food crisis.

The question of internal transport requires a careful examination in the interests of better farming and of equitable distribution. The cost of transit is one of the vital factors that affect agriculture, and this has been brought home to us during the war. No one can deny that the high railway freights are disastrous to agriculture and prejudicial to the economic interests of the country. In a paper read before the London Chamber of Commerce Mr. Balfour Brown, K. C., said: "I am not exaggerating when I say that the agricultural question is nothing else but a question of railway rates."

The food riots which have occurred throughout the Continent have been due partly to the unequal distribution of supplies owing to the congestion on the railways produced by military activity. The Russian War Minister, M. Gutchkoff, in his maiden speech in the Imperial Council, admitted that the disorganisation of railway transport had been "accentuated to the degree of a national calamity".

Since the outbreak of the war there has been a great strain on the railway traffic in India, and it is this condition of traffic which is one of the factors responsible for the present food crisis. The Government of India must have realised the need of looking after the old waterways of the country, as the railways are insufficient to supply the required facilities for transportation.

APPENDIX A

HARVEST PRICES OF JUTE (RAW) IN THE MOFUSSIL

(Compiled from the Season and Crop Reports of Bengal)

Districts	Rate	1913-14	1914-15	1915-16	1916-17	1917-18
		Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
24 Parganas ...	Per Md.	9 2 0	5 6 0	7 9 0	7 11 0	5 8 0
Nadia ...	,,	9 7 0	4 15 0	7 7 0	7 8 0	5 4 0
Murshidabad ...	,,	11 0 0	4 8 0	6 8 0	6 12 0	4 4 0
Jessore ...	,,	12 0 0	5 0 0	7 8 0	7 8 0	6 0 0
Khulna ...	,,	8 7 0	4 1 0	7 0 0	8 3 0	5 0 0
Midnapur ...	,,	10 8 0	5 8 0	8 6 0	6 7 0	5 9 0
Hooghly ...	,,	10 0 0	5 0 0	7 8 0	9 0 0	5 0 0
Howrah ...	,,	13 8 0	4 8 0	6 0 0	9 0 0	5 8 0
Burdwan ...	,,	...	...	7 3 0	8 4 0	9 0 0
Rajshahi ...	,,	7 8 0	4 0 0	7 8 0	9 0 0	6 0 0
Jalpaiguri ...	,,	12 3 0	5 3 0	6 14 0	7 5 0	4 12 0
Darjeeling ...	,,	13 8 0	6 8 0	9 8 0	9 8 0	5 0 0
Rungpur ...	,,	10 12 0	5 12 0	7 0 0	8 6 0	4 8 0
Bogra ...	,,	8 8 0	5 8 0	8 12 0	8 4 0	4 8 0
Pabna ...	,,	11 0 0	11 0 0	7 8 0	7 8 0	5 0 0
Malda ...	,,	8 0 0	2 8 0	8 0 0	7 15 0	4 8 0
Dacca ...	,,	14 0 0	5 0 0	7 8 0	8 12 0	7 8 0
Mymensingh ...	,,	12 0 0	6 6 0	7 0 0	8 8 0	5 0 0
Faridpur ...	,,	10 8 0	4 5 0	7 9 0	8 3 0	4 14 0
Bakarganj ...	,,	9 0 0	5 4 0	9 8 0	8 0 0	5 8 0
Chittagong ...	,,	6 0 0	3 0 0	4 0 0	6 0 0	6 0 0
Tipperah ...	,,	10 0 0	4 0 0	5 0 0	7 0 0	5 0 0
Noakhali ...	,,	11 0 0	3 8 0	6 8 0	8 0 0	4 8 0

AVERAGE WHOLESALE PRICES OF RAW JUTE, GUNNY BAGS AND GUNNY CLOTH AT CALCUTTA

(Compiled from the Price Current and Market Report published by the Bengal Chamber of Commerce, Calcutta)

Description	Rate	1913-14			1914-15			1915-16			1916-17			1917-18		
		Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.
Jute raw pucca bales M group	Per Md.	15	5	0	10	15	10	9	10	5	10	11	10	7	15	2
Gunny bags (A.T. hemmed 2¼ lbs. 44×26½)	100 bags	43	13	8	40	13	0	43	2	0	45	8	8	56	10	0
Hessian cloth (10½oz.×40½oz.)	100 yds.	17	7	2	12	8	0	19	5	0	18	2	2	28	15	4

Retail prices are not available.

Certified.

Superintendent,
Department of Statistics.

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APPENDIX B

As this brochure was going to the Press, I found that the *International Review of Agricultural Economics* published the Report of the Agricultural policy Sub-Committee of the Reconstruction Committee. The recommendations made by the Committee may be of interest to us.

The Report deals with the various problems connected with British agriculture and suggests a number of methods of effecting an increase in the home-grown food supplies. The following verbatim abstracts of some of the principal parts of the Report have been taken from the *Mysore Economic Journal*, March, 1919.

AGRICULTURAL RECONSTRUCTION IN GREAT BRITAIN AND IRELAND

Introduction

We desire at the outset to explain that we were informed that the question asked us did not refer to war but post-war conditions, and our Report is drawn up from that point of view only. Nevertheless, it is evident that for some time after the war agriculture must be seriously affected by the conditions which have prevailed during the war. Any inducements and assistance, which the farmers receive now to keep their fields cultivated or to cultivate additional land, will bear fruit in the post-war period, and may even be considered as direct steps towards the object we have in view: We trust, therefore, that we shall not be considered to have passed beyond

our legitimate subject when we express our conviction that farmers need and deserve all the help and encouragement which His Majesty's Government can possibly give them at the present time.

The experience of the war has shown that the dependence of the United Kingdom on imported food has already involved the country in special difficulties, and in the future may become a source of real danger. We have found that it has increased the cost of the war; aggravated the difficult problem of regulating foreign exchange; and absorbed an undue proportion of the tonnage of the mercantile marine at a time when its services have been so sorely needed for other purposes. We are conscious also of the possibility of a development in the construction of submarines which in a future war might make impossible a continuous supply of food to the people of the United Kingdom from overseas. We hope and pray that the greater sanity of nations and their increased obedience to the Divine law may save our country from any repetition of the hideous catastrophe which has to-day overwhelmed Europe, but we can feel no positive assurance that this will be the case, and we do not think that we should be faithful to our trust for our descendants if we omitted to take any practicable measures to increase the national safety in a future time of need. We can well imagine that in some future struggle the comparative independence of the United Kingdom of a supply of food from overseas might be a determining factor of victory. Apart from these grave considerations, it is evident that, after the war, the financial and physical welfare of the country will demand that the productive capacity of the soil should be developed to the fullest extent. Burdened with a huge debt, the nation will be strongly interested in producing as much as possible of its food at home, in order that it may buy as little as possible abroad. Exhausted in man power, it will find in the expansion of the rural population of these islands the best restorative of its vitality and creative energy.

We have approached the problem entrusted to us exclusively from the point of view of national security and welfare, and we have endeavoured to formulate a scheme of agricultural policy which may be generally accepted by the nation and adhered to through a long course of years.

Need for a New Agricultural Policy

We are confident that, as the years pass by and agriculture becomes more intensive in the United Kingdom, an increase of production will be reached which would now appear impossible to many farmers, and that, if the agricultural policy which we recommend is carried out steadily and continuously, a great change will be effected within a generation.

Nothing in agriculture can be done by the wave of a magician's wand. Results can only be produced in the United Kingdom as in Germany by a constant and consistent policy. The State must adopt such a policy and formulate it publicly as the future basis of British agriculture, and explain to the nation that it is founded on the highest consideration of the common weal. It must be explained to landowners, farmers, and agricultural labourers alike that the experience of this war has shown that the methods and results of land management and of farming are matters involving the safety of the State, and are not of concern only to the interests of individuals. They must be plainly told that the security and welfare of the State demand that the agricultural land of the country must gradually be made to yield its maximum production both in foodstuffs and in timber. The history of our country shows that, when once the path of duty is pointed out to them and they understand how grave is the responsibility put upon them, neither landowners nor farmers nor agricultural labourers will fail to rise to the emergency.

The general average of farming must be steadily and continuously raised throughout the United Kingdom; the

grass land and the arable land alike must be more intensively cultivated; the improvement of livestock, for which landowners and farmers have done so much even through the years of acute depression, must be progressive; much grass land must be reconverted into arable; the sugar beet industry and the manufacture of potato products can be introduced into British agriculture to its great advantage; estates must be managed with a single eye to maximum production; capital must be attracted to the industrial equipment and improvement of the land and to the operations of intensive farming; agricultural labourers must be provided with an adequate supply of good cottages; small holdings both of owners and of occupiers must be fostered to provide a "ladder" for the agricultural labourer and for the demobilised sailors and soldiers; the organisation of agriculture must be developed; the country must be permeated with a complete system of agricultural education; the status of the department of agriculture must be improved and their powers enlarged and reinforced by association with existing agricultural and administrative bodies, both national and local. All these questions and others of much importance, such as reclamation, the incidence of local taxation, credit, the working of the Agricultural Holdings Act, etc., etc., will be dealt with in our Report, which will present a scheme of agricultural policy as one whole; but we think it our duty to put in the forefront our conviction that a basis of security and stability of the conditions under which agriculture is to be carried on in the future must be the foundation of the whole structure, and that without it the increase of production, which we predict, cannot be realised.

We are of opinion that the conditions of agriculture must be made so stable that out of its profits the agricultural labourer can be assured a fair wage, the cultivator of the soil a fair return for his capital, energy, and brains, and the landowner a fair return for the capital invested in the land, and we believe that this stability can never exist so long as there is a possibility

of a recurrence of the prices of the late period of depression.

We recommend that the State should fix a minimum wage for the ordinary agricultural labourer in each country, guarantee to the farmer a minimum price for wheat and oats, and take steps, as set forth in later paragraphs, to secure the increase of production which is the object of the guarantee. The cereal crops are the pivot of agriculture, and we do not consider that dairy and stock farming will in any way be prejudiced by our proposals. Moreover, as we have already stated, these very important branches of the agricultural industry can be more, not less, advantageously conducted on arable land than on grass land. In the United Kingdom there is land so adapted to pasture that its retention in grass can be defended on economic grounds. There is also grass land the soil of which is a clay so sticky that in the climate of these islands under the plough "season can only be got upon it" once in three or four years; and there is other land where the climatic conditions render the harvest precarious. It would be useless to plough such land. Of the remaining grass land a large proportion could be ploughed up with advantage to the farmer, the landowners, and the State. The interests of the State demand that more land should be put under the plough, and any landowner and dairy or stock farmer, who chooses to convert part of his grass land into arable, could at once obtain the benefit of the guarantee and at the same time increase the output of his particular products.

We have no authority to consider the fiscal policy of the country as a whole; our reference, though a very important one, is strictly limited, and we shall confine our Report to an answer to it. At the same time we think it right to put on record our opinion that if the State, for reasons of general policy, were to adopt a tariff on manufactured goods, then a tariff corresponding in degree (with the necessary differentiations between the products of the Empire, of allied, and of other countries)

should be imposed on imported foodstuffs such as dairy produce, meat and corn, and that special consideration should be shown to the produce of the more intensive forms of agriculture (of which fruit and hops and flax may be cited as examples), where the capital invested and the annual expenditure in cultivation and the proportion of that expenditure on labour are particularly large.

Method of Securing Increased Production

The Government has no fairy touch which will enable it to produce instantaneous results. It must work through, and by means of, the men who are now holding and cultivating the land. If it was so foolish as to try and do their work as well as its own, the only result would be to bring agricultural production to a standstill. There is no body of men in existence except the farmers of the United Kingdom and those who have qualified, or who are qualifying, to become farmers, who are capable of farming the land. Technical knowledge based on experience is just as essential for successful farming as education and brains and capital. It is when all these qualifications exist in combination that the best farming is found. Therefore the State must give time to all concerned to adjust themselves to the new conditions dictated by considerations of national safety. It should formulate its policy and explain the reasons for it in simple, definite terms; it should make clear the part it proposes to play itself, that the policy explained will be steadily and consistently followed, and that, while the policy is being worked out, the agricultural industry will not be subjected to any harrassing legislation. The State must, in short, take every means in its power to give confidence and a sense of stability to landowners, farmers and agricultural labourers. It must then tell those classes exactly what is expected of them, and appeal to their highest instincts of patriotism to put personal predilections aside, and to unite to carry out a policy on the success of which the safety of their country

may some day depend. The standard set before their eyes should be the highest—not to be content till the whole soil of the United Kingdom is producing the greatest possible return of foodstuffs or of timber. It must be clearly understood that henceforth bad farming is a danger to the State, and that the waste of good land on game or games is inconsistent with patriotism.

When all this has been explained to them, landowners and farmers should be informed that they will be given reasonable opportunity to adjust themselves to the new conditions. The agricultural labourers being secured their share of profits by the institution of a minimum wage, the landowners and the farmers may be left to adjust their shares between them and also to come to an agreement (which is essential) about the relaxation of covenants against the ploughing of grass land or of any others which tend to discourage good farming. We are satisfied that they will have no difficulty in doing so much more satisfactorily than the State could for them.

We entertain no doubt that landowners, farmers and agricultural labourers alike will realise the greatness of the trust reposed in them, that they will rejoice at the recognition of the fundamental importance of agriculture to the national life, and that they will do all, and more than all, that their country demands of them. But we recognise that, when once the State has embarked on such a policy as we recommend, for the sake of the nation's safety, it can run no avoidable risk of its failure. Neither the idiosyncrasies nor the incapacity nor the lack of patriotism of individuals can be allowed to interpose even a partial barrier to the success of a national policy . . . ."

New Powers for the Board of Agriculture

We recommended that the Board of Agriculture should be empowered temporarily to supersede the landowner in the management of the estate for all purposes essential to agriculture. It should put the estate, or

such portion of the estate as it might deem necessary (except the mansion and the garden and park, if any, attached to the mansion), into the hands of a manager whose salary should be fixed by the Board of Agriculture and made a charge upon the estate. He should have the same powers in respect of the management of the agricultural land included in the estate as the owner had, and he should manage the estate as trustee for the owner. He should be a man of proved experience and capacity in the management of an agricultural estate, and he should render a yearly Report and statement of accounts to the owner and to the Board of Agriculture. The balance of income, if any, derived from the estate after the payment of the necessary outgoings should be remitted half-yearly to the owner by the Board of Agriculture. When once the management of an estate had been so taken over by the Board of Agriculture, it should retain that management for five years, unless within that period there had been a successor in title to the original owner, in which case the estate should be handed back to his management at the end of the current farming year, if he so desires it and is prepared to accept such liabilities as may have been incurred in connection with it. If there had been no change of ownership within that period, the Board of Agriculture should be empowered to hand back the estate to the original owner at its termination if it was satisfied that the future management of the estate would be satisfactory. If it was not so satisfied, then it would continue to manage the estate for another quinquennial period, and so on from five years to five years, until there had been a change of ownership. The owner should throughout be undisturbed in the exercise of sporting rights over the estate, subject to the power of the manager of the estate to prevent those sporting rights being exercised in a manner detrimental to agriculture or forestry. If the owner of such an estate is unable or unwilling to develop it for the purpose of agricultural production, the Board of Agriculture should have the power to borrow from the Land Commissioners and to develop it for that purpose by the expenditure of capital,

the charges for which (interest and sinking fund) should have priority over all existing charges on the land charged according to the principle embodied in the Improvement of Land Act, 1864. During the period of supersession the power of the owner to make any fresh charges on the estate, or part of the estate, should be suspended, and the existing charges on it, whether by way of mortgage or of settlement, should be paid out of the proceeds of the land by the Board of Agriculture.

For the guidance of all concerned it should be laid down that it shall be the duty of every landowner so to manage his estate, and that it shall be an implied condition in every lease or tenancy agreement, that the tenant of agricultural land shall cultivate the same according to the approved practice of the best agriculture, with a view to the economic production in the interests of the community of the greatest amount of foodstuffs (for man or beast) of which the land, having regard to its quality and position, is reasonably capable.

Where land is being badly farmed by a tenant who holds a lease, and who persists in farming badly after being duly warned of the ultimate consequences, the landowner may bring the case before the Board of Agriculture, at the same time giving formal notice of the action to the tenant. The Board should thereupon ask the local panel to appoint assessors resident in another county than that in which the farm is situated to report upon the farm, and in due course should refer their report to the Review Committee. If, as the result of the unfavourable nature of the report in respect of the farming of the land, the Review Committee so recommended, then the Board of Agriculture should be empowered to call upon the landowner to give twelve months' notice to the tenant to quit, and that notice should have effect as if the tenant had held no lease, but was a tenant holding on a yearly agreement.

In the later part of our Report we shall deal with agricultural organisation in all its aspects, but it is

advisable to state here that in our opinion the Agricultural Department in each country should, in carrying out the duties described in this part, act in constant consultation with a National Agricultural Council or Board, which we hope may be formed so as to represent the progressive agricultural thought of the country and fulfilling analogous functions to those exercised by the German Agricultural Council.[1]

Rural Cottages

The provision of good cottages for agricultural labourers, with ample gardens attached to them, was an urgent question before the war. We desire to impress upon His Majesty's Government with the greatest emphasis at our command that there can be no hope of a satisfactory development of agriculture as long as the demand for cottages remains unsatisfied. The provision of these cottages should be taken in hand without a moment's avoidable delay after the war. In another part of our Report we shall deal with the improvement of the amenities of rural life, the reconstruction of stagnant villages, and the provision of an agricultural ladder for the labourers by means of small holdings. We mention these subjects now, lest it should be supposed that we consider that the interest of the labourer in a national agricultural policy is limited to the questions of wages and housing.

Our attention has been directed to the point that some amendment in the Settled Land Acts may be desirable, to allow a share of the proceeds of the sale of a portion of a settled estate to be expended on improvements other than those specified in the existing Acts . . .

Need for Technical Advice

To bring about the changes in farming which we contemplate it will be necessary for the State, in addition

[1] See Middleton: *The Recent Development of German Agriculture.*

to providing farmers with security against loss, to place at their disposal the best available scientific and practical advice. Indeed, it will be impossible to carry out the scheme (except with serious loss and wastage) unless it is accompanied by an important development of the facilities at present available in the United Kingdom for agricultural education, technical advice, and research. It will be necessary to insist on the importance of drainage, and to demonstrate throughout the country the best means of converting grass land into arable, the best methods of manuring, and the best varieties of seed; and to carry out, on a much more complete system than has hitherto been attempted, demonstrations devised to show that increased production can be secured without loss of profit. These subjects are, however, of such importance that we are deferring their consideration until the later part of our Report.

Organisation and Administration of the Departments of Agriculture

The first thing necessary after the war will be to unite the whole Department of Agriculture under one roof. Proper administration is quite impossible when a department is scattered into a dozen separate houses in half a dozen different streets. The Minister in charge of the Department should be styled, as now, President of the Board of Agriculture, but his salary and status should be raised to an equality with that of the President of the Board of Trade and the President of the Local Government Board. The staff must be increased and strengthened; especially it needs the infusion of a proper proportion of Class I of the Civil Service; those members of the staff from whom expert, or at any rate practical, knowledge is required should be selected by a combination of the systems of nomination and examination; the First Division men, who enter through the Civil Service examination, should spend at least two out of the first five years of their service out of London; it is in our opinion important that they should get an early insight

into the working of agricultural administration, either on the provincial staff of the Department or attached to the staff of local authorities. The provincial staff of the Department requires reorganising. Before the war the work of most of the provincial officers covered an impossibly large area, but many fresh appointments have since been made in connection with the campaign for food production; in some cases officers may be made responsible for all the work of the Board in a given geographical area; in other cases the work of officers must be specialised. In this paragraph of our Report we merely indicate the fact that the staff of the Department must be permanently expanded above its pre-war strength. In subsequent paragraphs we shall explain what the work is which in our opinion it should do. It may, however, be convenient in this place to draw attention to the fact that the work of other Departments of the State must affect the welfare of the rural population and the state of agriculture. This is particularly true of the Board of Education, and of the Local Government Board in respect of the housing problem. It seems to us necessary that in dealing with rural housing the Local Government Board, and in dealing with elementary and secondary education in agricultural districts the Board of Education, should work in close touch with the Board of Agriculture. The organisation of the Department in London must be remodelled in the light of experience and in consequence of its increased reponsibilities. There is, however, one aspect of this reorganisation to which we wish to draw special attention. It will certainly be necessary to create a division charged with the management of all agricultural properties permanently or temporarily placed under the control of the Board of Agriculture. But the President of the Board, in his capacity of a Commissioner of Woods and Forests, is already responsible for the management of the agricultural properties of the Crown. We think that it would be a good plan to amalgamate the agricultural side of the Office of Woods and Forests with the Management Division of the Board of

Agriculture, and to put both sets of agricultural properties under the same control.

As in Scotland, so in England and Wales, the War Agricultural Committees of the County Councils [1] should be replaced by statutory committees, which, when constituted, should have powers of action independently of the County Councils, as in the case of the corresponding committees in Ireland and of the Education Committees in England. They should be composed of men and women who are not members of the County Councils, as well as of members of the County Councils, but in both cases alike it is essential to secure the services of persons with practical knowledge of agriculture or some other branch of rural economy, or representative of some special rural interest rather than of the different districts of the country. These Agricultural Committees should absorb the work of the existing Small Holdings and Allotments, Contagious Diseases of Animals, and Agricultural Education Committees (or Sub-Committees) of the County Council, and of the Live Stock Committees established by the Board of Agriculture in various counties within the last few years (all of which committees should be abolished), and they should undertake any other duties entrusted to them by Parliament or delegated to them by the Board. A County Council should have the power to set up more than one Agricultural Committee within its area, and the Agricultural Committee should have power to form District Sub-Committees.

The Agricultural Committees of England should elect two representatives from each County Council area

[1] Since this paragraph was drafted the Board of Agriculture has been empowered under the Corn Production Act to authorise approved bodies to exercise any of the powers of the Board under Part IV of that Act, with a proviso that the bodies so authorised shall, in the first instance, consist of persons who are acting as members of the County War Agricultural Executive Committees. This enactment, therefore, provides a natural link between the Statutory Committees here recommended and those already in existence.

to serve on the English National Agricultural Council, already suggested in this Report. The President of the Board of Agriculture should nominate to it persons representative of all agricultural interests, so that, however, the total number of nominated members shall not exceed one-third of the council. The President and the Parliamentary Secretary of the Board of Agriculture should be *ex-officio* members. The council so composed should meet at least twice a year to discuss questions of agricultural policy brought before it by the President, or by any of its members on due notice given, and the President or, in his absence, the Parliamentary Secretary should preside over its meetings.

There is already in existence a Welsh Agricultural Council which is not statutory but does useful work. We recommend that this council should continue to perform the functions of a national agricultural council for Wales, and that it should be made a statutory body for the purpose of advising the Board of Agriculture in regard to agricultural matters in Wales, to which the Board may delegate certain powers and functions relating to local administration. The council should consist, as at present, of two members elected by each Agricultural Committee in Wales and Monmouth and the agricultural departments of the two colleges, with not more than twelve members nominated by the President of the Board of Agriculture. The President and the Parliamentary Secretary of the Board of Agriculture should be *ex-officio* members, and the President or, in his absence, the Parliamentary Secretary should preside over its meetings. All the local work of the Board of Agriculture in Wales should be under the charge of a Principal Officer of the Board, who should be assisted by an adequate staff and have his headquarters and office at a centre in Wales convenient for North and South.

We recommend also that there should be established an Agricultural Committee for England and Wales, composed of the President and Parliamentary Secretary of the Board of Agriculture, eight members elected by the

English Agricultural Council, two members elected by the Welsh Agricultural Council, and three members appointed by the President of the Board of Agriculture. The committee should meet regularly every quarter, and on special occasions when summoned. The President or, in his absence, the Parliamentary Secretary, should preside. It should deal with any business brought before it by the President, but its members should be free to raise and discuss and pass resolutions on any subject of interest to agriculture or rural life in England or Wales. The proposed annual estimates should be laid before the committee and discussed by it before being laid on the table of the House of Commons, and when so laid they should be accompanied by a memorandum expressing the opinion of the committee upon them. All resolutions of the committee should be laid upon the table of both Houses of Parliament if so directed by them.

The National Agricultural Councils for Scotland, England and Wales, and the Agricultural Committees for Scotland and for England and Wales, should be appointed afresh after every general election of the County Councils; and the members selected, whether by the County Councils, or by the Presidents of the Boards of Agriculture, or by the National Councils, should hold office until the next general election of the County Councils.

If our recommendations are adopted there will be in existence in the United Kingdom four National Agricultural Councils, representing agriculture in Ireland, Scotland, England and Wales. We suggest that it would be of great advantage to agriculture if delegates from these councils, say, thirty for England and five for Wales, and ten each for Scotland and for Ireland, were to meet in conference once a year. The conference should never be held two years running in the same country, but in each country in turn, and the Minister responsible to Parliament for the agriculture of the country in which the conference is held should act as its president for the occasion. An officer of one of the Departments

of Agriculture should be permanent secretary of the conference, and responsible for the custody of its records. We believe that the result of such conferences would be to diminish the chances of friction between the three Departments, to encourage the pursuit of a common policy, and to inform public opinion of the special difficulties and needs of agriculture and of its magnitude and importance as an industry. It would be a great encouragement to agriculture if His Majesty the King would graciously consent to become permanent patron of the conference of the combined councils.

Purchase of Land Bill

We recommend that the principles of the Purchase of Land Bill should be adopted and an Act passed to give effect to it. We attach special importance to clause II of the Bill, which prohibits subdivision and sub-letting, and we strongly advise that the principle of this clause should form an integral part of any purchase scheme.

Village Reconstruction, Industries, and Social Life

The intimate connection between a plentiful supply of agricultural labour and an increase in the output of home-grown food—the primary object of our reference—was recognised in the early stages of our enquiry, and the recommendation with regard to farm wages contained in Part I of our Report was framed to meet the competition of other and better-paid industries. But, in our opinion, the question is not merely one of wages; the conveniences and interests of town life exercise an attraction upon the young rural labourer which can only be met by offering counter-attractions in the country districts; and no agricultural policy will be worth having which does not aim at a better-developed social life in our villages, at the introduction of fresh industries into the country districts, and at a large increase in the rural population. To this end an effort must be made to break through the stagnation in the life of too many villages by offering better opportunities for social intercourse and amusement, by arousing a stronger feeling of corporate existence and

responsibility, and by opening out improved prospects of advancement to the energetic and hard-working. With the advance of education a desire for greater opportunities has arisen among the more active and ambitious of the younger generation, causing them to covet the greater scope for their energies offered in urban districts. The proposals made under this head of our Report are designed to lessen the despondency of outlook sometimes associated with existing conditions, and to provide a machinery, which does not at present exist, for the improvement of village life.

The difference between villages, even in the same neighbourhood, is often marked. Some seem to carry outward evidence of the prosperity and happiness of their inhabitants, while the aspect of others, less fortunate, seems to indicate with equal plainness a dull and colourless outlook. In the former are seen smiling gardens, well cultivated and conveniently situated allotments, cottages in good repair, village playgrounds, and social clubs and reading rooms; in the latter, with land in abundance around, we find cottages possessing no gardens or insufficient gardens, huddled together so as to reproduce some of the evils of town slums, and an absence of all the amenities of life, and allotments so distant from the centre of the village as to be difficult of access and inconvenient for cultivation, the whole presenting an appearance indicative of the conditions prevailing therein. Enquiry will usually show that the difference is due to the fact that in one village a guiding spirit has exercised a sustained policy of development, based upon a clear perception of the requirements of the inhabitants and a study of the best means of providing for them, while the other has been without these advantages. In this connection it has been pointed out that an examination of the maps of the Ordnance Survey reveals how lacking in system has been the development of the ordinary village. In its midst, even adjoining the village street, may be often found land let with large farms, which might better be used for housing or other public purposes, for providing

gardens, cow pastures or allotments, or for occupation with adjacent cottages. But it is no one's business to take the lead in demanding a better scheme of use for the land, nor does any machinery exist by which a re-arrangement could be carried out. An atmosphere of stagnation prevails, and it is not surprising that the best men in such districts prefer to try their fortune in places offering greater scope for their ambition. The less efficient remain, and the deterioration in the rural working population, of which complaint is often made, becomes an accomplished fact.

We are of opinion that the machinery of the Parish Council, the Agricultural Committees of the Country, and the Board of Agriculture should be utilised for the purposes of village reconstruction, and that under proper conditions the necessary land should be acquired by compulsory powers if it cannot be acquired by voluntary agreement. If cottages are built or small holdings are created, we think that the inhabitants of the village should be given the option of tenancy or ownership, but that ownership should not carry with it the power of subdivision or of utilisation for a different purpose than that for which the house was built or the holding created. The money required for a scheme should be advanced out of public funds, and repaid by the Parish Council and the parties benefited, following the exact analogy of a scheme under the Small Holdings and Allotment Act, 1908.

We have been much impressed with the value of the work done by the Rural League in establishing village industries, and of the Agricultural Organisation Society in establishing women's institutes, and we recommend that either the Agricultural Organisation Societies in the three kingdoms or some analogous body should receive distinct grants for these specific purposes, and that the task of fostering village industries and of forming women's institutes should be entrusted to them under the supervision and control of the respective Departments of Agriculture.

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NEVER before in the history of the world have we been so impressed with the great importance of Agriculture.

UPON it, in time of peace or in time of war, depend the life, liberty and well-being of the ...

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