



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

PROCEEDINGS OF THE
NINTH
INTERNATIONAL CONFERENCE
OF
AGRICULTURAL ECONOMISTS

HELD AT
TEEKKARIKYLA, OTANIEMI
FINLAND
19-26 AUGUST 1955

THE IMPLICATIONS OF TECHNICAL
CHANGE IN AGRICULTURE

LONDON
OXFORD UNIVERSITY PRESS
NEW YORK TORONTO
1956

POLITICAL OBSTACLES TENDING TO RETARD THE INCREASED ECONOMIC WELFARE OFFERED BY TECHNICAL CHANGE IN AGRICULTURE

K. L. ROBINSON

Department of Agricultural Economics, Cornell University, Ithaca, New York

THE major purpose of this paper is to focus attention on the past and possible future deterrents to innovation in agriculture created by political pressures. I shall deal, not with political forces as such, however, but mainly with the results of these forces as they are reflected in government policies. Coalitions of political forces lead in some cases to government inaction and in other cases to government action. Both are relevant to the discussion. Obstacles to change can be removed under certain circumstances only by appropriate legislation and may be created under other circumstances by government programmes. My part of the discussion will be confined largely to an appraisal of those acts of omission and commission by governments in various countries of western Europe and North America which may have an adverse effect on the rate of adoption of welfare-increasing innovations in agriculture. By welfare-increasing innovations, I mean those changes that will permit society either to obtain more of the products desired from the same bundle of resources or to maintain output and at the same time decrease inputs or costs.

The first part of the paper deals with resistance to the enactment of legislation and the appropriation of funds for programmes that might stimulate innovation in agriculture. The second part deals with barriers to technical changes in agriculture arising from legislation enacted to protect the economic position of various interest groups.

Political Resistance to the Adoption of Programmes that might Facilitate Technical Changes in Agriculture

The failure of society to develop and make available new techniques of production can limit gains in economic welfare. While the unavailability of innovations might at some future time constitute a barrier to increased economic welfare, this probably is not a major limiting factor at present. Practically all governments now assist in the process of developing and making available innovations appli-

cable to agriculture. Political support for State-subsidized research and advisory or extension services apparently is not lacking although some would argue that current appropriations for agencies concerned with these functions are inadequate. A more serious obstacle to the realization of gains in the future may be the attempt on the part of some governments to enforce laws of political conformity on scientists.

Potential gains in economic welfare will not be realized, of course, no matter how many techniques of production are created and made available unless a considerable number of those individuals who actually make management decisions on farms have both the required capital and the desire to change. At least some of the factors affecting the ability and willingness of farmers to try out new methods of production can be influenced by government action. The State, for example, can, by appropriate monetary and fiscal policies, affect industrial employment opportunities—one of the major determinants of the rate of technical change in agriculture. In addition, the State can alter existing land-tenure laws which in some cases limit incentives to change. Even more direct action may be taken to stimulate particular types of innovations. For example, governments can offer financial rewards in the form of subsidies, tax concessions, or favourable terms of credit to producers who make specified changes in production practices. These special inducements may apply to such things as the purchase of machinery, livestock, or fertilizer, the construction of drainage, irrigation, or conservation devices, the planting of improved varieties of seeds, or the control of insects and disease.

Clearly, governments have numerous tools at hand which can be used to encourage the development and adoption of innovations in agriculture. However, most governments probably have not used these tools to maximum advantage. Programmes that seek to maximize long-run gains frequently meet with political indifference or outright resistance. This is due largely to the fear of some individuals that government expansion will reduce their freedom or threaten their privileged position, and to the doubts of others that gains from additional government expenditures will exceed losses resulting from higher taxes or inflation caused by increased borrowing. Those in office as well as those seeking election are reluctant to press for the passage of legislation requiring increased appropriations unless they can point to some immediate benefits likely to accrue to their constituents. Government programmes which promise short-run gains to particular groups obviously have the political advantage. Any

gains from programmes designed to stimulate innovation in agriculture are likely to be diffused rather than concentrated, both geographically and over time; for this reason, such programmes have only limited political appeal.

One obstacle to the realization of gains in economic welfare may be simply ignorance on the part of politicians and voters regarding the beneficial effects of certain types of government action. If this is true, economists can perform a useful function by making careful estimates of the public costs and benefits of proposed policy alternatives.

*The Effects on Innovations in Agriculture of Government Action
to Protect Special Interest Groups*

Thus far, I have dealt only with political obstacles to expanding government activity of the type that might be expected to stimulate changes in agriculture. Another aspect of political pressure as it affects innovations also needs to be considered. This is the effect of political pressure which seeks to protect or improve the welfare of particular groups by means of government programmes. Much of the legislation passed by democratically elected governments in recent decades reflects the demands of special interest groups for economic protection. In some cases, government action to maintain or improve the welfare of particular groups has had no serious effects on the rate of technical change in agriculture, or has in fact stimulated innovations. In other cases, however, legislation adopted for this purpose has, over a period of time, reduced incentives to change. My purpose is neither to condemn nor to endorse protective legislation but to call attention to the strength of the political forces demanding protection and the possible effects legislation enacted to satisfy those demands may have on innovations and hence on the long-run economic welfare of society as a whole.

Both farm and non-farm groups have succeeded in their efforts to enact protective legislation, particularly during the past two or three decades. Manufacturers and farmers have obtained protection in the form of direct subsidies and tariffs or quantitative restrictions on imports; industrial workers have received protection in the form of minimum wage laws, unemployment compensation, immigration quotas, and, in some cases, restrictions on movement between jobs and areas. One cannot isolate the specific effects on innovations in agriculture of each act, particularly those directed at providing economic security for non-farm groups; but one can point to a few of the general effects.

Perhaps the most important obstacle to change created by the various protective devices has been the erection of barriers to labour mobility. Where entry into non-farm occupations is limited, or where shifts of labour from one type of occupation or one area to another are restricted, potential gains in economic welfare will not be realized. Agricultural efficiency can be increased in most areas only if part of the labour force now engaged in farming can find productive employment in non-farm industries. Protective devices that restrict entry into non-farm jobs clearly will have an adverse effect on the rate of adoption of innovations in agriculture.

At least some of the effects on technical changes in agriculture of protective legislation can be illustrated by case studies of agricultural price and income programmes. These, of course, have had a more direct impact on the ability and willingness of farmers to change crops and production practices than have those designed to protect the interests of non-farm groups. A great variety of devices have been used by governments in an effort to maintain or improve agricultural incomes during recent decades. Among these are tariffs, embargoes and quotas on competing imports, subsidies on agricultural exports, acreage controls, direct price or income payments, restrictions on the size of individual land-holdings, and ceilings on land rents. I shall not attempt to summarize in detail the results of all these programmes, but I shall try to highlight the more important effects they have had on technical changes in agriculture.

Grouped from the standpoint of their effect on innovations, protective devices introduced in an effort to improve farm incomes can be classified as follows:

- (1) Those types of action which stabilize or raise farm prices and incomes without affecting directly either the freedom of farm operators to use particular inputs or the prices of factors.
- (2) Those types of action which restrict the quantity of a particular factor which might be used in production.
- (3) Those types of action which hold down or reduce the price of a particular factor.

This classification emphasizes the difference between those types of farm programmes which have a direct effect only on farm-product prices and incomes and those which have a direct effect on the amounts or proportions of various factors used in production as well as on product prices and possibly incomes. The distinction between those types of action which influence directly the proportioning of factors of production and those which do not is somewhat arbitrary,

since all types of protective devices, if effective, are likely to alter product and factor price ratios. These price changes in turn will lead at least some farmers to change the composition of total farm output and the amounts and kinds of factors used in production. The distinction I have made is useful mainly in analysing the primary or short-run effects of farm-price and income programmes on the rate of technical change in agriculture.

Included in the first category are those price- or income-support programmes which make use of such devices as tariffs, embargoes and quotas on competing imports, export or domestic consumption subsidies, and deficiency or compensatory payments based on the difference between the actual market price and a guaranteed price. Farm programmes of this type leave the producer free to use unlimited amounts of any factor he desires. The effect of such programmes on innovations depends on whether or not fluctuations in price are reduced and whether or not farm-product prices are raised relative to factor prices. To the extent that farm prices are stabilized or raised, the capital or credit position of farmers is improved. This enables the farmer to invest in equipment and materials needed to increase output and efficiency. If the danger of a price collapse is reduced, creditors also are more likely to grant loans for farm improvements. Thus, price-support programmes, if successful, can help to create conditions favourable to increasing capital expenditures in agriculture. Unquestionably, one of the effects of price-support programmes in both the United States and Great Britain, at least during certain periods, has been to stimulate investment in machinery, livestock, drainage, and similar types of farm improvements.

The creation of a favourable economic environment for investing in agriculture, whether by price supports or other methods, however, will not always lead to increases in efficiency. A larger total income, under some circumstances, may be a necessary condition but not a sufficient condition for changes in agricultural production to occur. Gains in income, for example, may be used simply to bid up land values or to purchase consumer goods. The *capacity* to change must be accompanied by the *willingness* to change if the benefits of new techniques of production are to be realized. Price supports, while increasing the capacity to change, may neutralize or decrease incentives to change. If incomes already are high, any additional increment in income provided by price supports is not likely to stimulate further changes in production. Both the United States and Great Britain provide examples of the negative effects of price guarantees on the willingness of producers to change. Such guarantees have at

times given farmers a comfortable margin of profit, thereby enabling them to retain or achieve their accustomed level of living without improving efficiency.

Generalizing more broadly, one might conclude that farmers respond to price changes in what economists would term a 'rational' manner only within a limited range of prices. Farmers cannot change established production patterns if prices and incomes are very low, and they are not necessarily motivated to change if prices and incomes are comfortably high. Experience thus far suggests that the effect of a price-support programme on innovations in agriculture will depend in part on the level of prices and incomes preceding the introduction of the support programme or the level likely to prevail in the absence of such a programme. Price-raising devices of the type that do not affect directly the proportioning of factors of production are more likely to stimulate innovations if they raise prices and incomes from a relatively low level than if they increase incomes from a relatively high level. Beyond a certain point, additional increments in income simply encourage farmers to relax their efforts to increase efficiency. In such circumstances, a reduction in prices and incomes gives farmers as much or perhaps more incentive to alter techniques of production than an increase in prices and incomes.

Price-support devices of the type just discussed influence the rate of technical change in agriculture primarily through their price-stabilizing and income effects. Indirectly, such devices are likely to raise factor prices by increasing the cost of living. To the extent this occurs, ratios between product and factor prices and hence real incomes will differ little from those that would have prevailed in the absence of government intervention. In such circumstances, price supports will not materially affect the rate of innovation in agriculture.

Price-support programmes of the second type, that is, those which restrict the use of one particular factor, are more likely to influence technical changes in agriculture than price-support programmes of the first type. In theory, restrictions could be applied to the use of any factor, but in practice limitations have been imposed only on the use of land for particular crops. A land-area control programme influences the rate of technical change in agriculture directly by inducing farmers to add more inputs to land. Indirectly, as with programmes of the first type, those of the second type may help to stabilize farm product prices and raise them relatively to factor prices. Farm incomes are increased, of course, only if the control programme reduces total output and the demand for the product is price-inelastic. But regardless of the effect on incomes, acreage controls

bring about changes in land use and probably in production practices as well.

The effects that land-use controls are likely to have on technical changes in agriculture are well illustrated by the experience of the United States. Unquestionably, changes in production practices were a major by-product of the acreage-control programmes which were introduced there during the decade of the 1930's. From 1933 to 1942, acreage controls reduced or held down the output of cotton and tobacco and hence helped to improve the incomes of cotton and tobacco producers. Restrictions on the amount of land which could be planted to wheat, corn, cotton and tobacco forced farmers to alter their rotations and led them to try new crops and production practices. While the area that could be planted to certain crops was limited, total output was not; hence farmers sought to increase yields by using improved seeds, more fertilizer, better methods of controlling insects and disease, planting at closer intervals, using more legumes in the rotation, and so on. These techniques proved to be so successful that they were applied to crops not subject to control as well. A considerable part of the increase in crop yields which occurred between the late twenties and early forties probably can be attributed to the acreage-control programme because of the incentive it gave to experimenting with new practices.

While acreage controls undoubtedly stimulated technical changes in agriculture, particularly just prior to World War II, the changes induced were not necessarily beneficial to society in all cases. Tobacco yields, for example, were increased, but at least a part of the increase was obtained by sacrificing potential gains in labour efficiency. Moreover, acreage controls retarded shifts in production to areas where costs of production might have been reduced; thus additional potential gains in total economic welfare were sacrificed. Gains in output and efficiency induced by creating incentives to experiment with yield-increasing innovations undoubtedly were more important in the early years of the acreage-control programme than they have been in recent years; the costs to society in terms of lost opportunities to improve labour efficiency, by using more land relative to other factors and by changing the location of production, have been greatest in cases where acreage restrictions have been maintained for an extended period.

Farm programmes of the third type, that is, those which seek to improve incomes by holding down or subsidizing the price of a particular factor, also are likely to have a direct effect on the proportions of various factors used in production. The income effects of such

programmes are important only if the factor subsidized or controlled accounts for a relatively large proportion of total inputs. Unlike farm-income programmes of the second type which lead to more *intensive* use of a particular factor, those of the third type encourage more *extensive* use of the factors controlled. By creating or maintaining artificially low prices for such factors as land, fertilizer, and machinery, governments give farmers an incentive to use more of these factors.

Where the prices of certain factors have been controlled or subsidized as in Great Britain and the United States, farmers undoubtedly have employed more of these factors in production than they might otherwise have done. The purchase of additional machinery in Great Britain and greater use of fertilizer and lime in the United States, for example, has been encouraged by favourable tax laws and outright subsidies. But, as with programmes of the second type, efficiency has not always been increased by the changes which have been induced. Subsidizing fertilizer purchases in the United States, for example, has led to wasteful use in some cases. Where a more intensive rather than extensive use of a factor would contribute to gains in total welfare, such programmes also have shortcomings. In Great Britain, for example, the maintenance of relatively low land rents has encouraged some farmers to use land extensively rather than intensively, thus sacrificing gains in total output.

The cases I have discussed illustrate the diversity of effects which farm-price and income programmes can have on technical changes in agriculture. The evidence points to the conclusion that all effects are not negative. Gains in income resulting from increases in the prices of products relative to the prices of factors can have a stimulating effect on innovations, especially if the previous level of incomes was relatively low. Land-area-control programmes give farmers a special incentive to change rotations and try out new methods, particularly those which might increase yields. Subsidizing the use of particular factors also may lead to gains in output and efficiency if farmers have been using less than optimum quantities of those factors.

Under certain conditions, however, farm-price and income programmes can create an environment unfavourable to change. They also may induce changes which are not necessarily in the public interest. The retarding effects on innovations of income-increasing programmes probably have been important only in cases where farm prices and incomes have been maintained at relatively high levels over a period of years. The beneficial effects of those farm programmes which contribute directly to changes in the proportions of

factors used in production have been greatest in the short run, while the undesirable effects have increased in cases where the programmes have been continued for a decade or more.

Conclusions

The absence of political support for long-run programmes that might remove institutional or economic barriers to change and the pressure for programmes that protect or improve the short-run welfare of particular interest groups constitute, in my view, major political obstacles to the realization of gains in economic welfare. Political pressure based on regional or special interest groups frequently prevents the enactment of laws that might facilitate the adoption of innovations in agriculture. The pressure to provide immediate protection often results in the passage of legislation which promises short-run gains but which, over a period of years, may retard desirable changes in agricultural production or bring about changes not in the public interest. Once in effect, measures to improve the welfare of particular groups, regardless of their influence on total economic welfare, become difficult to change. The political advantage under a democratic system of checks and balances usually lies with the *status quo*.

My major concern, in this paper, has been with the long-run effects on innovations in agriculture of government policies, including the failure of government to act under certain conditions, and the positive acts of government under other conditions. Barriers to change, of course, are not necessarily undesirable if the ends achieved are preferred by a majority of citizens to increased economic welfare. If society does wish to achieve gains in economic welfare, however, the ability to change, that is flexibility in government policies, must be preserved.

A. G. BAPTIST, *School of Agriculture, Ghent, Belgium*

No one doubts that economic progress depends in the first place on scientific research, and we can see that politicians in European countries are interested in it. Its development forms an increasingly large part of governmental policy. This is true especially of work which promises practical results in the fairly near future. Such work absorbs a large part of the intellectual reserves in agriculture. Although this policy is most encouraging, I have the feeling that we must watch that there is a corresponding development in funda-

mental research which runs the risk of losing ground in relation to empirical research.

If, for example, plant improvement has developed intensively, we must watch that research in pure genetics can develop at least as much. In the same way, research in the domain of cattle feeding may one day be handicapped if we do not take care that there are preliminary studies in animal physiology. Fertilizer trials have remained, in the main, empiric through lack of sufficient knowledge of plants and above all of the soil. Those specializing in livestock feeding have an urgent need for more thorough physiological studies.

Another important point is that farmers and politicians should be kept informed of the research being carried out in their countries and should be convinced of its utility. Political leaders, faced with an overwhelming task, must inevitably tackle immediate problems. Also, many farmers are interested primarily in the immediate solutions which can be reached by means of legislation. In these circumstances, it is difficult to imagine a long-term policy based primarily on agricultural research.

As regards new crops, mistakes are inevitable if much study has not been given to climate, soil type, and the place of such crops in the rotation. But although the physical conditions for an enterprise may have been carefully studied, the economic conditions for development of the enterprise—such as the competitive position with regard to existing enterprises, the existence or lack of necessary materials and machinery, the competition of new crops in the use of the land, possibilities for marketing, availability of transport and storage—may have been forgotten. Also, the introduction of new enterprises may be transitory owing to chance circumstances as, for example, high prices over a short period. In the distribution of subsidies for artificial fertilizers, losses are inevitable if farmers do not know how to use them rationally. The subsidizing of machinery may make farmers buy machines in order to profit from the subsidy though these machines may never be replaced.

Altogether, the best investments are those basic ones which would reduce the dispersion of fields and improve the soil, the pastures, the farm buildings, the facilities for storage, and would extend electrification, reduce disease, &c. These latter investments are truly long term. Investment subsidies which do not possess this fundamental long-term character are often inadequate. For instance, to pursue a subsidy policy for machinery of which the results appear uncertain would be deplorable if the same credit could have been given more usefully for the electrification of isolated farms.

Governmental action should not go too far, as Dr. Robinson says, and as I should like to emphasize, because each farm is different from the next and cannot be managed efficiently without a good deal of private initiative on the part of the farmer. When external intervention plays too big a part, prices can deviate too much from world prices. This in its turn increases the demand for intervention and control, which sooner or later becomes insupportable.

Agricultural economic policy can also be too aggressive. In those regions where agriculture is more a way of life than a means of production, and where social needs are relatively more important than economic needs, to push economic development too rapidly may lead to the destruction of a social system, to rural depopulation, and to the destruction, rather than the construction, of a progressive agriculture. I should like to stress the fact, however, that technical progress can be less destructive if, when innovations are made, care is taken to replace one form of balance by another. For example, in the tropics, if a farmer's hut, in which he could make a fire to protect himself against cold and mosquitoes during the night, is replaced by a dwelling in which there is nowhere to make a fire, care must be taken to give the farmer blankets and a mosquito net. Such elementary things are easily forgotten. Protecting income is a matter of degree. Too much protection may not only make farmers relax their efforts, but also result in the maintenance of too many people on the farm, and in the raising of rents. It is possible to protect the peasant's income in two different ways. The first consists of measures which help the farm; the second of measures which help the farmer. It seems to me that the former is the better method.

The application of some parts of this policy may be difficult for constitutional, psychological, or political reasons, and also because they are long-term policies. For this reason we do not exclude a process of price supports; but this should be used only as a last resort. Indeed we should always think of a hierarchy in the technical improvements to be recommended. Thus, in a country where agriculture is still at a relatively primitive stage, one should first consider what I once called indirect mechanization, which refers chiefly to housing improvements, to the construction of roads, wash-houses, wells, &c. As regards technical progress on the farm itself, I have seen the use of tractors recommended before it had been shown that tractors were suitable for the existing natural and economic conditions, and when there were still many improvements to be made in hand tools. But since this latter type of improvement was less spectacular, it interested only a relatively small number of people,

although the economic return was certain and represented a considerable advance.

Finally, if each country has its own policy for protecting agricultural incomes, these protectionist measures are a handicap to the development of international trade. Industrial or agricultural protectionist measures engender agricultural or industrial protectionism. The differences in the relationship between indirect and direct taxes create artificial inequalities between countries. All these different policies create artificial inequalities between costs of production. The question is, would not the establishing of international agreements more certainly increase agricultural as well as non-agricultural incomes than growing retrogression through indirect taxes, protection measures, frontier barriers, and restrictions on the movements of money and people?

E. M. H. LLOYD, *London, England*

We owe a debt of gratitude to Professor Robinson for his skilful analysis of this difficult topic, and also for his courage in criticizing the policies of his own government and indeed of most other governments, my own included. It is appropriate, perhaps, that in our jealously guarded atmosphere of academic freedom we should conclude our deliberations by all joining in some sort of general confession of our respective governments' sins of omission and commission. May I offer Professor Robinson a version that my wife invented in our early married life in the context of domestic economy—to cover the problem of when to darn and when to throw away a pair of socks. It went like this: 'We have darned the things we ought not to have darned; and we have left undarned the things we ought to have darned. And there is no darned health in us.' So it is with the combinations of politicians and civil servants that we call governments. They go on patching up untenable policies with short-run expedients; they hesitate to scrap outworn policies that may have been good in their day but have outlived their usefulness; and they shirk the long-term issues on which progress depends. I suggest that many of the devices for maintaining farm incomes by protective tariffs and price supports which had their origin in, or stemmed from, the disastrous depression of the thirties would not have taken their present form if they could be thought out again today. As Professor Robinson says, vested interests usually tend to support the *status quo*.

Professor Robinson has provided us with a number of pegs for discussion. I will pick out only a few and, like him, raise questions rather than give the answers a politician would give. Perhaps the

central question is: what forms of state intervention do we as agricultural economists approve and what common yardstick are we to use for judging between them? He has given us one criterion we could perhaps all accept, namely, whether the changes will permit society either to obtain more of the products desired from the same bundle of resources or to maintain output and at the same time decrease inputs or costs.

I was glad to see him emphasize the supreme importance for agriculture of monetary and fiscal policies designed to maintain an expanding economy on a fairly even keel without violent ups and downs. I hope that the doctrine that a trade cycle of from eight to ten years is inevitable, on which I was brought up and against which I protested in a book called *Stabilization* published more than thirty years ago, is now out of date and has been exploded by the teachings of Keynes; and that skilful management by central banks and treasuries is now substituting a series of minor short period fluctuations of from two to three years. I suggest that the success or failure of this policy may be of decisive importance to the future of the Western world. Let us recall that it was Marx who exposed the catastrophic effects of the trade cycle and prophesied the eventual collapse of the capitalist system as a result of recurring crises. It was the slump of the thirties which made so many young men turn towards a planned economy. Can we yet say with confidence that Keynes has answered Marx?

Next, while we should all agree that greater stability for agricultural products is desirable, our attempts hitherto have been largely experimental, and we have not yet learned the right answers to such questions as: how much stability, at what level, by what means? And should measures be taken nationally or internationally? Stability should not imply rigidity and must not be such as to destroy or seriously to distort the price mechanism in determining the pattern of production. Guaranteed prices in the Netherlands, for example, are minimum prices which have been consistently below the market price. But excessive price support, at a level which satisfies high-cost producers, may positively discourage economic and technical progress. It is a fallacy to suppose that you get greater efficiency by guaranteeing a price that gives a fair income to the inefficient. As Arthur Jones said, guaranteed prices increase output at rising costs rather than provide technical advances at lower unit costs. It is the business of government not to prevent but to facilitate desirable shifts of production, for example, from vine-growing to fruit and other enterprises in parts of France. I suggest that subsidies and direct

production grants designed for specific purposes may be more useful in the long run than indiscriminate protection or price support for all producers including the most efficient and the higher income groups.

We must also consider trade barriers. This is the most difficult and controversial issue. I thought Mr. Englund dealt with it a bit gingerly—rather like a red hot poker. He emphasized the advantages that the United States has gained by the 'absence of internal trade restrictions' through greater specialization and division of labour. But he said little about similar gains on a stupendous scale that might be obtained if absence of trade restrictions could be applied to a wider area and ultimately to the whole world. At the East Lansing Conference Mr. Minderhoud and I dealt with the political obstacles that prevent this development even in the area covered by the eighteen States of O.E.E.C. Since 1952 there has been little progress to report. The 'green pool' proposals for commodity agreements came up against the principle of liberalization and involved too rigid ideas of price support and protection. After three years it still seems that integration of agriculture in western Europe, with a common market and common measures of price support, depends on some form of monetary and fiscal union.

Much has been said about problems of land tenure and I propose to add little except to emphasize its explosive political implications in many undeveloped countries. In densely populated countries, land hunger is a burning issue and agrarian revolt against landlordism has been a recurring theme throughout history. Mr. Justice Paul Douglas in his stimulating book on peasant problems in the Middle East, *Strange Lands and Friendly People*, has painted a vivid picture of the evils of absentee landlordism in that part of the world. In India we have been assured by Mr. Sen that land reform is going fast; but is it going fast enough? Mr. von Dietze has rightly emphasized what he called 'the imponderabilia of family farms' and has praised their 'modest wants'. I suggest that there may be countless millions of peasant families throughout Asia who in their heart of hearts would like to be left alone and to live as their forefathers have lived. Indeed I am reminded of what Douglas tells us about the Lurs of Luristan. They are attached to their traditional life as free nomads and despise the civilization of urban life. This attitude raises the central question of what has been called social and political engineering—how to improve the lot of backward peoples even against their will. I suggest that this is the problem on which we all have much to learn; for example, to what extent are the governments of the Soviet Union and the People's Republic of China able to

count on the whole-hearted co-operation of the peasants? I suspect that the answer is that conditions vary widely in different regions. For example, Mr. Tinley was telling me that in Yugoslavia he has visited a collective or co-operative farm in the mountains of Macedonia which has achieved remarkable technical progress under a popular leader. But in other regions such as the Voivodina there is strong resistance to co-operative farming. Evidently the extent to which measures of compulsion can be applied with popular support or acquiescence is something of a mystery. For example, we were told that in Sweden a law has been passed providing for compulsory amalgamation of farms. This would be almost unthinkable in the United Kingdom, especially in Wales. But the speaker added that a compulsory monopoly for milk, like our Milk Marketing Board, would be unthinkable in Sweden.

Lastly, is not the greatest political obstacle to economic progress the danger of war and the stupendous cost of war preparations? One of the strongest arguments for self-sufficiency and restrictions on international trade, which we as agricultural economists must surely deplore, is the strategic argument. I recall a lecture we were given on our arrival in Paris after our Stresa Conference in 1949. Our French lecturer explained that one of the chief reasons why wheat had to be grown nearly everywhere in France, irrespective of varying costs and climatic conditions, was that France had been invaded three times during the last eighty years and each *département* must be able to feed itself in time of war, even if it was cut off from the rest of France. Similar arguments were used for agricultural self-sufficiency in Germany; and even in the United Kingdom these arguments have often been advanced for being as self-sufficient as possible. But since the coming of the hydrogen bomb, strategy can no longer be regarded as a localized affair of contending armies; it has become mass suicide. With the addition of cobalt, strontium, and other elements to the hydrogen bomb, farms and fields over a vast area and countless human beings and animals would be exposed to destructive radiation and in the end the atmosphere of the whole world might be poisoned for years to come.

Mr. Englund has done right to end his address on a hopeful note. It is upon the assurance of peace that all economic and technical progress depends, including the development of freer and mutually advantageous international trade.

May I add one further hope, based on the recent discussions of heads of States at Geneva? M. Pinay has broached the possibility of using part of the vast savings that would result from disarmament

for creating an international budget for technical aid for all countries in the world, analogous in some ways to U.N.R.R.A. but with greater resources and a longer life. Think of the sums that might be available for what Mr. Sherman Johnson has called investment in people—that is, in education, public health, housing, roads, and all the other public services, in which the backward areas of the world—including the backward rural areas of advanced countries—are so woefully deficient. I believe M. Pinay's conception may be the next step, if not the essential condition, for the establishment of peaceful coexistence between peoples with different social systems and historical backgrounds, which may lay the foundations of the rule of law between States and of mutual tolerance and understanding between the peoples of the world.

FRITZE BAADE, *Institute of World Economics, University of Kiel, Germany*

We are greatly indebted to Mr. Lloyd for the information he has given us and also for his insistence that the contribution of politics to technical progress in agriculture should be judged from positive as well as negative aspects. I, like some other members of this Conference, being both a professor and a practising politician, bear a twofold responsibility. Permit me, therefore, to give you a brief survey of the contribution made by politics to technical progress in agriculture during the last thirty years.

As Mr. Lloyd rightly stressed, the most important contribution has been the providing of the means, based on scientific knowledge, to fight economic crises. We are today much better able to meet such dangers than we were ten years after the end of the First World War, not only because of our scientific knowledge of market trends and economic cycles, nor only because of thinkers like Keynes, but also because no serious politician in any progressive industrial country in the world today—whatever its inner political structure may be—would dare put forward an indifferent, or impassive 'wait-and-see' policy, should an economic crisis threaten. On the contrary, he would use every means to overcome the difficulties.

Furthermore, I entirely agree with Mr. Lloyd that we as agricultural economists should not speak too negatively about protective price policies in agriculture, even though mistakes in the methods of 'pinning' agricultural prices may have been made in many countries. That the machinery which was created for market regulation under the influence of the dreadful crisis at the beginning of the thirties would be too weighty nowadays is also generally recognized. But if we feel we can manage today with lighter weapons it is firstly

because of an agrarian and a market policy in agriculture which is based on an industrial employment policy and, secondly, because we have learnt something about the techniques of market regulations. In the stabilization of agrarian prices, we are indebted both to science and politics. Scientists gave us the knowledge, but it would have been of little use had politicians not used it. Last, but not least, politics has contributed a great deal during the last generation to the spreading of technical progress through the raising of the general standard of education and the improvement of specialized occupational training in agriculture. We know that much remains to be done here. We know that much has been amiss in the past. But there is no doubt that it has been the policy of every country, particularly throughout the last generation, to regard this work as vitally important.

We must be grateful that the retarded territories of the world are in the main no longer under the rule of colonial governments, but have national governments which are spending considerable proportions of their national incomes to raise the general standard of education and improve the specialized occupational training of the masses of farmers.

So much for the past. The effects on the future can be summed up in a few words. What we first require from politics is the prevention of a general economic crisis. Agricultural-industrial countries in particular must pursue policies of full employment so as to enable workers who become redundant on the land to move into industry. Secondly, moderate price policies must be continued, which will effectively stabilize agricultural prices. The third requirement is for policies to raise educational standards and to provide specialized and progressive agricultural training.

I agree wholeheartedly with Mr. Lloyd's final words that our most emphatic demand on politics is for security and peace in the world.

P. M. REASON, *Ministry of Agriculture, Fisheries and Food, London, England*

It may be worth looking in a little more detail at the question of the level of rent, as raised by Professor Robinson in relation to Great Britain. It concerns an interesting economic problem. He pointed out that in Great Britain legislation has probably had some influence in preventing rents from rising as fast as they might have done in its absence, and there is little doubt that if this position could be changed, the raising of rents would encourage a more intensive application of various factors of production to the land. However,

there does not exist in Great Britain, nor in many other countries, a system of complete economic freedom. We have, for instance, systems of guaranteed prices.

The first effect that would be felt of allowing the level of rents to rise, or of encouraging them to rise, would be to increase farmers' expenditure. With our system of reviewing the guaranteed prices once a year this would tend to result in prices being set at a higher level than they would have been otherwise and, consequently, subsidies would also have a tendency to increase. These subsidies are considered as being already too high and this therefore is not a result which would be welcomed. Legislation such as that of the Agricultural Holdings Acts, if it has any indirect effect in checking the rise of rents in some circumstances, cannot be regarded in isolation; it exists alongside much other legislation.

This in no way invalidates Professor Robinson's general point. I raise it only because he referred to it specifically in connexion with Great Britain. Indeed, in the long run, it would clearly be desirable to aim at a restoration of rents to a more natural economic level and to secure a proper spread of rents as between good land and bad. Both with us and in some other countries it is evident that rents on good land and land near the main markets are often too low, sometimes much too low, in relation to the rents on distant and poor land.

H. NIEHAUS, *Agrarian Policy and Market Research Institute, Bonn, Germany*

I think Mr. Robinson has pointed to a crucial problem, namely, the contradiction frequently met with in actual agrarian policy between some short-term measures enforced by an electorate in a given political situation, and those long-term measures which it is a government's duty to carry out.

As Mr. Lloyd has already pointed out, there is a tendency prevalent in agricultural-economic associations to give too much consideration to marginal producers. In agricultural policy we can choose between two aims only: either to preserve the agricultural economy in its present state, marginal producers and all, or to aim at a sound long-term economy. The choice is not easy. It is something like squaring a circle. Yet it seems that there is a way out if we follow the advice of President Lincoln who once said that the people knew very well what was best for them. An additional difficulty is that one cannot expect to get good permanent results if one has been forced to apply the wrong measures temporarily.

Today, every country has powerful agricultural associations and I

believe that part of the problem is that the leading men of these associations do not sufficiently appreciate the interdependence of all the relative facts. These men should be trained to feel great responsibility for the common good. In short, it is not sufficient to raise the educational standard of the masses; everything possible must be done to make the men at the top of the various agricultural organizations fully cognizant of modern techniques both in agriculture and in the general economy, so that they may become an efficient *élite* who will not only foster the occupational interests of their members but will also look after those of the whole community.

K. L. ROBINSON (*in reply*)

We have learned much about the consequences of government intervention in recent years. Each speaker has contributed to our knowledge of both the desirable and undesirable consequences of government intervention. This knowledge may help us to modify government programmes in the future so as to increase the proportion of desirable consequences. Mistakes are inevitable as Dr. Lloyd has pointed out, and modifications in government programmes may lead to further problems as Mr. Reason has emphasized, but we now know more about what to expect.

Agricultural economists are beginning to play a more active role in helping individuals to appraise the effects of alternative types of government action and are thus helping to provide a better basis for making decisions on public issues.

THE two papers which follow are abbreviated versions of contributions which were not delivered in full as no time had been allowed for them in the programme. Editor.

THE PLANNING OF POLISH AGRICULTURE

R. WIELBURSKI, *Institute of Agricultural Economics, Warsaw, Poland*

On behalf of Polish economists I would like to show the way they contribute to technical development—to show what the boxes Professor Schultz was speaking about are filled with in Poland. This is really a problem of the planning of agriculture because in our country, which is building socialism and where agriculture is still mainly an individual peasant agriculture, we are planning to enlarge our agricultural production and to better the conditions of the people.

When judging our development I ask you to take into consideration the fact which was stressed by Mr. Cardon, namely, that there are striking differences between the levels of agriculture of different peoples owing to their different historical and economic developments and their social, political, and cultural backgrounds. The direction and speed of development are more important than its absolute level.

The agriculture of our country has been one of the more backward in Europe and even in the world, and it is still not productive enough, though progress has certainly been great as measured by the rise of productivity, the *tempo* of intensification, and the increased well-being of the peasants.

I do not want to discuss ways of planning large State and co-operative farms. This was done by our Soviet colleagues, and we are learning from their experience. My purpose is to draw attention to the way in which the State, the workers, and the peasants have continued, for more than ten years now, to influence the planning of the production of individual peasants.

The results, briefly, are as follows. Our total agricultural production, in spite of tremendous war losses, stands at 140 per cent. compared with pre-war years; productivity per head of the population has risen one-and-a-half times; and per head of those occupied in agriculture it has risen from about twice (as in our main cereal, rye) to about five times (as in our one chief product for both home consumption and export, sugar-beet). Average yields of cereals in 1932-8 were little more than 8 cwt. an acre; in 1950-4 they were more than 9½, although two of those four years had serious droughts. Production

of animal products has risen substantially too. The number of pigs per thousand ha. has risen from 287 in 1938 to 414 in 1953. As you can see, the level of our production in absolute numbers is not high, but if you consider that after the war we were left with less than 50 per cent. of our productive and power animals, our improvement is considerable.

We attribute our progress to the fact that we have State planning in general and also in agriculture. This means that the State gives productive help to the working peasant. It has abolished large private landownership and has given six million ha. to peasants. It has given them seeds, machinery, and building materials, and has provided credit on cheap and easy terms. It has written off their heavier debts. It has arranged the supply of improved varieties and better livestock, and it has expanded the advisory service. It is developing industry, thus helping to solve the problem of the overpopulation of the countryside. Our production of machinery and tools has risen enormously during the last twenty years.

Before 1914 there was a heading in our statistics for the number of tractors and steam ploughs in the countryside, but it disappeared from the statistics between 1918 and 1939 because tractors were no longer being used. Human and animal labour was many times cheaper. One landowner in Posnan, in a paper describing the economy of his farm, said: 'I keep one tractor always ready, but I never use it. It is a permanent reminder to my workers that I can do without them.' Today many thousands of tractors are in full use.

The State has taken great care to see that the small farmers have the use of up-to-date machinery and techniques. It does this by promoting co-operative machine pooling and, what is more important, by establishing more than four hundred State machinery stations which serve the peasants, both co-operative and individual, with increasing efficiency. Rural electrification has multiplied thirteen times. By supplying agriculture with more and better means of production we not only increase production but we can influence the direction of that production. That is the goal of the economists' work. It is the aim of our State planning, of the nationalization of industry and of the industrialization of the country. And so far our planning has been more successful in agriculture, I think, than in industry.

In addition, we have a proper price policy, which ensures a fair deal for the workers and peasants and stimulates the kind of production which the balanced development of our economy requires and which meets the nutritional needs of the nation.

The government often uses a combination of State planning and material incentive. For example, there is increasing use of a contract system, by which the peasant is given help with his seeds, his fertilizers, and his fodder—in fact with everything to enable him to enlarge his output per man and per hectare, while on the other side it guarantees stable and profitable prices for the quantity of products stated in the contract, with special premiums for extra production.

It does not follow that the process is going smoothly. There are difficulties, and they keep us agrarian economists fully occupied. One of our problems is to encourage the peasants to co-operate so that, by voluntarily combining their means and resources, they may have some of the advantages of the larger farm. Our experience shows that co-operating farms achieve much more speedy growth of productivity than is possible with individual farms. For our next five-years' plan we intend to develop further the productivity of the individual peasant, so that the agriculture of the whole country may grow at a much more rapid rate than the most advanced district of our country grew during the best years of capital development. I refer to Poznan where progress at the end of the nineteenth century and the beginning of the twentieth was equal to that of the advanced districts of Germany. Such a *tempo* is possible because, besides the growing output and productivity of individual farmers, there is the much greater productivity of the large socialist enterprises, the State farms and co-operatives. Comparative figures in 1952 per unit of work are: State farms, over 40 units of grain and about 30 of sugar beet; co-operative farms, about 30 units of grain and about 18 of sugar beet; individual peasant farms, about 16 units of grain and about 8·8 of sugar-beet. In State farms net production amounts to 58 per cent. of gross production; in co-operative farms, to 44 per cent.; and in individual peasant farms, to 23 per cent. The incomes of the peasants and of the co-operative farms go hand in hand with productivity.

We agricultural economists have a lot to investigate if we are to be able to help in choosing the best ways of planning, and to show the ways in which the institutions can help towards the speediest growth of production. We must discover the best ways to stimulate technical development, the most economic use of resources, the speediest ways to increase the productivity of labour so as to ease the toil of the worker and to keep improving the material and cultural standards of the nation. This is our main goal, and I think it is this humanitarian principle of bettering the conditions of life of peoples throughout the world that unites agrarian economists of all countries.

WORLD FOOD SUPPLIES

A. P. JACOBSEN, *Copenhagen-Lyngby, Denmark*

I should like to make a few remarks on three questions to which I have given much thought during recent years. I apologize if they deviate a little from the framework of the programme.

Apart from the production of rubber and vegetable fibres which require only a small part of the total agricultural area, plants are grown mainly to provide food for man. This plant production, however, is far too large for direct consumption. When the need for seed, direct consumption, and industrial processing (in particular, for beverages) is covered, there still remains around 300 million tons of grain, besides all grass, hay, fodder, roots, &c., which can be utilized only as animal feed and might therefore be called the 'fodder remainder'. The transformation of the fodder remainder into animal products such as milk, meat, and eggs causes a great loss of energy, on the average probably not less than 80 per cent. in terms of calories. At the same time, however, some very valuable food is gained, particularly animal protein.

These facts provide a basis for economic consideration of *price determination*. The value of the fodder remainder depends upon the prices of animal products, and the utilization value of the fodder also determines the prices of plant products to be sold for direct consumption or other purposes. The farmer sells plant products only at prices which in his opinion are higher than the net return he can expect to get by using these products as fodder. At the same time the farmer considers the kind of animal production for which he should use the fodder, and therefore allocates the fodder remainder to different kinds of livestock production so as to maximize returns.

The same applies to wheat. If the overall price of wheat is higher than necessary from the farmer's point of view, compared with prices for other kinds of grain, production is expanded; and if the overall price is too low, the farmer uses the wheat as fodder, or decreases production until a satisfactory price can be obtained. This has been confirmed by a study of Professor Malenbaum of Harvard who has analysed wheat prices for the years from 1885 to 1939 and has found that the prices of wheat were mainly determined by the prices obtained for wheat which was used for purposes other than direct human consumption.¹ This points to the conclusion that the price-level for agricultural products is determined in the long run by the price for animal products.

My second point is that this conclusion necessitates a revision of

¹ Professor Dr. Plate, *Agarwirtschaft*, Sept. 1954.

the ways and means which have been used or envisaged for *stabilization of prices*. Hitherto, efforts have been made to stabilize the prices of individual plant products—in the first instance, for wheat. It was expected that the stabilization of wheat prices would contribute to the stabilization of prices for all agricultural products. However, when it becomes evident that the prices of animal products are the determining factors, not only of the price of fodder but also of the prices of wheat and other kinds of grain to be sold for human consumption, it seems likely that the problems of stabilization should be tackled from another direction. This is particularly important with regard to grain and livestock products, as grain is more easily stored and transported than most other plant products. The fodder remainder of grain can be regarded as a raw material. The demand for animal products at reasonable prices should determine how much of this raw material ought to be used.

Obviously the above considerations have a strong bearing on *nutrition possibilities*, as these depend to a large extent on the appropriate allotment of plant production to men and to animals. The demand for original calories in the form of plant products varies according to the composition of the diet, one animal calory being equivalent to five vegetable calories. This is the third point I wish to emphasize.

In Denmark about 4,000 grain units, which provide 12 million calories, are harvested per hectare. One person requires about one million calories per year. Allowing 25 per cent. for seed, waste, and other uses, each hectare should therefore provide sufficient, in the form of plant products, for nine people. The total agricultural area of the world is estimated at 3,600 million ha. If the average plant production were equal to that of Denmark or other north-western European countries, there would be food enough for 32,400 million people—about twelve times the present world population.

However, the average plant production of the world is much lower than in north-western Europe; furthermore, most people require some food of animal origin to attain a balanced diet. In Denmark the average consumption per day is about 3,300 calories, of which about 37 per cent. is derived from animal products. In these circumstances requirements in terms of plant products rise to three million calories per person per year; and only three people can then be maintained per hectare.

The ability of various countries to provide adequate food for their populations depends upon the densities of population, and, even more, on the degree of industrialization.

The densely populated and slightly industrialized countries have low plant production per inhabitant and must resign themselves to a predominantly vegetarian diet. On the other hand densely populated and heavily industrialized countries like Belgium, the Netherlands, the United Kingdom, and Western Germany, having industrial commodities with which to pay, can afford to import agricultural products from the thinly populated areas, particularly the thinly populated and heavily industrialized countries, such as Canada, U.S.A., New Zealand, Australia, and Denmark.

For the world as a whole, the nutrition possibilities are almost unlimited, as plant production can be considerably increased and the livestock, when necessary, can be reduced in number and at the same time made more productive. On the other hand the feeding of livestock is the most effective way of disposing of surpluses of grain and other plant products. But is there an effective demand for such livestock products? This is the crucial question facing the agriculture of the whole world, regardless of technical changes and technical progress.

It may appear alarming that there will be from seventy to one hundred thousand more persons needing breakfast tomorrow than there were this morning. It should be remembered, however, that 60 per cent. of the world population, or about 1,500 millions, are engaged in agriculture and are endeavouring to produce more food tomorrow than they did today. The numerous predictions of disastrous future scarcity of food have been shown to be wrong. I do not think anybody can foresee the limit of food production.