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LARGE-SCALE AGRICULTURAL PRODUCTION AND ITS PROBLEMS

K. P. OBOLENSKI

All-Union Scientific and Research Institute of Agricultural Economics, Moscow, U.S.S.R.

AT the present time, the general trend in the development of agriculture in the U.S.S.R., is towards intensification. The Soviet State can now earmark large-scale capital investment for the production of agricultural chemicals, the construction of irrigation works, mechanization, electrification, and other needs of agriculture. Suffice it to say, that the production of agricultural chemicals will reach 80 million tons in 1970 in comparison with 20 million in 1963. Based on this increase, the development of irrigation, the improvement of soils, mechanization, and electrification, the output of the main agricultural products will reach the following levels:

Grain (billion pud) ¹	. . .	14-16
Raw cotton (million tons)	. . .	6.8
Sugar beet (million tons)	. . .	86
Sunflowers (million tons)	. . .	6.5
Meat (dressed weight, million tons)		20-25
Milk (million tons)	. . .	115-135

The projected rapid rate of intensification of agriculture in the U.S.S.R. presents, as a sequel, a series of problems. We shall dwell on some of these.

Mechanization and Electrification of Agricultural Production

Agriculture in our country is being equipped with new high-production machinery. Every year, agriculture receives thousands of tractors, lorries, grain, beet lifting, and other combines, planting and sowing machines, and machines for ploughing and working the soil. Industry produces a variety of machinery for the mechanization of livestock farms. Despite the impressive increase in the technical equipment of collective farms, there is still a certain backwardness in the all-round mechanization of some sectors. The cultivation and harvesting of grain is the most mechanized branch of agriculture. However, even here there are weaknesses in the collection of chaff and straw and in the post-harvest treatment of grain. In this type of

¹ Pud = 16.38 kilograms or 36 lb.

work considerably more labour is expended than in all other types of work connected with the cultivation of cereals. The mechanization of the gathering of long-stapled flax lags behind, as well as that of harvesting potatoes, cotton, and also the mechanization of the most labour consuming processes in livestock production, horticulture, and cultivation of vegetables. The mechanization of the preparation, transport, and spreading of organic and mineral fertilizers has acquired great significance.

The concentration of production in large agricultural enterprises makes its own demands on means of production, on techniques, and on their technical and economic parameters. All-round mechanization is one of the more effective elements in the growth of productivity of labour. For that reason the economic basis and establishment of machinery for all-round mechanization of collective farm production for different zones and purposes of economic development has great significance in agricultural life. The spread of mechanization demands large capital investment. It is not possible to produce those billions of capital investment all at once, nor to devise and produce the necessary numbers of machines and energy-producing means necessary for the manufacture of machinery. For that reason well-defined planning and a well-defined order of priorities are of the greatest importance. Newly established technology must have the highest production indicators and also the highest level of technical progress. Moreover, every new machine ought to be an organic link in a given organization or system. This is why the economic basis of developmental tendencies of technology, the foundation of the technological policy of agricultural production, acquires present-day significance. The basic problem consists in obtaining all-round mechanization in all branches of collective farms.

The main course of mechanization consists in the wider use of more powerful tractors, machines of greater range and multiple use, and in the increase of speed of the work of tractors and other machinery. General types of machinery should be created with different parts that can be substituted for each other for application to varying ranges of culture. A primary task is the equipment of collective farms with machinery for carrying out full mechanization of harvesting of beet, cotton, potatoes, and other products, also for cleaning and sorting grain, and loading and unloading work in cattle farming.

Technology is one of the more important elements of the productive forces of society, and a fundamental factor in the production of material goods. Technical progress furthered the establishment of

collective agriculture. It is not possible to understand the development of technology separately from the economic conditions from which it derives. Technology is closely associated with economic life, with those economic tasks which are placed before agricultural production. The problems are great if a level of production sufficiently high to satisfy the needs of the population for foodstuffs, and those of industry for raw materials, is to be achieved in a very short time. Those problems accordingly require a very rapid spread of a basic economic system of use of machinery in zonal sectors.

The gigantic work of electrification of the country establishes favourable conditions for the more general electrification and mechanization of agriculture. The use of electric energy permits the solution of certain problems of mechanization of labour-consuming work in livestock production. Collective farms will receive the greater part of electric energy for their use from large government electricity stations, where electricity is from ten to fifteen times cheaper than that in the small collective farm electricity stations.

Chemicals in Agriculture

The enormous flow of mineral fertilizers directed to collective farms poses serious problems concerning their more rational use. Their distribution to the various zones of the country and to collective farms according to soil and climatic conditions, and with scientific data and the experience of advanced economies as guides, is being studied. They will be sent in the first instance to those districts and collective farms where soil and climatic conditions and the economic and organizational situation permit expectations of increased yields. In the first instance, fertilizers should be used on cereals, potatoes, and vegetables. For the more effective economic use of fertilizers, their application in seed rows and holes and furrows in small doses should become widespread with mixtures of organic fertilizers and compost.

Problems of improving mineral fertilizers are posed before industry—granulation, prevention of lumping and increased concentration of nutritional qualities. A considerable amount will be supplied in containers (polyethylene or reinforced paper bags or others). A wide net of depots, some near railways, others near stations, is being established for the storage of herbicides and other chemicals. Serious attention will be directed to the chalking of acid soils in areas outside the black earth zone of the Russian S.F.S.R., the Belorussian S.S.R.,

the Lithuanian S.S.R., the Latvian S.S.R., the Estonian S.S.R., and a series of other areas where there are acid soils. In order to achieve more effective use of fertilizers, a unified agro-chemical service and laboratory are being established and fitted out with up-to-date equipment; the training of appropriate staff is also being organized.

Irrigation and Land Improvement

There are at present in the U.S.S.R. 9.6 million hectares under irrigation. Towards 1980 this area will reach 28 million hectares. In the course of the years 1966-70 the area of irrigated land will increase annually by one million hectares. In the past, irrigation works were mainly carried out in areas where cotton is grown, but at the present time the problem is how to increase irrigation for the improvement of grain production (rice, maize, &c.) up to 1.5 to 2 million pud, thus safeguarding the irrigated land of collective farms which provides vegetables and dairy products. In the large livestock-producing collective farms, especially sheep farms of the Kazak, Turkmenian and Uzbek Soviet Socialist Republics, and in others, it is planned to carry out irrigation works and to rebuild fountains in up to 10 million hectares. This will permit the improvement and increase of cattle stock and the production of wool and meat on those farms.

In the collective farms in areas where there is greater humidity, in the Belorussian S.S.R., in the Baltic Republics, in the central and north-western areas of the Russian Soviet Federated Socialist Republic, in the forest and western areas of the Ukrainian S.S.R., around a million hectares are being drained, mainly by closed drainage. In order that land which is being ploughed for the first time in collective farms, may have a regular water supply, work is being carried out on the building of an inter-farm water provision system. Special attention is being paid to the elaboration and introduction of high production methods of irrigation, and rational means of watering and efficient drainage. It is necessary to water part of the irrigated lands by raising the water level mechanically, not only by gravity flow.

Specialization and Concentration of Agricultural Production in Collective Farms

An indispensable part of intensification and one of its most important conditions, is specialization and concentration of production. During the period of Soviet power, and especially after the plenary meeting of September 1953 of the Central Committee of the Communist Party of the U.S.S.R., considerable changes were made in the

distribution of specialization. Large areas devoted to marketable production of grain, beet, cotton, flax, potatoes, milk, meat, wool, and other products were established in the country.

In the vast territory of the U.S.S.R. there exists a great diversity of natural and economic conditions of agricultural production. These differences render specialization of collective farms an objective necessity, in order that in any one zone or area, in any agricultural undertaking, greater production may be achieved with the least expenditure of labour and means for the unification of production. Specialization of collective farms in the U.S.S.R. takes different forms. In those zones and areas of the country where farms are developed on a large scale, preference is given to broad specialization of undertakings and specialization within the farm acquires particular significance. In these cases the principal branches, in so far as it is necessary, are concentrated in the section of separate production corresponding to the character of a given branch. At the same time, where at present, because of special economic and natural conditions, there are smaller undertakings, inter-regional and inter-enterprise specialization has been effected, that is to say there has been concentration and distribution of different branches of the production administration.

In the last few years, large agricultural establishments are being developed for the production of definite types of output. Such establishments which more often specialize in products that are not easily transportable are established in the outskirts of Moscow, Leningrad, Donets, Rostov-on-Don, Sverdlovsk, and other great industrial centres. These narrowly specialized collective farms, concentrating on dairy products and vegetables, have a very high productive activity. Large chicken 'factories' (at Bratsk, Tomilinsk, Leningrad, and other places) have successfully solved the problem of supplying large towns and industrial centres with fresh eggs and chickens. To the category of highly specialized establishments belong also complex enterprises of hothouses, forcing beds, pedigree cattle breeding farms, fruit tree nurseries, and different types of stables for feeding and fattening cattle. These cattle-fattening farms function in various areas of the country, alongside sugar factories, starch-syrup factories, and other establishments connected with the food production industry. Specialized farms are now widespread in the Ukraine and so is the Russian Federation for breeding and feeding cattle by making use of cheap feedstuffs of their own production; such farms are organized on the principle of specialization within a district.

In natural conditions, favouring the cultivation of such valuable

crops as cotton, grapes, or citrus fruits are farms specializing in such cultures. Thus, certain differences in natural and economic conditions within the country, lead to different types of specialization of collective farms. Along with a deeper zone specialization of agriculture, it is necessary to establish specialization of production in every collective farm in such a combination of commodities as will guarantee maximum production and least expenditure. Basic commodities will be concentrated in large specialized agricultural establishments, farms and brigades which are familiar with present-day techniques, production data, and other means, guaranteeing that everything will be done according to a high standard of technical achievement. There is a lot of work to be done in the concentration and specialization of collective farms in the production of a marketable output of potatoes, grain, eggs, wool, breeding of broiler chickens, feeding of pigs and other cattle.

*Concentration of Agricultural Production, Size of Enterprises,
and their Subdivision within the Economy*

One of the basic tendencies in the agricultural development of both capitalist and socialist countries is the improvement of the size of agricultural enterprises corresponding to present conditions of high mechanization. So in the U.S.A., the average size of farm in the five years between the censuses of 1954 and 1959 increased by 26 per cent. Twenty per cent. of the entire marketable production is produced in farms giving 100,000 and more dollars of gross profit, although such farms are only 1 per cent. of the total. Analogous processes of concentration of production occur in other capitalist countries.

However, in socialist countries the increase of agricultural output, conditioned by up-to-date organization, based on all-round mechanization and consequent intensification of production, continues in a planned manner on the basis of scientifically elaborated criteria. So far as size is concerned, the large socialist agricultural undertakings in the U.S.S.R. surpass considerably the average size of agricultural undertakings in all countries of the world. In 1962, on average, a sovkhos had 28.3 thousand hectares of agricultural land out of which 10.1 thousand hectares were arable and each kolkhoz averaged an area of 6.2 thousand hectares of agricultural land out of which 2.8 thousand hectares were arable.

Naturally such large agricultural establishments present problems of administration, organization, and planning. In the Western press,

quite often, the following problem is discussed: to what extent agricultural enterprises of such a large size are rational and effective. The All-Union Scientific Research Institute of Agricultural Economics, together with a whole series of other research institutes of our country carried out investigations into the optimum size of agricultural undertakings. In that study we considered the chief criterion of the size of collective farms and their subdivision as a result of the unit of land with the largest high-quality production and the minimum production expenses per unit of output. Of great significance in defining rational dimensions of farms are conditions of work, organization, and mode of life of workers, familiarity of the management with agriculture, qualifications of the leadership of the farm, &c. In every agricultural undertaking with any degree of specialization and independently of its situation, the place of work of a worker should be as near the place where his family lives as possible. Rational divisions of every agricultural undertaking can only be established in conformity with concrete conditions, such as its location, specialization, and degree of productive activity. Our research concerning the best division was carried out with the use of three basic methods: (1) Statistical method; (2) Study of the experience of progressive farms; (3) Method of 'constructive calculation'.

Statistical inquiries were on the basis of such indicators as interdependency of sections of the undertakings as regards land and number of workers, degree of specialization, sown area, number of cattle, yield of different types of culture, productivity of cattle and fowl, level of gross and marketable commodity production. The following were also taken into account per unit of land and per worker: labour output, profit, revenue per unit of capital investment. The elaboration of very numerous statistical data from the annual accounts of collective farms and from special inquiries is added to research in the best farms and to the economic analysis of the efficiency of their production. In this way, on the basis of concrete farms and with numerous calculations of objective and subjective conditions of production, the influence of modification of size of farms on efficiency of production is studied. Of great value in the study is the 'constructive design' method. By the method of varying calculations, which is the outcome of contemporary scientific technology, the most suitable size of subdivision and, further, the most suitable size of establishments as a whole is found. This is done by the study of a large number of farms in different areas of the country and with the aid of advanced methods of technology. In the same way the most suitable size of sovkhoz was found. At present, analogous

work is defining the size of kolkhoz. The scientific elaboration and definition of the optimum size of agricultural establishments gives a theoretical basis for a consistent policy of management of collective farms, for calculating their size, for making them bigger or smaller.

The large size of socialist agricultural undertakings determines their internal structure and type of management. In order to ensure proper management, and bring closer to actual production that part of the leadership which takes the greater number of operational decisions, sovkhoz are subdivided in several sections and kolkhoz in brigades. Sections or brigades are established according to indications of production specialization in some aspect of agricultural output based on territorial indications. The question of the necessity of subdividing sovkhoz is answered by considering the size and specialization of the farm. The necessity to subdivide a farm into sections increases with intensification of production, with the improvement of cultivated crops and development of livestock. Only a comparatively small number of sovkhoz, small in size and with narrow specialization, are able to function without subdivisions.

The study of the optimum size of agricultural undertakings is logically connected with the study of the size of their productive subdivisions by the application of all the above-mentioned methods. However, here a great part is played by the 'constructive estimation' method which, on the basis of the estimate of varying sizes, allows the most suitable size to be selected. The size of subdivisions may be periodically revised, bearing in mind changes in technology, scientific methods of production, degree of specialization, intensity of production, and improvement in staff qualifications. Divisions and large subdivisions are capable of making use of the most advanced scientific methods and technology. Divisions of such size permit extensive specialization. In this way for example, in a farm specializing in pigs is concentrated a given type of livestock. Similar work is carried out in defining the optimum size of subdivisions of kolkhoz.

The management of large socialist agricultural undertakings in recent years has undergone important changes. The basic direction of these changes consists in greater specialization and improvement of the level of specialization. The immediate leadership of kolkhoz and sovkhoz is exercised by the production management. The management concentrates its forces on innovation in production, giving qualified help to collective farms. Such a change in the structure of the management was conditioned by the increasing role of agricultural science and progressive experience served by scientific knowledge and technology and the improved qualifications of the

leaders of collective farms. The old methods of administration are being changed by scientific knowledge and the practical help of qualified specialists. In these conditions a problem facing agricultural economists is that of the definition of departmental links in agricultural production, which in practice signifies the elaboration of clear-cut rights and responsibilities in the different steps of management.

One of the more important problems of collective farms is the working out of methods of planning within the farm. In accordance with the new planning directives of 1955, new tasks are given to collective farms, if only in selling to the Government a series of basic agricultural products. The workers have the right to plot the structure of sown land, number of cattle, plan the harvest, the productivity cost, and the payment for work. The principles of planning consist in the combination of government leadership with the general labour activity of collective farms and agricultural specialists. However, it should be recognized that in the last few years local organs have intervened in farm management, giving orders to decrease sowing of one commodity or another, or to increase the numbers of this or that type of cattle. Among the objectives of strengthening democratic principles of leadership, is the decision taken by the Soviet Government this year, which severely prohibits giving collective farms tasks besides maintaining the plan of government purchases of basic agricultural products. In connexion with this, as the independence of collective farms increases, they will be able to take local conditions more into account.

Material Incentives in Agriculture

Among the problems which arise with the establishment of intensification of agricultural production, is that of material incentives. In the last few years a series of important measures have been taken to heighten the material interest of collective farmers in increased production. All the same, even in future, care should be taken to increase the material interest of rural workers. Great additional investments are more likely to give the expected economic effect, if rural workers are interested not only morally but also materially in its best utilization. The principal methods whereby material interest can be increased are the change-over to payment for work from the individual production centre, the introduction of bonuses, the transition to direct money payment on a higher basis, and the giving of payment monthly. The experience of the best collective farms speaks for the great success of such a system. The consecutive establishment of new planning directives and the freeing of the initiative of rural

workers in many different ways, is governed by a great zonal differentiation of purchase prices in agriculture.

Among other problems it is necessary to recall the part played by mathematical methods in research in agricultural economics, especially in problems of investment, planning, and organizing production of collective farms.

Long years of experience of collective farms, the largest agricultural undertakings in the world which exist in the U.S.S.R., have shown not only the viability but the great advantages of large socialist farms. This type of undertaking responds more fully to the possibilities of contemporary science and technology, permitting the establishment and concentration of specialization, and the use of the advantages of division and co-operation in labour. Perspectives of development of the agricultural economy of the U.S.S.R. enables the best advantages of large farms to be taken. This development is based on intensification of production by mechanization, use of chemicals, irrigation, land improvement, and specialization. Together with the growth of production, agricultural management will be developed and improved, and so will the organization of farms and their divisions. We consider that the problems of agricultural economists lie in foreseeing changes, on the basis of careful analysis, and making scientific provisions for such changes.

F. H. GRUEN, *Monash University, Victoria, Australia*

I do not propose to supplement Professor Obolenski's paper by telling you about agricultural production in Australia or about the size of our farms. I hope to be able to do this in three years' time.

Professor Obolenski has given us a broad survey of the future plans for the development of agriculture in the U.S.S.R: Briefly, the means chosen to raise output are: increased mechanization, an expansion of the use of fertilizers and of other chemicals, land development, increased specialization along lines which we would regard as corresponding to the comparative advantage of different areas or regions. I do not want to comment on these plans at length except to express my disappointment at the planned increase in wool production. The Soviet Union has been a good customer for our wool in the past and many of us hope they will continue to be so. To a Western agricultural economist, the techniques chosen by the Soviet policy makers appear to be an eminently sensible way of expanding agricultural output, though one would need to know much more about Russian conditions than I do to discuss possible priorities among the various measures.

As the title of the paper suggests, the organizers of this session intended it to be devoted to a discussion of the problems of large-scale agricultural production. My comments will be concerned with those parts of the paper which deal with this topic.

If we compare the agriculture of Western countries with that of communist countries, one of the more striking differences is in the typical size of the agricultural enterprise in the two types of economy. Apart from certain types of specialized farming, such as poultry production or the cultivation of truck crops, there are very few examples in Western countries of very large agricultural enterprises showing any decisive economic advantage over more typical-sized farms. It would be intriguing to speculate about the reasons for this difference. Presumably the material techniques of production do not differ sufficiently to make the optimum size of the enterprise so different in the two types of economies. The first question I would ask Professor Obolenski is whether he has any economic explanation for this great gap in the typical size of agricultural enterprises in the two types. Or, to put it differently, why is the optimum size of the economic unit in agriculture in Western countries so much smaller than it apparently is in communist countries?

I do not believe that it is plausible to argue, as Professor Obolenski appears to do, that the growth in the average size of farms in Western countries in recent years represents a movement towards the scale of farming practised in the Soviet Union. One of the main reasons for the trend towards larger farms in Western countries is the 'lumpy' or indivisible nature of the labour input on small farms. As technical change proceeds and as the cost of equipment and other capital goods falls relative to the cost of labour, it pays Western farmers to substitute these goods for labour, whether it be hired labour or their own labour. Since the amount of labour on family farms is usually fixed, more equipment, buildings, fertilizers, &c., can usually be profitably employed only by an expansion in output of the farm enterprise and often of the area which it occupies. Hence we observe in Western countries that farm enterprises tend to grow in size when this is defined by either average output per farm or the average area used. However, to the best of my knowledge there has been little or no change in most Western countries in the average number of farmers or workers per farm. If technical progress in Western countries were to lead to conditions where the Soviet scale of agricultural enterprise became the most economic unit, one would expect some increase in the average farm size, *when this is measured in terms of number of workers per farm.*

Many Western agricultural economists would agree that one of the disadvantages of the small scale of the typical Western farming unit is to be found in the difficulty of adjustment in farm size; perhaps it might be better to say that adjustments in the capital-labour ratio and in the man-land ratio to allow for changing technical and economic conditions is likely to be more difficult for small one or two-man units. It does not follow, however, that the optimum size of the farm enterprise under Western conditions is necessarily approaching the typical Soviet unit. In other words, I reject this as a possible explanation of the difference in farm size. I must also reject the traditional Marxist theory of the increasing concentration in capitalist agriculture. In every capitalist country there are some large farms—it is true—but there is little evidence to show that the 5 or 10 per cent. largest farms account for an increasing proportion of total farm production. If anything, the share of production of the largest farms has tended to decline.

Because we have so little experience of the very large-scale unit of enterprise in Western agriculture, it would be very interesting to obtain more information from Professor Obolenski about Russian experience in this field. Do the studies of farm size to which he has referred allow us to generalize about the most likely shape of the cost curve in Russian agriculture as the size of the enterprise is increased? Does it tend to be U shaped or is it more typically represented by an L shape? Another question which is rather intriguing for a Western economist concerns the difference in the typical average size of the sovkhoz and the kolkhoz. If the size of farms in the Soviet Union is adjusted to the most economic level in each case, why is the typical sovkhoz so much larger than the typical kolkhoz? I would like to stress that my motive in asking these questions is not to engage in ideological debate, but solely to seek information in an area where Western agricultural economists have not been too successful in arriving at either generally acceptable techniques of analysis and measurement or at any reliable empirical generalizations. If Professor Obolenski or any other Russian agricultural economist could specify *in detail* how they have measured optimum size of enterprises in Russian agriculture, I and many other Western agricultural economists, would be most grateful.

In addition, I would like to discuss the problem of incentives. In any large organization, whether in secondary industry or in agriculture, it is necessary to take conscious steps to co-ordinate the activities of its members. That is, to make sure that they co-operate in achieving the goals of the organization or, to put it another way,

that they co-operate to maximize the organization's objective function, whether this be maximum possible fulfilment of certain plans or gross or net revenue. How much decentralization of decision-making is desirable in a large organization has received considerable attention in recent years in Western countries. On the whole, I think it would be true to say that the virtues of increasing the decentralization in large organizations has tended to be stressed more. In the Soviet literature which I have been able to examine a similar trend is apparent. I think Professor Obolenski discusses this problem under the heading of material incentives in agriculture. I would like to ask him to enlarge on his statement that in the last few years a series of important measures have been taken to heighten the material interest of collective farmers in increased production. First, what are these measures? Secondly, do they apply to sovkhoz workers as well? Thirdly and lastly, could he briefly outline how much initiative the management of a collective farm and the individual brigades or sections have in deciding what to produce and what techniques to use?

In conclusion may I make a plea to our colleagues from the Soviet Union for a franker discussion both of the techniques they use and the problems which they encounter. As our President pointed out in his address, the theoretical problems of agricultural economics have no national boundaries. We ought to help each other in their solution.

H. GIBERTI, *Buenos Aires, Argentina*

Beyond the information which it gives us concerning Soviet agriculture, Professor Obolenski's work has little direct practical application for non-socialist countries. This, of course, is no fault of his, but results from profound differences in economic structure. As he so rightly says, it is not possible to understand the development of technology if we separate it from the economic conditions which originate it. Consequently, the totally different economic conditions of the Soviet Union, in comparison with the capitalist countries, explain the great differences between their respective systems of agricultural exploitation. They are much greater than the differences among capitalist countries according to their different degrees of economic development.

The first three parts of the paper summarize the panorama of Soviet agriculture and its present tendencies. The remaining three refer specifically to the theme of this discussion. But it would have been very useful if the concept of large-scale agricultural production

had been previously defined. Without attempting a rigorous definition, I should say that exploitation on a large scale is that carried out on farms of a size which multiplies that of the family farm several times. In turn, I should describe the family farm unit as that which can be effectively managed by one farmer on the basis, principally, of his own work and that of his family, using a technique and total capital in accordance with local conditions. Without any doubt these definitions can be applied to capitalist countries, but they are not adaptable to the Soviet Union; therefore I think that the concept should have been defined.

Another point which should be made clear is where Professor Obolenski mentioned the increase in the average size of farms in the United States of America. He gave figures, as an example of the process of concentration of crop and stock farming into large units. If this is indeed a fact in the United States, it does not permit generalization without further evidence. The increase in size of farms is a frequent phenomenon, since it implies an adjustment to new technological conditions, but it does not necessarily imply a rigorous concentration of production into large farm units. In many parts of the capitalist world it is not so, especially in the less well-developed areas, where the large estate, the *latifundium*, is characterized by its low productivity. Although this type of farm may concentrate some branch of agricultural activity, it does not predominate in the general total, because of its low productivity. Thus, in Uruguay over 30 per cent. of the produce of rural areas comes from the smaller farms (less than 200 hectares) which together constitute barely 16 per cent. of the land in use, but absorb 72 per cent. of the agricultural population. According to Professor Obolenski, it would seem that in the Soviet Union, too, the biggest exploitations are less intensive. In the *kolkhozes* the cultivated area represents 46 per cent. of the surface in agricultural use, but in the *sovkhozes* the average size of which is four times that of the former, this proportion drops to 36 per cent. It would be very interesting to know if these differences are significant and, if so, to know the reasons. It would be no less useful to know what is the comparative efficiency of *kolkhozes* and *sovkhozes*.

These are the principal doubts arising from my reading of his paper. It is evident that this can only be a very limited analysis, since I have no personal experience of the Soviet Union. For the same reason my congratulations to the author have not the value which would be contained in those of someone with first-hand knowledge of the Soviet Union.

Perhaps I may add something further on the subject of large-scale farming, but with reference to the part of the world I know best, Latin America. There the matter is of the highest interest because of the frequency with which latifundia and very small holdings are found together. In my own country, Argentina, partisans of the large agricultural enterprise are not lacking. I think that the financial advantages which the large farm can have (greater availability of capital and credit), are cancelled out by their strong tendency to simpler, less-intensive forms of work. Although by this means the productivity of the land is low, the owner's total income is high on account of the vast area. Owing to this low degree of utilization of land, the latifundium becomes anti-social when all the available land is in occupation. Here we should note the great difference between agricultural and industrial enterprises. In the latter the raw materials go to the machines, and the machines, which are stationary, are concentrated in a small space; consequently the work is easily supervised, in both quality and quantity, and loss of time is reduced to a minimum. In an agricultural enterprise, on the other hand, work is very much more difficult to mechanize. Further, it requires the dispersal of men and machines over the fields, which leads to frequent loss of time while they move, and to a difficulty of supervision. This latter difficulty can cause serious damage, because it is very hard to remedy poor quality work in agriculture, such as seed sown too shallow, or wrongly directed spraying. All this constitutes a grave technical disadvantage for the large industrial enterprise compared with the family unit. Of course, at the other extreme (the small-holding) disadvantages are also to be found, but of another kind, which it is not relevant to analyse here.

In the economic and financial aspects again there are differences between the agricultural enterprise and the industrial, which contribute to produce relatively low efficiency in the large agricultural exploitation. In industry the machines constitute the major part of one's capital, and even without wear they become redundant through rapid technical progress. This obliges the owner to maintain his productivity at a high level to offset the loss of capital. By contrast, the typical big landowner is not under any such pressure, and can allow himself the luxury of low productivity. In fact, the majority of his capital is in land which runs no risk of losing its value, but rather tends to increase it as a result of social progress. Capital in the form of machinery is very much less important, and technical progress is slower.

As has been shown in these few examples, the problem of

large-scale exploitation differs greatly according to the predominant economic structure. In general, the large agricultural enterprise shows a tendency to the less-intensive forms of exploitation, with a lower productivity per hectare than is found in smaller enterprises. I refer, among others, to studies by G. Martin for Chile and Argentina, to those of the I.I.C.A. for Uruguay, and of the I.N.T.A. in Argentina. For the United States of America I recall the work of Shickele.

We should not forget that in addition to the internal problems of the agricultural enterprise there is the pressure of others derived from external economies, not connected with the enterprise, and not within its control. Thus large-scale production concentrated in large units requires a degree of development of the infra-structures, of trade, and even of industry, which can only be found in the most advanced nations. On the other hand, we should ask whether, in both developed and under-developed countries, the big undertakings with high productivity always pass on the advantages they gain from their reduced costs in the form of lower prices for their products.

So far, I have been discussing economic and sometimes social problems. Now let us consider others, of a social nature. In the Soviet Union the greater or lesser extent of an agricultural enterprise cannot very seriously alter the social structure of the population connected with it. In capitalist countries the reverse is true. Where family farming predominates—I am speaking of market, not subsistence, economies—the middle class predominates, and this implies a fairly satisfactory distribution of incomes. But on the big estates nearly all the work is done by hired hands, where they are plentiful, and the working class predominates. There is hardly any middle class, and we may even observe highly undesirable deformation of the population pyramids. I refer again to the work of Martin, of the I.I.C.A., and to the earlier study by Goldschmidt. The family undertaking seeks above all the greater productivity of the land, while the interest of the large agricultural enterprise is in raising the productivity per person employed. But although the productivity per worker in the big enterprises may be superior to that achieved by family undertakings, this does not necessarily mean greater well-being for the community, since the distribution of income in the areas where large enterprises predominate is usually defective. The hired workers, who make up the mass of the population, receive a part of their total income in the form of wages. The greater part of the income pertains to a very much smaller number of persons, the owners. Further, this latter part of the total income does not usually remain in the zone

where the great estates are situated, because the big landowner often buys his capital and other goods in the big urban centres, not in the rural areas.

In summary, the essential difference which arises between large-scale farming in socialist countries and large-scale farming under capitalist systems, is based upon the fact that, in the former, efficiency is measured in terms of collectivity while, in the latter, it is measured in individual terms, each farm taken separately. In capitalist countries the gross product is of interest from a macro-economic viewpoint, because it is a measure of the quantity of goods produced. On the other hand, the individual producer is more interested in the net profit, since it expresses his potential gain. The art of government consists in harmonizing these two points of view so as to make them coincide. According to Brinckman's classic formula, the intensity of exploitation (I) is given by the relation existing between the sum of capital (C) plus labour (L) and the surface utilized (S):
$$I = \frac{C+L}{S}.$$

It is clear then that this proportion tends to diminish in the case of the big estate, which has no great interest in increasing the numerator of the fraction, since this leads to complications in the management of the estate. This is not compensated for by the highest possible income, since it is sufficient at its present level. On the other hand, there could be an incorporation of capital balanced by diminution of labour, which maintains the degree of intensity virtually unchanged. Hence, while large-scale farming may well be best suited to a socialist economy, it is not so in the capitalist countries, at least in those I know best.

Professor Obolenski says that the problem of rural economists is that of anticipating changes, by careful analyses, and by carrying out scientific preparations for such changes. Within such a frame of reference I think that the commonest size of farms that has to be developed in capitalist countries is that of the family unit.

V. M. KAVUN, *Vinniza, U.S.S.R.*

During recent years intensification of agricultural production has been carried out successfully in the U.S.S.R. It continues in a variety of ways: complex mechanization, general use of artificial fertilizers, irrigation, reclamation of land through drainage, and increase of agricultural production. It takes different forms in different zones. The kolkhoz of the Vinnitskaya Oblast, where I am working as President, may serve as an example. The kolkhoz is a large, highly

mechanized agricultural establishment. It has an area of 8.5 thousand hectares, it owns 82 tractors, 64 lorries, 50 combines, 120 electric motors, and many other machines. In this kolkhoz, 18 tons of organic fertilizers and 800 kilos of mineral fertilizers are distributed over every hectare of arable land. This makes certain of good harvests of all crops. In the last five years, the average production of grain has consisted of 3,400 kg. per hectare, of maize 6,500 kg. per 1,100 hectares, of sugar beet 3,100 kg. per 1,200 hectares.

The enterprise works at a profit. During the last few years the average annual revenue was 1,200,000 roubles. The average monthly salary of a kolkhoznik (agricultural labourer) is 80 roubles; of a specialist, 160 roubles. In the kolkhoz work is being carried out successfully to raise the cultural and material standard of life of the kolkhozniks. The following have been built: three secondary schools, a palace of culture, kindergartens, four crèches, a hospital, a canteen, a bakery, and other cultural and welfare establishments. A new category of agricultural worker has been created in the Soviet Union, who, hand-in-hand with the working class, is solving great historical problems.

M. W. BUTTERWICK, *University of Oxford, U.K.*

I enjoyed reading Professor Obolenski's paper and listening to his exposition of it this afternoon and I particularly respected the way in which he faced the fact that these large-scale agricultural enterprises do create important economic problems. I would like to question him on two minor but still important problems as they were not mentioned by Professor Gruen. In so doing I would like to draw on experiences last month when I visited East Germany, that is, what is often referred to as the German Democratic Republic, as agricultural conditions there are in some respects similar to those in the Soviet Union though the size of the State-owned farms and the co-operatives is smaller. The average type III co-operative is roughly one thousand hectares or, say, between two and three thousand acres.

My first point is concerned with the man-land ratio. I found that in East Germany on arable farms where one might have expected a relationship of perhaps five men per hundred hectares there were often double this number. I believe that the man-land ratio in the Soviet Union is also fairly high and I wonder whether this may be due in part to the form of management in Soviet agriculture. We all know that in practice it is often difficult to reduce a farm's labour force, even if there is clear redundancy and good opportunities for

alternative employment. Perhaps the Committee form of management in Socialist agriculture makes this problem still more difficult.

My second point is concerned with management overhead costs. In East Germany I was astonished to find that farms which, had they been in the United Kingdom or France, might have had *at most* two people working in the farm office, had perhaps six or seven full-time office staff. This was the general pattern at all the co-operatives I visited. Admittedly the system of wage payments was more elaborate and the number of statistics and returns required by the Government more extensive, even than in the United Kingdom, but I would ask Professor Obolenski how the Soviet Union aims to prevent the development of this sort of management bureaucracy in agriculture, which may well make management more expensive without any gain in efficiency.

OTTO SCHILLER, *University of Heidelberg, Germany*

Professor Obolenski has mentioned that the Soviet Union is the country with the largest average size of agricultural holdings, namely 10,000 hectares sown area for the sovkhoz and 2,800 hectares for the kolkhoz. The enormous average size of kolkhoz farms came into being only in recent years as a result of an amalgamation of several smaller units into larger units. The size of the new large unit was determined partly by incidental factors, as, for example, by the size of the area of a particular village, where formerly several kolkhoz farms existed and now, after the completion of the amalgamation, there is only one. Professor Obolenski told us that after this process is completed research is carried out to find the optimal size of kolkhoz and sovkhoz farms in the different regions, having regard to local conditions. He indicated that in accordance with the findings of such research the size of the farms is changed, being either enlarged or reduced. This concerns the sovkhoz farms and their subsections as well as the kolkhoz farms and their subsections, the so-called production brigades.

It is interesting to observe that so much attention is now being paid to the question of optimal size of farms. I hope that the results of this research will be available in Soviet literature soon so that we may have the benefit of them. Whether a family farm working without hired labour has some advantages compared with large-scale farms is not a question under discussion in the Soviet Union because the decision in favour of large-scale farming was taken there a long time ago, mainly on the basis of political considerations. The question

in the Soviet Union is only that of the optimal size of large-scale farms of the one or the other form. It should be mentioned that in the Soviet Union there are also nearly sixteen million dwarf farms, the subsidiary farms of kolkhoz peasants which, according to Soviet statistics, have considerably higher yields than the gigantic large-scale farms. I think that the sovkhoz and the kolkhoz farms in their present forms are to a great extent oversized, and this may be one of the reasons for the unsatisfactory results which have been criticized often in the Soviet press in the last few years.

There are two examples in the history of Soviet agriculture of oversized units being split up and reduced in size. One example is the so-called grain plants established at the end of the twenties at a time when I myself was working in the Soviet Union. These were large-scale grain farms established by the grain trust, some of them of gigantic dimensions. Afterwards, the Soviet Government objected to what they themselves called *gigantomania*, and the oversized farms were reduced in size by splitting them into their own departments or subsections which became independent units. The other example is the dissolution of the M.T.S., the Machine Tractor Stations. Before that it was argued that the individual kolkhoz farm was too small for the rational use of agricultural machinery. As a result, machines were to be concentrated in the M.T.S. Since 1958, when the M.T.S. were dissolved, the individual kolkhoz farm is considered to be large enough for the rational use of machinery.

On the basis of these experiences, I would think that perhaps one day in the Soviet Union they may come again to a systematic reduction in the size of all these large-scale farms which are oversized at present. They may have their subsections or production brigades developed into independent farming units, preserving some centralized services, as has been the case for instance with the repair of machinery after the dissolution of the M.T.S. Professor Obolenski mentioned the reduction of the size of farms at least as a theoretical possibility. I would ask him whether there are already some concrete examples of this process.

D. GALE JOHNSON, *University of Chicago, Illinois, U.S.A.*

There are two other types of production units in Soviet agriculture apart from those mentioned by Professor Obolenski. (1) State farms, other than sovkhozy, which are approximately 50 hectares of sown area each, and number, if I remember correctly, more than 100,000, employing about one million workers, or one-fifth as many

as there are in the whole of United States agriculture. These farms are operated mainly by industrial enterprises, apparently largely to provide the raw food materials for dining halls and canteens. (2) Industrial plots allocated by the State to collective farm members. They number perhaps thirty-five million, and occupy 3 per cent. of the total sown area. The census of population indicated that in 1959 nine million persons were engaged exclusively in auxiliary farming, probably less than full time, but many others spend some time on their plots. These plots are of enormous importance, according to official Soviet data. In 1959, of gross agricultural output (not net, since published data are insufficient) 16 per cent. of crop output and almost 50 per cent. of livestock, or about one-third of total gross agricultural output, came from these tiny economic units.

It may be estimated that in 1959 approximately one-third of all agricultural labour was engaged in auxiliary or plot-type agriculture. If true, it means that gross agricultural output per worker is the same on the tiny plots, with their reliance upon hand labour and little or no machinery and power, as on a large collective farm or sovkhos. These data, while largely suggestive and not definitive, raise questions about the gains that can be achieved by increasing scale when that increase is associated with changes in the control and management of the economic enterprises.

The U.S.S.R. has both the world's largest and the world's smallest farm production units. This dichotomy is a puzzle to most non-Soviet students of Soviet agriculture. I would appreciate it if Professor Obolenski would enlighten us on the nature of the economic or other relationships that result from such disparities in scale.

D. PAARLBERG, *Purdue University, Indiana, U.S.A.*

Professor Obolenski describes an agricultural system with collective farms averaging five hundred times larger than farms in the United States of America and State farms two thousand times as large as ours. This scale of operations has been determined to be the most efficient, he says, based on research which utilizes a method which he calls 'constructive calculation'. One wonders how this research would have been received had it produced the finding that the most efficient size of farm was 250 acres.

In the United States we have used all of the research techniques available to the Russians in our effort to determine the optimum size of farm. In addition we have allowed 3.5 million individual farm operators to experiment as to the optimum sized unit. The result is

that our farms vary greatly in size depending upon the nature of the product, the skill of the operator, the pattern of resources, and the value system of the farmer. A system which allows for experimentation on the part of the operator is more likely to produce farms of optimum size than a system which begins with a dogmatic assumption that the large farms are the more efficient and engages in research only within that assumption. This is what we shall continue to believe in the United States until we find it necessary to go to some country with a different pattern in order to make up a food deficit.

R. LETTS, *University of Lima, Peru*

It is difficult to dispute that the consolidation of production has obvious economic advantages, for it is the natural way of development. This is already openly accepted on the scientific level, but the ways by which it is achieved is a matter of current importance, especially in Latin America. The fact is that the basic argument is becoming concerned not so much with the consolidation of production as with the consolidation of ownership. I am moved to mention some ideas on the subject by some of the statements made by our colleagues from Argentina.

When, for example, it is stated that the latifundia in Latin America are not efficient and should be replaced by thousands of family holdings, I think it becomes necessary to define some concepts as clearly as possible. For instance, in my own country, Peru, the large holdings, latifundia, or coastal plantations, are the most efficient, the levels of productivity per unit area being on average 150 metric tons of cane, or 2,300 kg. (50 quintals) of cotton, per hectare. Such levels of output are possible on such large holdings because the consolidation of production permits the most efficient utilization of resources, including capital and equipment. When someone recommends the family holding as a substitute for this type of latifundia in Latin America, it becomes necessary to point out that the family holding has never anywhere been a substitute for these large plantations, nor can it ever be under the given conditions. It is clear that one would here be dealing with an historic retrocession, a retrograde step in economic evolution, and a scientific appreciation totally disfigured by ideological and political considerations.

The correct way to attain a consolidation of production, avoiding the consolidation of property, is through a co-operative and collective framework, or by utilizing the existing native structures as, in the case of the Peruvian communal organization, *La comunidad de Indigenas*.

The consolidation of production is a condition towards which we should tend, and the consolidation of property one which we should avoid by all possible means.

K. P. OBOLENSKI (*in reply*)

Professor Gruen and Professor Giberti presented interesting thoughts, and I am grateful also to the other persons who participated in the discussion. Taking into consideration the interest shown in material incentives in sovkhos and kolkhos, I shall dwell briefly on this problem.

It is possible to divide the system of material incentives as practised in the U.S.S.R. into two parts, (1) Stimulation through prices. Prices paid by the Government for agricultural products guarantee that all expenses will be covered and a benefit or gain will be assured to all undertakings working normally. Increase of production automatically increases the gains and stimulates greater productivity. Prices for agricultural products vary according to zone, depending on climatic and soil conditions. Prices are higher for types of production in which the Government is particularly interested. (2) Material incentives for the workers themselves. Every worker is paid for his work in accordance with what has been accomplished. Depending on what has been harvested, brigades or smaller groups receive a complementary salary in proportion to one-quarter or a half of the additional production. Among the new tendencies in the remuneration of kolkhozniks one should note the introduction of payment for every 100 kg. of production received and the payment of advances calculated on the basis of remuneration for work. Now kolkhozniks receive monetary remuneration.

The question was also put regarding strengthening agricultural undertakings in the U.S.S.R. and other countries.

The process has been basically completed in the U.S.S.R. The problem consists of scientifically defining the optimum size of kolkhos and sovkhos, about which I have already spoken in my paper. In other countries, the process is continuing with great impetus. This is evident from statistical data. Several members have spoken about this, and it has been mentioned also in the Discussion Groups. Economists and governments of many countries are worried about the position of small farmers who cannot compete with large-scale establishments working on an industrial scale. As regards the definition of large-scale agriculture about which Professor Giberti spoke I would like to say that this refers to both quality and

quantity. Depending on the level of our productive forces we decide what will be the dimensions of an undertaking.

Finally I would like to reply to many questions concerning the harvest in the U.S.S.R. which several persons have put to me. This year we expect a good harvest particularly in the unploughed lands in Kazakhstan, Siberia, and on the Volga. The grain and other harvest will be sufficient for the needs of the population and the Government; sufficient for feeding the people, for industry, and for establishing reserves.