

## AGRICULTURE WITH SPECIAL REFERENCE TO STATISTICAL ASPECTS IN THE THIRD PLAN\*

DR. S. R. SEN (Planning Commission) who initiated the discussion presented a paper prepared jointly by Shri Tarlok Singh, Planning Commission and himself.

According to Dr. Sen the basic statistical requirements of any plan of economic development, whether it be for a country's first, second, or third plan, are the same. With each plan, however, the economy becomes more complex and problems of allocation of resources, balance between different parts of the economy and appraisal of results call for fuller data and for employment of a wider range of methods and techniques of study. In this sense arrears in statistics of the past get more difficult to catch up with at the very stage at which further progress depends on their being removed without loss of time. Once the priorities are clearly established there is, therefore, need for a body like the Indian Society of Agricultural Statistics to lay down its own programme for the next year, the next two years and for a period beyond, and to check at each stage the extent of advance and the further steps to be taken. In many directions progress in agricultural statistics will be hastened through independent initiatives rather than by confining this task to the machinery of government.

Agricultural statistics needed for planning may be viewed from (a) the points at which planning operations or decisions bearing on agricultural production have to be undertaken and (b) the areas or units in terms of which such operations or decisions have to be worked out. The former refer to various kinds of inputs and outputs and the valuation of each in terms of the other; the latter to such different units as the individual farm, the village, the development block, tehsil or economic region, the districts, the State or the country as a whole. In many directions, the statistics really useful for planning are those which can be readily aggregated or broken up by various area units according to requirements.

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Agricultural statistics required for planning may, therefore, be thought of as falling into several distinct groups such as,

- (a) Basic series, *e.g.*, area and production of different crops, land utilisation, area under improved agricultural practices, irrigation, use of commercial fertilizers, distribution and size of owned and operational holdings, etc.;
- (b) Index series, *e.g.*, for agricultural production prices received by farmers, prices paid by farmers, marketable surplus, farm stocks, farm employment, etc., and related trend studies;
- (c) Statistics derived from special studies which may be either 'representative' or 'illustrative' depending on the scale on which they are undertaken, *e.g.*, those concerning farm costs and incomes, investment, savings and capital formation, benefits of irrigation, improved seed, fertilizers, additional labour inputs; range of influence of favourable and unfavourable weather conditions on output in different regions, etc.;
- (d) Estimates of elasticities of demand and supply, projections concerning demand and supply of agricultural products and programming of agricultural operations; and
- (e) Statistics designed to assess the real worth of suggested technical improvements and the degree to which such improvements are being put into practice.

So far as the first group is concerned a considerable amount of work has been done in this country by our agricultural statisticians in the I.C.A.R. and elsewhere during the last decade, but there are large gaps which have yet to be filled up. Some of these gaps have been indicated in Chapter XIII of the Second Plan itself. It is sufficient to say that for want of accurate data of our agricultural production in areas where satisfactory Patwari records of area do not exist or where sample surveys have not been conducted for area and yield our estimates of production are still subject to very large margins of error. The available information about area under irrigation is full of discrepancies and we have very little information about area under improved practices or the exact nature and location of culturable waste lands. Again, we have hardly any data regarding livestock products like milk, fish, meat, eggs, etc., or about vegetables and fruits. The available information about agricultural holdings is still extremely sketchy in spite of a census and a sample survey of land holdings having been carried out a few years back. While we have now some overall

information about the distribution of holdings according to size-groups and this has been of some use for land reforms work, the detailed holding-wise information required for area planning is not yet available. It is obvious that no scientific planning in the field of agriculture can become really possible until such basic data are available.

Once we have the basic data it is not difficult to prepare indices out of them and, as is well known, these indices are most useful for the administrator and the policy maker. Unfortunately, however, in many States requisite indices are yet to be built up even where the basic data are available. It is true that some action has been taken in this regard at the all-India level by the Directorate of Economics and Statistics of the Ministry of Food and Agriculture and by the Central Statistical Organisation, but most of these series have not yet been published. The method of the preparation of these series also requires careful consideration by experts. Agricultural statisticians can do a very useful service if they can suggest the best and the most convenient methods for the preparation of these indices, examine carefully the basic formulæ adopted and suggest short-cuts wherever possible, which may enable the State governments with their limited resources to prepare and maintain these indices without undue demand on their technical manpower and finance. It would be useful if ways and means are also explored for the preparation of these indices and for organising trend studies in such a manner that from time to time forward projections can be easily made to guide policy actions even when the latest data have not come in. These tentative projections may, of course, be corrected later when more firm and up-to-date data are available. The administrator cannot always hold up action pending availability of accurate data and has often to make do with whatever information is readily available. Any rough projection made by trained statisticians will be certainly better than rough guesses of laymen.

As regards the third group, information available in this country was extremely meagre—almost non-existent until very recently. As a result, however, of the farm management surveys which have been carried out since 1954-55 in half a dozen regions, we have today some quite useful information concerning farm costs and incomes, investments, savings, capital formation, benefits of irrigation, good seeds; fertilizers, additional labour inputs, etc. Similar data are also available from some of the cost of production surveys which have been conducted by the Indian Council of Agricultural Research. Surveys of this type, however, require to be extended as also deepened further and the results published quickly and in a form which can be easily assimilated

by the policy-makers and the administrators. It is, therefore, a good thing that on the basis of the farm management data a group of about a dozen indicators are being prepared on an experimental basis in the Directorate of Economics and Statistics for each centre. These indicators should be very carefully examined by the agricultural statisticians and ways and means of improving them suggested. There is, however, one important lacuna in all these data in that they give us only some regional figures and not national figures. While regional figures have their uses especially for day-to-day administration, national figures are very important from the point of view of national planning.

It is equally important that we should have adequate information about coefficients like elasticities of demand and supply of agricultural products, input-output ratios in different types of agricultural operations, etc. For, such coefficients are indispensable for any satisfactory programming work in the field of agriculture. It is not enough to have information about elasticities merely for the country as a whole. It is necessary to estimate them separately for different regions and classes as well. But at present whatever we have been able to calculate is only national estimates and even these are subject to very large margins of error. A time has come when agricultural statisticians should devote greater attention to problems of estimating these elasticities in much greater detail and with much greater accuracy than that has been done hitherto. The same thing is true about the input-output coefficients. We have quite a large volume of information about the relationship between inputs and outputs so far as fertilizers, irrigation, etc., is concerned, but these are very rough and not available in sufficient detail.

Another field where the agricultural statisticians can make very useful contribution to agricultural planning is the field of programming and operational research. As our economy develops, the work of planning will become more and more complex and, therefore, more refined techniques will have to be made use of. The best type of programming at the national level, at the sectoral level, at the regional level and in regard to particular processes or operations are questions which deserve immediate attention from the experts in the field. We are only too conscious that we are not able to make the best possible use of our meagre resources because we are often unable to use different types of inputs, like water, fertilizers, seed, etc., in the right proportion or to make the best use of a particular resource, for instance, fertilizers as between different areas and for different crops. We could also make a particular process, say the distribution of fertilizers, much

more effective if we made a rational study of the different operations involved in fertilizer distribution with a view to ensuring that there was no unnecessary waste involved in the process. The statisticians can also help us a great deal in framing the best model of development for the country as a whole for the agricultural sector and for its different branches, and in forecasting how far these models may change with changing situations from year to year and what corrective actions can be implemented most effectively.

Finally, statistical methods can be most useful in keeping a close watch over the progress of the Plan and ensuring that the different programmes are being correctly implemented and any deviations are promptly brought to the notice of the authorities concerned. The Indian Council of Agricultural Research had started some useful work for assessing statistically the real worth of suggested technical improvements and the degree to which technical improvements are being put into practice. After a promising start, the progress in recent years has been unfortunately rather slow. This is a field which deserves a very high priority in any scheme of work which the agricultural statisticians of the country may have in view.

Planning in a democratic socialistically oriented economy presents many new problems and in some respects the approach has been exploratory. The statistical techniques that are being developed to tackle the problems of such planning are also new. The matching of the two requires great effort and ingenuity. But the job is important and urgent and has got to be done.

Dr. R. N. Poduval (Ministry of Food and Agriculture) pointed out that some of the problems which are thrown up in fixing the targets of agricultural production are partly statistical and economic and partly agro-technical. He said that quantitative targets in agriculture have to be set up by a careful assessment of the requirements, the technological possibilities and the organisational problems involved. The determination of requirements in quantitative terms involves forward estimates of effective demand for the principal agricultural commodities. The most important factors which influence demand are the rate of growth of population and the rate of growth of incomes. Without some reliable estimates about the rate of growth of these factors, it is difficult to make any forward estimate of demand for agricultural commodities. Other factors influencing demand include changes in the composition of rural-urban character of the population and changes in income distribution and consumer preference.

The population in the country has increased at the rate of about 14% during the decades 1931 to 1941 and 1941 to 1951. The Planning Commission, the Registrar General and the Foodgrains Enquiry Committee have made different estimates of the rate of population growth. On the basis of trends in birth and death rates, we could reasonably assume that the population growth during the Third Plan would be about 2% per annum. This would mean that there would be increased demand for foodgrains to the extent of 10% during the Third Plan due to population increase alone. To assess the influence of income, an estimate of income elasticity of demand has to be made. The data at present available for making such an estimate is the coefficient of expenditure elasticity which could be worked out from the N.S.S. data on consumer expenditure. One difficulty of using this coefficient is that it varies from round to round, possibly due to changes in prices. It would, therefore, be desirable to have data on quantity consumed so that we may have a better estimate of the elasticity of demand. It would also be desirable to have region-wise coefficients of elasticity of demand. Since the rural consumption of foodgrains is higher than the urban consumption, separate elasticities may have to be worked for the rural and urban sectors. This involves again an estimation of the rate of growth of urban population during the Third Plan period. Between 1931 and 1941, the urban population grew by 35.5% and between 1941 and 1951 by 41.9%. There were, however, certain special factors like partition which affected the rate of growth of urban population between 1941 and 1951. In view, however, of the growing tempo of industrialisation, it may not be unreasonable to assume that the rate of urbanisation during the Third Plan period cannot be very much lower than during the period 1941 to 1951. To the requirement of human consumption arising from population growth and income elasticity of demand, we have to add the requirements of animal feed, seed and wastage, for increase in pipeline stocks and buffer stocks as a safeguard against weather so as to arrive at the aggregate requirement of foodgrains.

Having estimated the aggregate requirement, it is necessary to fix targets in terms of additional production potential to be created during the Third Plan period. This additional production potential has to be based on the achievement at the end of the Second Five-Year Plan. The estimate of likely achievement at the end of the Second Plan is again a difficult task especially when it is realised that the target of additional food production originally fixed for the Second Five-Year Plan, namely, 10 million tons was subsequently raised to 15.5

million tons without any substantial addition to resources. There is every indication that the target under minor irrigation and land development might be more or less achieved in full if the present tempo is maintained. Depending on the availability of fertilizers in the closing years of the Second Five Year Plan and the success in respect of popularisation of more intensive utilisation of local manurial resources, the targets in respect of manures and fertilizers might be achieved by 80 to 85%. In the case of seed distribution, due to the delay in the setting up of seed farms in the initial stages and in view of the fact that these seed farms are expected to give full benefits only four years after their establishment, the achievement would fall short of the target fixed. Due to lack of adequate utilisation of irrigation potential created, the benefits from major and medium irrigation schemes are also expected to lag behind. We have also to take into account the contribution from improved agricultural practices, the precise benefits from which cannot be assessed. Thus, the achievement of food production by 1960-61 while falling short of the target fixed might reach the level of about 75 to 77 million tons, against the target of 80.5 million tons of foodgrains laid down under the Second Five-Year Plan.

Having fixed the target of additional production during the Third Plan, the next problem is the break-up of this target in terms of the contribution to be made by the various production programmes. This involves first an estimation in physical terms of the area likely to be covered by the various production programmes and the additional output likely to accrue from the various inputs. The Planning Commission have set up a study group on agricultural production data for reviewing the yardsticks of additional production for different measures of development at present in use. The group has so far finalised only the yardsticks of additional production due to fertilizers and manures. The study group felt that the yardstick of additional production due to irrigation could be arrived at only from the results of properly conducted irrigation experiments on cultivators' fields. Further study has necessarily to be undertaken before yardsticks for either inputs could be finalised. There is also the question as to whether the effect of inputs applied together is additive.

Planning presupposes a knowledge of cost benefit ratios in respect of each of the different types of programmes and also the scope for undertaking each of the programmes in the different areas. Choice as between the different inputs has to be made in the light of these factors. For example, with regard to irrigation, there is the question of choice between major and medium irrigation schemes on the one

hand and minor irrigation schemes on the other. In the case of the former, the investment per ton is relatively higher, the programmes take longer for completion and hence in giving benefits, while the minor irrigation schemes are relatively cheaper and are also quick maturing. With regard to fertilizers, there is the question of increasing supplies either by imports or by increasing internal production by the setting up of new fertilizer factories.

Shri J. K. Pande (Uttar Pradesh) drew urgent attention of agricultural statisticians to the following four important facts in the food economy of the country which have a statistical bearing. These are:

- (1) that a very large proportion of our population lives in rural areas,
- (2) that *per capita* consumption of foodgrains is greater in rural areas than in urban areas,
- (3) that food is produced on numerous little farms or fields, with small or no marketable surplus in a large majority of cases, and
- (4) that in our rural areas we have what may be called a subsistence or sub-subsistence food consumption economy.

If it be assumed that roughly 80% of the population lives in rural areas and 20% in urban areas and if it be further assumed, for argument's sake, that the *per capita* daily consumption of cereals is 8 chattaks in rural areas and 4 chattaks in urban areas, it would follow that if the average figure of 8 chattaks were to go up by only one chattak, the additional consumption of cereals in rural areas would amount to 80 units, which would wipe out completely the entire supply of 80 units needed for the 20% population residing in urban areas. This additional one chattak need not actually be consumed. It would produce the same effect if it were hoarded or withheld from urban supplies, or if the assumed figure of 8 chattaks were itself incorrect and the correct figure were in reality 9 chattaks. Even if an addition of only as little as 0.25 chattaks, were to be made to the *per capita* daily rural consumption of 8 chattaks, it would take away 25% out of urban supplies, which would be sufficient to lead to a rise in prices of cereals such as the one which has been witnessed recently.

As our food is grown on numerous little fields, it is evidently not feasible to obtain an estimate of our food production by means of a census. It has to be obtained by a sample survey. While the I.C.A.R. and others deserve our thanks and congratulations for the improvements they have brought about in this direction, particularly through

the introduction of crop-cutting surveys, it is easy to see that a margin of sampling error is inherent in such sample estimates and, considering the facts stated above, we can hardly afford to let this margin assume any appreciable magnitude. And yet, to bring it down within our requirements means much additional expenditure of our limited resources. Even more important than sampling errors, which are measurable, is the question of non-sampling errors. For instance, if an investigator engaged in a crop-cutting experiment, leaves behind through neglect even one out of 50 acres of corn which he has cut from the experimental plot, he is contributing to an underestimate by 2%, of which there can be no measure. This question assumes added importance when it is remembered that while statistics of production have made a good headway recently, very little has so far been done in obtaining scientific and precise estimates of food consumption in the country as well as in its various regions. In this connection in Uttar Pradesh a proposal which is both different and novel, is under consideration for obtaining monthly estimates of food consumption in rural areas, based on at least a portion of the sample being measured by actual weighing.

As a last point, the speaker suggested an examination of whether ordinary economic laws of elasticity of demand will always apply in the situation obtaining in our country, particularly in the rural areas. For instance, if a producer has been compelled in the past to eat less than what he would and could, because there was not enough grain to eat, it may be fatal to assume that the additional foodgrains which he may produce will be governed by the ordinary laws of elasticity of demand and that at least a portion of such additional foodgrains production would be available in the form of marketable surplus. What may possibly happen is that the entire additional foodgrains production, or at least a much greater part than would ordinarily be expected, may go into the producer's own consumption.

Dr. V. G. Panse (Indian Council of Agricultural Research) said that in formulating the Third Five-Year Plan for agriculture, a serious effort needs to be made to build up this plan from below. Each community project or national extension service block can be taken as a unit for this purpose and a plan for each block showing its requirements, potentialities and targets should be prepared jointly by the officials and people of the block. Although the total plan prepared in this manner may become impossibly large, this will help in allocating targets and resources that may be fixed under the overall plan to different parts of the country in a more realistic manner depending

upon the needs and potentialities of different areas as revealed by the block plans, and thus securing the achievement of plan targets in a greater measure. The basic requirement for formulating a plan in this manner is detailed agricultural statistics on land use, irrigation resources, cropping patterns, human and animal population, etc., for each block. Unfortunately, such statistics are not available for an appreciable part of the country and neither is the village machinery yet set up in several areas for collecting these statistics. Even the cadastral survey is still incomplete. It is, therefore, a most urgent need of the plan that the Ministry of Food and Agriculture which is responsible for compiling and co-ordinating all-India agricultural statistics should take the initiative in ensuring that the entire country is covered in the shortest possible time by the machinery required for collecting detailed agricultural statistics on a continuing basis. We have lost several years already under the wrong notion that some kind of an all-purpose sample survey will provide all the data that we need in planning and that detailed statistics from the village level are unnecessary. A second group of data needed for realistic planning is results of experimental research in order to show the direction along which agricultural improvement can be made most profitably and provide the yardsticks for formulating targets and measuring achievement. In regard to fertilizers, a considerable headway has been made by launching a countrywide programme of fertilizer trials, but very little information is available in other important fields such as irrigation and experimental work in these fields needs considerable expansion.

It is important to subdivide the overall agriculture plan between food and non-food crops, animal husbandry, etc., with due regard to the priorities for improvement required in the different fields and also rate at which increased production can be secured from a given investment in the different fields. For instance, targets of production of foodgrains will have to be given the highest priority. Improvement in animal production by breeding is a slow process and quicker results are to be expected by improving nutrition. In nutrition again the relative needs of human beings and animals have to be kept in view. While it is not suggested that investment should be confined to specific fields, it is certainly important to allocate the investment among various competing fields in accordance with national priorities and potentialities.

Technological possibilities of improving agricultural production are immense. Among principal measures for increasing agricultural yields are irrigation, fertilizers, improved seed and plant protection.

It is distressing to find that the new irrigation resources that have been created are not being fully utilised and it is equally distressing that old resources like numerous tanks in South India are gradually going out of use for lack of maintenance. Chemical fertilizers provide readily available plant food and have been demonstrated to increase yields substantially, through a large number of experiments and demonstrations in cultivators' fields. Organic manures are also helpful but we must recognise their limitations. They act slowly. The quantities available are limited. For adoption of green manuring certain conditions are essential which are not always there. If the proposition that is advocated sometimes that we should confine ourselves to indigenous manures is accepted in formulating the Third Five-Year Plan, we shall meet with frustration in the end as anything like the targeted increase in yield will not be achieved. Improved seeds are a well-known method of increasing yields but it is disappointing to find that except a few commercial crops like cotton and sugarcane, use of improved seed is still extremely limited. Thousands of seed farms were proposed to be set up during the Second Five-Year Plan but only a few have been established so far. In propagating improved seed, however, it is necessary to be sure that it is distinctly superior to the local seed used by the farmer.

It is a curious position that while methods of increasing production are known and while the plan sponsors projects for making them available to the farmer their impact on production is still small. It would provide a very revealing object lesson if a few typical projects of different kinds such as those on irrigation, provision of fertilizers, improved seed or plant protection measures are subjected to a critical on the spot enquiry by a small team of experts. Such a study might bring to surface reasons for lack of progress which are, perhaps, not known not only to Central Ministries but even to State Ministries. It may be that there is not enough co-ordination among different government departments as for example between irrigation and agricultural departments or between finance and development departments. It may be that serious economic factors are operating such as high water rates and other levies or low and uncertain prices of farm produce or lack of credit. Once major reasons have been pin-pointed, sustained efforts can be made to remove obstacles in the way of increased production in the current plan and remedies against such obstacles provided when formulating the new plan.

Continuous and critical assessment of achievement is an essential requirement of planning. Today, only progress of expenditure on

various projects is followed. What is really needed is information on progress of physical achievement. Such assessment together with other operational studies will not only show the correct picture of the working of the plan but will also help to modify the working of the projects found to be inefficient or give them up altogether if judged as being inherently unprofitable. The resulting economies would be immense, and in comparison the expenditure involved in setting up the machinery for statistical assessment and operational research both at the Centre and in the States, insignificant.

Dr. M. M. Babbar (Food and Agriculture Organisation) discussed some general economic aspects of the Five-Year Plan as far as agriculture is concerned.

For an analytic consideration of the agricultural development, two aspects may be treated separately: the increase in agricultural production by devoting more factors of production to agriculture and the increase by optimum or efficient use of those resources on the farm. The speaker's impression was that the last two Five-Year Plans have given relatively lesser attention to the second aspect. The Second Five-Year Plan attributes, for example, 8.5 million tons of increase in foodgrains to major irrigation, minor irrigation, fertilizers and manures, improved seeds and land reclamation. All these factors are examples of adding more factors of production to agriculture. In regard to these factors trend studies will be helpful for planning up to a level of possible special extension of these factors and not for their extensive use. Accordingly, the necessary statistics have to be organised on two different lines so that two types of economic analysis is possible, one to show the trends of agricultural production if a minimum level of irrigation, fertilizers, etc., is extended to more and more areas and the other to study the economic intensity of these factors of production on various types of farms. Only with these two separate studies, the real potential of agricultural development can be explored. This kind of investigation can best be done at regional level preferably at district level.

The Second Five-Year Plan lays emphasis on the general improvement of agricultural practices. The importance of extension work, contour bunding, consolidation of holdings and farmers' education regarding protecting his crops is recognised and provision is made for designing and introducing improved types of agricultural implements. The value of agricultural research and education is properly accepted also. But what has not been given due importance is the economic

aspect of agriculture, although a beginning is made by setting up agro-economic research centres in the country and the programme of farm management studies.

Firstly, there exists a major difficulty for planning in agriculture, that is, all hopes and targets depend on the behaviour of individual farmers. They may or may not accept what the central planning body wants. The case in industry is different. The Government can open new factories to support their industrial programme, but they cannot acquire appreciable quantities of new land and start farming of their own. Nor can they command the farmers, in a democratic society, to behave in a particular way. Thus planning in agriculture reduces practically to 'hopes' or at the most to some calculated effects of by-products of other development programmes, unless the personal interests of the farmers are in accordance with the planned propositions.

Secondly, there is a serious problem of alternative use of agricultural resources, both at the national level and at the farm level. As long as more land can be brought under cultivation, the corresponding increase in production can rightly be expected. But a limit to such an increase is obvious. More irrigation facilities, fertilizers, better seeds and extension of agronomic results are means of increasing productivity in agriculture. But if land is limited, the increase in agricultural production due to other factors obeys the classical law of diminishing utility and there comes a limit when additional use of those factors is uneconomic, *i.e.*, the additional physical yield after that limit is lesser in value than the value of the additional factors employed. For example, even if the government supplies free fertilizers, the use of fertilizers beyond a limit may amount to bad planning from the national point of view.

In view of these considerations the following suggestions were made by the speaker:—

(1) The national agricultural targets may be broken down to the level of the smallest regional units possible. Since the soil and climatic considerations generally indicate the regions where the production of a particular crop is more suitable, the suggested breakdown is possible.

(2) Within each region, a statistical study may be carried out to classify farms taking into account the size of the holding and the availability of labour and capital on one hand and the differences in soil and other factors on the other.

(3) For representative farms of each class, optimum farm production and alternative land use studies may be carried out considering

various price situations with the help of modern econometric techniques like linear programming.

(4) The farmers' interests may then be studied within the framework of regional targets and with a proper price policy and extension of credit and other State benefits, efforts may be made to achieve the regional targets.

(5) With the help of the suggested detailed studies, the alternative land use problem from national point of view can also be studied in a more realistic set-up.

It may be argued that it is premature in India to think of such detailed research in agricultural economy, but if the need is accepted, efforts should be made without delay for establishing the corresponding systems of statistical data. The 1960 agricultural census can be availed for getting some additional data regarding farm situations as suggested above.

If the proposed classification of farms could be achieved so that in each region there is a limited number of farm types, a sound basis is also laid down for the establishment of crop insurance, since within each class, the farms could be assumed homogeneous. This would resolve one of the major difficulties for an efficient system of crop insurance, which, by assuring minimum farm incomes, facilitates less risky expansion of agricultural credit and provides an additional tool of agricultural development.

A small number of farms of each class may be selected at random and input-output data may be recorded in physical terms on the selected farms. The interview method is not suitable for this work since details like hours of work spent during past number of weeks cannot be expected to be remembered by the farmers. These data have manifold use in economic analysis. For example, by applying the current prices of the factors of production, cost of production studies can be carried out easily.

The Chairman, Shri K. R. Damle, in his concluding remarks said that the various speakers had stressed the importance of statistics in agricultural planning and had pointed out the pitfalls in the analysis which one has to guard against in coming to reasonable estimates of targets and such other matters. Dr. Poduval has added a personal guess regarding the likely production target of agricultural produce at the end of the Third Five-Year Plan. He thought that the production figure of 90 or 95 million tons of foodgrains would be feasible and within the realm of possibility. There need be no scepticism at

all regarding the exactitude of this figure. Recently in connection with the examination of a plan which was prepared by four industrial lists on behalf of the Federation of Indian Chambers of Commerce and Industry, estimates were made as to what extent agricultural production could be increased, given the basic minimum requirements both in the matter of materials as well as of resources. The four industrialists had planned an increased production of 100% over a period of 15 years. Subsequently, in working out a paper for consideration by a committee appointed by the All-India Congress Committee to go into the question of increased agricultural production, a further exercise was carried out in estimating the target of increased agricultural production at the end of the Third Five-Year Plan and, given reasonable resources, it was thought and perhaps Dr. Poduval was also a party to it—that 70% increased production was well within the bounds of achievement. That would give a figure of nearly 110 million tons at the end of the Third Five-Year Plan. Therefore, an estimate of 90 or 95 million tons of foodgrain production at the end of the Third Five-Year Plan was, in the Chairman's view, a conservative estimate, provided of course reasonable facilities are available.

As Dr. Sen stated in the beginning of his address, the importance of increased agricultural production has been admitted on all accounts now. The emphasis which was placed upon agricultural production in the First Five-Year Plan was to a certain extent diminished at the time of the formulation of the Second Five-Year Plan. But no industrial activity of any kind can be sustained, unless the agricultural base is firm and it is hoped that any departure from this accepted rule, which is almost axiomatic, will be corrected at the time of the writing of the Third Five-Year Plan, particularly now that Dr. Sen will also have some say in this matter. He should take care to see that the point of view which the Ministry of Agriculture will put forward will have a sympathetic consideration.

A point was raised that perhaps local manurial resources did not play as much important role in the economy of present-day India as they did in the past, but unfortunately our needs for artificial inorganic fertilizers cannot be met on account of lack of insufficient local production in the country and want of foreign exchange to import the necessary quantities. When a situation like this has been presented to us, we have naturally to fall back upon local manurial resources. It is true that a unit of nitrogen produced from such resources will probably give a much lesser yield of foodgrains. At the same time, it may also be true that the cost per unit of nitrogen produced from these resources

may even be more than the cost of a unit of nitrogen from imported artificial fertilizers. The Chairman referred to this question of exploitation of local manurial resources in order to refute a commonly held belief that if we were to use all the waste materials in this country and convert it into manure to enrich the soils of this country, we would probably not be in need of the application of inorganic fertilizer. This was a view which was very seriously advanced, when a plan for production and consumption of a million tons of nitrogen at the end of the Third Five-Year Plan was presented. On an analysis made of the claim on the merits of the statement, it was found that even if all the waste material like farm-yard manure, cow dung, night soil, green manure which can be produced in the country, were to be utilized for putting back into the soil, the present poor soil fertility status of Indian Soils cannot even be maintained at its present level to say nothing of adding anything in order to enrich them. Therefore, one should remember that any statement that the local manurial resources will be a substitute for artificial inorganic manures for increased agricultural production should be taken with considerable reserve. We must provide either for establishment of factories which will give us the necessary nitrogen requirements for producing the targets that will be assigned to fertilizer or import the balance which cannot be produced in the country. In planning the basic needs have to be taken into consideration and if the basic needs are not supplied on account of any extraneous considerations, which cannot of course be taken into account by the planners, to that extent there will be default in attaining the results.

The Chairman did not wish to comment upon any other aspects of agricultural planning for the future, nor upon the yardsticks which have been prescribed for increased agricultural production under various heads, except to make only one suggestion. It related to the yardsticks for the intangible increases which have been assigned to improved agricultural practices. This is a matter which comes up from time to time. As to the figure which has to be taken into consideration in assigning targets for improved agricultural practices, it is not known whether line sowing will give us 5% increase or 10% increase or 20% increase. Similarly, it is not known whether weeding the grass or roguing the fields will give 5 or 10% and therefore just a rough guess was made of 2 million tons of additional production on account of improved agricultural practices lumped together. This is a matter in which the State Governments and statisticians will be able to help, if as a result of experiments carried over a series of years

and over various types of soils and climates, they show that 5 or 10% more production from these agricultural practices may be assumed with a reasonable sense of accuracy. In closing his remarks, the Chairman appealed to the Indian Society of Agricultural Statistics to try to evolve some yardsticks for this purpose.