

COST ACCOUNTING AND FARM MANAGEMENT ANALYSIS IN AGRICULTURE IN THE NETHERLANDS ¹⁾

Some fundamental problems

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§ 1 INTRODUCTION

In the Netherlands economic research in the agricultural field developed much later than technical research. The first attempts to bring about an improvement in this respect were made in the period of depression after 1930. The need was felt on the one hand for possessing information which could serve as a basis for the Government's price policy regarding agricultural produce, while on the other hand it was hoped that in the fight against the low level of prices, an analysis of farm management would assist in reducing costs of production in agriculture. No important results were booked in the early years owing to the absence of adequate information and also because those engaged on the work had insufficient knowledge and experience of the research methods that could be applied.

It is true that from as early as 1924 onwards some financial data concerning costs and yields from a fairly large number of farms had been employed by the Ministry of Agriculture to arrive at certain statistics. This information was derived from accounting offices, which had been set up by agricultural organizations to assist their members in matters of taxation. The sets of information supplied were, however, of a very summary character. They referred to the farm as a whole only, contained nothing but financial data, had been almost exclusively compiled in accordance with taxation regulations in force at the time and formed only a poor basis for comparison of one against the other. They did, it is true, give some idea of the remunerativeness of the farms concerned, but not sufficient. And they could not be used for the purpose of analyzing farm management with a view to its improvement.

In 1940, immediately prior to the German occupation of the Netherlands, a new and more systematic beginning was made with economic research into agriculture. This entailed close co-operation between the Ministry of Agriculture and the representative agricultural organizations, who jointly created a new institute, the management and financing of which was shared equally between them.

All economic research into agriculture was to be centralized in this new body which is known as the Landbouw-Economisch Instituut (Agricultural Economics Research Institute) and is established at the Hague. The plan has been put into effect to the entire satisfaction of all concerned. The early beginnings in 1940 were, by the nature of things, on a small scale, but since that time, and especially since the end of the war, the Institute has increased considerably in size. At the moment it has about 180 persons in its service, while

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²⁾ Mr VAN RIEMSDIJK wrote § 3 and § 4.

its annual budget exceeds one million guilders. The greater part of this sum is spent on unit costs analysis and farm management analysis in agriculture and horticulture.

It is not intended to say anything further here about the way in which this research work has developed during the course of the years. It will suffice if we give a sketch of the present situation as regards the analysis of unit costs and farm management, laying the emphasis on the basic points concerning the working methods employed and the solutions we think we have found to the various problems arising.

Economic research into agriculture in the Netherlands has a variety of aims, though all aims have one thing in common, that is to say, they all seek to increase prosperity in the farming industry. In the early years most attention was given to constructing a reliable basis for price fixing in agriculture, but problems to do with the promotion of efficiency and productivity have gradually come more to the forefront. Some of these questions are closely connected as regards the assembling of data and working methods, while others display quite different aspects, necessitating an entirely different system of documentation and entirely different methods of research.

§ 2 RESEARCH ON BEHALF OF GOVERNMENT PRICE POLICY

In order to make the position clear it should be said that during the war and the years immediately following a system of fixed prices for most of the products of arable farming and cattle farming was in force. This system has been gradually abandoned, however, in favour of freer price formation, the Government continuing to guarantee minimum prices for some main products, while for two others, such as wheat and sugarbeet, fixed prices still apply.

Documentation

Both the agricultural organizations and the Government accept and employ the calculations of unit costs and remunerativeness made by the Agricultural Economics Research Institute as the basis for their price policies. An effort is made to arrive at the most accurate picture possible of the costs of each separate product and the best possible survey of the remunerativeness of the various types and sizes of farm in the various areas. This picture must always remain a fragmentary one, of course, though an attempt is made to choose the various component parts in such a way that the main features are ascertained with a reasonable degree of certainty. The picture obtained is more like a charcoal sketch than an aquarelle.

Although we have not yet got so far, the intention is to make do for the time being with fifty groups of farms, which can be regarded as representative for characterizing the variety in natural conditions of production. Each group contains 20 to 40 farms. When selecting these farms, the first question considered is whether, as a group, they are representative of the area concerned as regards soil fertility, size and type; if, that is to say, they can be regarded as typical from the point of view of *production potential*. In the second place, the farms selected must be run efficiently, that is to say, the farmer must satisfy certain reasonable demands. Thus it is not an empirical average that is sought for, but that standard which may reasonably be expected to be achieved, given the existing production potential. According to our Dutch way of looking at things, badly run farms cannot be taken as a basis for determining price policy.

A complete system of bookkeeping is maintained for the farms selected by personnel of the Institute and at the Institute's expense, Government agricultural consultants in the areas concerned lending their assistance.

In addition to information of a financial nature, this bookkeeping also records, as far as possible, the consumption of means of production and production yields, both expressed in size and weight. At the present moment the Institute maintains the books of over 2000 farms and horticultural undertakings. Not all of these are sufficiently representative to furnish information for determining price policy, a large number of them having been selected with a view to economic research into farm management, which subject will be discussed in § 3.

Surveys of Remunerativeness

On the one hand the bookkeeping mentioned above provides an insight into the remunerativeness of the entire farm for the year during which the information is recorded, enabling us to draw up summaries of the financial results achieved during the year gone by. Thus an attempt is made to account for differences in the results obtained in the various areas and in various types of farm, and also to explain the course remunerativeness has taken. Costs, physical yields and the prices of finished products are all taken into account here. These statistical summaries, or surveys, of the state and course of development of remunerativeness of farms in different areas and of different type provide valuable material for orientation.

Unit Costs Calculations

This bookkeeping also provides "bricks" for calculating the unit costs of individual products. The word "bricks" is used deliberately in this context. In my opinion it is pointless to calculate unit costs simply on the basis of the bookkeeping, that is to say, by relying exclusively on the information recorded; and this for two reasons. In the main, the only purpose the calculation of the unit costs can fulfil is to serve the Government in framing its price policy and the farmer in managing his farm. It bears in other words, on *future* transactions. Its aim is to influence the size of production in one direction or the other; it must assist the farmer to come to the best possible decisions regarding the pattern his production will assume and the choice and the use he will make of the means of production.

The relationship between the cost and yield of the various products concerned in past years is only of significance in this context in so far as it is maintained in the years to come.

Generally speaking, this will be so in some cases only, not in all. Conditions influencing production which vary from year to year and which cannot be controlled by man, the temperature, precipitation, hours of sunshine, give rise to continual fluctuations from year to year in the relationship existing between the quantity of means of production used and the size of the resultant product. The ratio arrived at by chance in any given year is accordingly a small indication of probable expectations to be reckoned with. In the second place, the prices paid, or calculated, for means of production in the year gone by are in the majority of cases no longer applicable in the period for which the calculation has to be made.

Determination of input-output relationship as the basis for unit costs calculation

Thus the data obtained from the bookkeeping records are not suitable, in their original form, for use in calculating the unit costs. They need first of all to be analyzed and incidental influence removed. For this purpose it is desirable to dispose of the accounts relating to the same farms over a period of years. The aim of the analysis is to discover the most likely input-output ratio, expressed in physical amounts, that is to say, the normal input-output ratio under average production conditions for the farms concerned. Tracing the normal relationship between the consumption of means of production and yields in kind forms one of the fundamental problems of the research for unit costs calculations. In the Netherlands the process is called the "normalization of costs and yields".

In agriculture, the input-output ratio, in physical quantities, varies more or less according to the degree of influence exerted by the uncontrollable variable factors of production. It varies for different products and sometimes also for the same products in different regions. For instance, the ratio of input of labour and fodder to output of pork varies between much narrower limits than the ratio of input of labour and artificial manure to output of potatoes. And on a dry soil this ratio for potatoes varies between much wider limits than on a moisture-retaining soil.

The wider the limits between which the input-output ratio varies, the less significance have the calculations of unit costs. This does not, however, apply to the calculation of unit costs only, but, in the same degree, to all calculations, including calculations of the costs of the marginal quantities of agricultural produce.

The variations in input-output ratio do not make much difference when using the calculations for price policy, as this is based on the most frequently occurring unit costs. For farm management purposes, however, we have to deal with each farm individually. The more chance, in the form of natural conditions, enters into the picture, the more unsettled are the conditions for cost accounting.

For the normalization of the input-output ratio it is essential that, as far as possible, the use of means of production should be recorded in the bookkeeping by size, weight and hours, and that the quantities of products obtained should also be ascertained and recorded.

Although the bookkeeping forms an important source of the information required, it is often necessary to make use of other sources as well. Valuable contributions to this work can be made by agricultural research of a more technical nature, such as that carried out on trial plots and research into cattle feeding.

Calculations are made on the basis of a prototype or standard farm. A standard farm is constructed in such a manner that it typifies the average farm in a given agricultural area, as regards its size, type of soil, parcelling out, production plan, supply of tractive power, labour methods and suchlike. The way in which it is run should correspond with the average standard of farm run on expert lines in the area concerned. It should be made clear that the standard farm is not an existing farm, yet it nevertheless closely resembles the existing farms which it typifies. That the standard farm should be imaginary in its set-up does not mean that it is theoretical or unreal. Farms of nearly the same design do exist in practice.

The task of constructing a standard farm may be approached from two different angles. On the one hand it can be based on the statistical average for a given agricultural region, as regards type of soil, parcelling out, plan of cultivation, while, on the other hand, one can aim at producing as close as possible a resemblance to the predominant type of farm in the most important part of the area concerned.

The objection to the first method is that the diversity in type of soil, parcelling out, labour methods, supply of tractive power, etc., is so great that the combination of average values which characterizes a standard farm constructed along these lines, is not to be met with in reality among existing farms.

The aim of the second method is precisely to make the standard farm correspond as closely as possible with existing farms. According to this method, the standard farm is defined and localized in such a manner that it is possible to point to farms in the area concerned which practically correspond with the standard farm.

In the beginning we applied the first method but we are now going over to the second and more realistic method.

It is clear that such a prototype or standard farm corresponds far more closely with reality than an average arrived at by arithmetical calculation based on the records of, for example, 40 farms which in practice differ from each other in many respects. A standard farm can be transformed in practice into an actual farm, whereas an arithmetical average of the records of many differing farms is an abstraction, not capable of being realized in practice.

Assessment of cost factors

The second fundamental problem of unit costs calculation consists in assessing the value of the means of production used. As has already been said, the historical price, i.e. the price paid, or calculated, in the past, is devoid of any significance for this purpose. In our view, the costs of producing the means of production supplied by the farm itself are likewise unserviceable for the same reason, that is, by virtue of their being data determined in a past period. The assessment must be up to date, i.e. for products yet to be produced. To this end one is obliged to base one's calculations on the situation existing at the moment the calculations are made, in so far as reliable estimates of price movements in the immediate future are not available.

The basis for this assessment is the principle of opportunity costs.

In calculating the unit costs per product, all the means of production used should be assessed at their money value. In this way sacrifices in kind are reduced to the same denominator. The valuation of means of production obtained from third parties presents no difficulty, the figure taken being the purchase price to be paid now or in the future.

Not all means of production are obtained by purchase however. Besides those obtained from third parties we can distinguish:

- 1 those produced on the farm itself, e.g. sowing seed, seed potatoes, cattle feed, stable manure;
- 2 other means of production necessitating no expenditure, e.g. unpaid labour of the farmer and his family and the farmer's own capital invested in equipment and live-stock.

In valuing these means of production, the question one must always ask is what their most profitable alternative employment would be and what return

such employment would yield. The sacrifice involved in making use of a given means of production is the return obtained from its most profitable alternative employment, expressed in terms of money. For those means of production for which there is a definite market price, this assessment usually presents no difficulty. In this case the alternative employment is sale at the market price. For example, cereals raised on the farm and fed to the farm cattle are valued at the price they would have fetched, if sold on the market, and the unpaid labour of the farmer and his family at the ruling wage, increased by the usual percentage for social insurance.

If there is no definite market price for the means of production, valuation is more difficult, but in my opinion not insoluble. Two cases can be distinguished.

The first regards the valuation of a main product, e.g. mangolds as fodder for the cattle, if there is no reliable market price for it. The best valuation to me seems to be the unit costs of a normal yield and the normal quantities of cost items valued at up to date prices. In these unit costs a normal profit, as could have been acquired by growing an other crop, which would have taken about the same place in the rotation, has to be included.

The second case regards some by-products, which are turned back into the production process, e.g. sugar-beet tops and leaves. In this case the only solution of the valuation problem lies in assessing the most profitable alternative use. Of by-products costs of production cannot be assessed. If the quantity is so large that it cannot all be used as fodder, part having to be ploughed back into the soil, the product must be assessed at its value as manure. The cost of similar manuring in another form, e.g. the cost of green-manuring combined with certain artificial fertilizers, can serve in this case as a basis for valuation. If the quantity is, however, such that all of it can be used as fodder, its (higher) value as fodder must be taken as the basis for valuation.

Summarizing, the means of production obtained from third parties must be valued at the reigning purchase price at the farm, while means obtained in other ways are assessed at the return they would yield in the most profitable alternative employment; in so far as a definite market price is known, this return is the sale price from farm, while in so far as there is no definite market price, the valuation will depend on the circumstances in each case.

Distribution of Costs

The third fundamental problem concerns the distribution of the costs over the various products turned out by the individual farm. This problem touches on that of determining the normal input-output ratios and that of valuation, though especially the latter.

The joint production of products on a farm is due in part to biological and agricultural factors. One has only to think of wheat and straw, of milk and meat. In these cases the input-output ratio, expressed in physical quantities, cannot be determined for each of the products separately but only for both together. A separate unit costs calculation for each of the products that have to be produced jointly is accordingly impossible and at the same time pointless.

For practical purposes it is, of course, possible, to calculate "unit costs", for example, for wheat and milk, proceeding from a given price for the by-product, straw and meat respectively. The significance of such "unit costs" is, however, dependent on the prices of the by-products. In the case of joint production, it is only when there is scope for considerable variations in the

proportions of the two products concerned that a solution is theoretically possible and meaningful, and even then it remains a matter of difficulty.

If, however, the reason for joint production lies in the economic field, viz., improved use of labour, means of production and soil (rotation of crops), the physical input-output ratios can, indeed, be determined, the problem being wholly a matter of valuing the amounts of the means of production employed. The principle of opportunity costs provides the right solution here. We have already spoken about the assessment of products turned out by the farm itself which are put to use as means of production in other sections of the farm. There are no difficulties of principle in this matter, though there are certain practical difficulties, viz., the determination of the quantities used and the quality of the products.

The distribution of the costs of human labour and tractive power presents a few difficulties, i.e. as regards peak periods and slack periods. These difficulties can be solved, in principle, by introducing variations in the assessment of labour and, for example, horse hours, accordingly to the different seasons of the year. We have not yet applied this principle, however, in our practical work.

The special character of the cost of the land

One cost factor which deserves closer attention in view of its special character is the cost of the land. The value of the land, or in the event of its being leased, the rent paid, is largely dependent upon the remunerativeness of the farms and consequently upon the prices fetched by agricultural products. In calculating unit costs it is possible to base these calculations on the situation as it is; but this is not so when it comes to using these calculations for determining price policy. There can be no doubt that if one did so, one would be caught up in a price spiral. For if a favourable degree of remunerativeness caused the purchase price and rent of land to rise, this would result in higher costs for the products, which would in turn result in their fetching higher purchase prices. This would bring about a further increase in remunerativeness and the price of land and rent would also receive a fresh impetus to rise.

The solution, in my opinion, is to be found by splitting the cost of land into two categories, viz., the expenditure required, on the one hand, to maintain the land and buildings in good condition and, on the other hand, the portion of the income accruing to the land, i.e. the net rent.

In my view the expenditure required to maintain the land and useful buildings should include the following items:

- a cost of insurance, maintenance and repairs to buildings and possibly to other non-permanent artificial works,
- b depreciation of non-permanent capital goods on the basis of replacement value,
- c interest on these non-permanent capital goods to fulfil the conditions for re-investment,
- d payments to public corporations for the maintenance of drainage, irrigation and road works,
- e taxation on land and buildings not affected by fluctuations in the farm's remunerativeness.

Price policy should, I believe, take these costs fully into account.

It is a different case with the net rent, i.e. the income element of the return on the land. A certain net rent can be accepted, that is to say, at least the

differential rent which the better land yields, when the rent of the group of marginal farms approximates to nil. In the Netherlands, the tendency of the minimum price policy is in this direction. One can even go somewhat further and allow a certain net rent on these marginal farms for the purpose of price policy. The decision as to the basis on which one is to proceed is to a certain extent an arbitrary one. The point is, however, that in calculating the unit costs for the purpose of determining prices, a rise in land prices and rents is not accepted as a price-increasing factor in so far as it results from a rise in the net rent. Thus the danger of a spiral movement in price policy from this source is avoided.

Effect of the degree of intensity

An objection sometimes raised to the unit costs calculations is that, as a rule, only average costs per unit are employed, based on a certain degree of intensity of production. Now, it is undeniable that the intensity of production is influenced by the price level. There is thus a tendency for unit costs to depend to some extent on the prices fetched by the products in the years from which the data are taken.

For a proper interpretation of the costs calculations, therefore, care ought to be taken to consider various degrees of intensity when analyzing the input-output relationship. There is no doubt about the usefulness of knowing what these input-output ratios are for different degrees of intensity, when it comes to determining price policy. Although research in the Netherlands tends to take this direction, for example, in connection with the effect on the milk yield of using nitrogen fertilizers on pasture land and concentrated cattle-feed, much still remains to be done in this field. To this end, close co-operation with purely technical research into agriculture is essential. Actually, economic research into agriculture is predominantly technical research approached from special angles.

We have dealt here briefly with the principal aspects of costs calculation as regards agricultural products, as we see it in the Netherlands. If such calculations are to be of any use, they should refer to the future and not be a mere record of what has taken place in the past which, seen by itself, is of doubtful value. Costs calculation is, in essence, a systematic technique of estimation. It displays a close relationship to fixing the premium for a life insurance policy. For in this process numerous incidental and individual factors of uncertainty relative to a future period are reduced, by applying probability calculations to a large body of particulars relative to the past, to a figure which experience has shown to possess a large measure of reliability.

§ 3 RESEARCH DESIGNED TO IMPROVE FARM MANAGEMENT

Aim: The control of efficiency and planning

There is no doubt that agriculture as a branch of industry is characterized by its venerable age. It cannot be said, however, that it has acquired so much wisdom with advancing years that farm management no longer presents any problems. In agriculture, too, we still observe striking variations in the remunerativeness of undertakings run under practically identical conditions. These variations are due, in part, to a number of factors outside the farmer's control. Others, however, are quite definitely influenced by the procedure followed on the farm, thus by the farmer himself, who decides upon such procedure. It is,

indeed, possible to bring about an improvement in the management and remunerativeness of farms and in view of the large size of the agricultural industry, such an improvement must greatly benefit the welfare of the country as a whole.

It is, however, no wonder that there should be so great a variation in farming results. In agriculture particularly, the management of an undertaking entails dealing with a large variety of problems, while the conditions under which these problems arise are in all respects liable to change. What is more, it is often hard to judge the significance of these changes. It is not possible, therefore, to achieve the desired aim — good farming results — merely by providing a series of set answers to the problems which arise.

Here one may ask oneself what contributions economic research must be expected to make to the improvement of farm management. From farming circles comes the old dictum that the organization and management of a farm are matters which must be learned from practical experience. Even in times when agricultural technique was not undergoing very rapid development, men were of the opinion that a great deal of experience was required to be able to run a farm well. The significance attached to experience implies that in agriculture, too, much can be learned from what one observes and does oneself. Thus it is apparently possible to learn to judge conditions better and in this way to come to wiser decisions on the various problems with which one is faced.

Experience can be regarded as the outcome of a kind of control kept on what has been done, or, in other words, on the efficiency of the farm management. This control will very often be a matter of exercising the memory, partly intuitively, partly deliberately, and require neither pencil nor paper.

Economic research into farming will already be doing useful work if it encourages farmers to carry out this control of efficiency more deliberately, to put it on a more systematic basis and support it as much as possible with factual information. Accordingly an effort has been made for some years now to promote the control of efficiency in the first place by making use of the information obtained from a relatively simple form of farm analysis.

The control of efficiency is necessary in the first place to ascertain whether what has been done has been done efficiently. This amounts to asking whether crops and cattle have received at the proper time that attention which, in the given circumstances, was the most appropriate for achieving optimum production. The next question, namely, whether purchases and sales have taken sufficient advantage of market opportunities is of equal importance. Finally, it involves the question as to whether the work carried out in tending land, crops and cattle has been organized in as effective a manner as possible.

In the agricultural industry, however, other kinds of questions arise in addition to those just mentioned. On practically every farm there are several combinations of crops and cattle possible; the intensity of cultivation and animal production can also vary product by product. At the same time the total equipment required for carrying out the work to be done can be based on one of many possible combinations of labour, machines and tractive power. These questions too are of continual interest to the farmer by reason of changes in price relationships and advances in agricultural technique. Taking into account the land, capital and labour he has at his disposal, the farmer must endeavour to keep the entire organization of his farm, i.e. both his plan of

cultivation and his equipment, in line with the opportunities which arise. In order to do this, he will have to estimate the result he can expect to see from all kinds of possible modifications in the set-up of his farm, so that he may make the right choice out of all these various possibilities. Faulty methods of estimation and inaccurate basic data will naturally lead to mistaken decisions. In order as far as possible to reduce the risk of a mistake being made, economic research must also make it its aim to bring about improvement in this work of planning.

Farm management analysis as the basis for the control of efficiency

The documentation mentioned in § 2 above also provides the data for the analysis of farm management aimed at bringing about an improvement in the control of efficiency.

The analysis of farm management is intended in the first place to be used for the benefit of the farms to which the information relates. In order to draw a profit from this analysis, one needs not only particulars relating to a number of accounting years, but also those relating to a number of similar farms. By co-operation between the farmers and the Agricultural Advisory Service, this information can then be used to compare one farm with another. In this way the efficiency of each farm can be tested by comparison with what has been done and achieved by others. Other farmers not involved in the process can then benefit, via the medium of the Advisory Service, from the experience gained in making these comparisons.

The method of analysis followed at the moment is based on what has already been achieved in this field, among other things, in the United States. The way in which the information obtained from each farm is treated is comparatively simple. Attention is paid to three main aspects, viz.,

- 1 the results achieved by the farm as a whole;
- 2 the yield of each separate product (quantity and price);
- 3 the operational costs of the farm as a whole (wages, cost of tractive power, machines, cost of contractors' work e.g. rates for threshing, ploughing, spraying and the like).

The information under these heads is supplemented by particulars regarding the organization and operation of the farm and the circumstances under which this took place, in so far as this can be expressed in simple terms. The entire body of information from a number of analogous farms is summarized and handed out to the farmers and the Advisory Service.

The fact that the aspects mentioned are shown separately does not mean that their inter-relationship can be ignored.

A comparison of the final figures showing one farm's results¹⁾ with the information elicited from analogous farms for the same period will indicate whether the farm's results have been satisfactory or not. The comparison of final figures does not afford any insight into the factors which have led to the final result, be it good or bad.

These factors may have lain in circumstances which the farmer could do little or nothing to alter, at least not while production was in progress. Such

¹⁾ The way in which the final result is calculated, i.e. either as a net surplus (entrepreneur's salary and profit), labour income, or family income and so on, is immaterial here.

factors include economic and natural (weather) conditions in the period concerned and the quantity of means of production available per farm.

Another group of factors is, however, dependent to a high degree on the farmer himself. These have to do, on the one hand, with the way in which the group of factors mentioned in the preceding paragraph is appraised for the purpose of deciding upon all the different processes which go to make up the organization and operation of the farm, and, on the other hand, the manner in which these processes are performed.

In order to ascertain whether the second group of factors has been responsible for a result different from that achieved by other farms, or in other periods of production, attention first of all is paid to the yields obtained. In the farm analysis summaries the quantity, price and total yield in money are shown, product by product.

The prices obtained by the different farms can be compared with the course of the market prices for products of similar quality. By taking into account the date the sale was effected, one can judge how well the farmer has fulfilled his function as a merchant. It is therefore a comparatively simple matter to determine whether the cause of a result divergent from the results of other farms lies herein.

It is not so easy a matter to determine whether the actual yield in kind represents what was desirable and possible under the given circumstances. Here, too, however, by comparing similar farms, one can obtain some indication, as far as large differences in yield are involved. That a rough appreciation only is possible is due to many factors which have to be taken into account here, while at the same time the effect of each factor taken separately cannot be gauged satisfactorily.

Similar farms display all kinds of divergencies as well. The character of the soil, for example, may be exactly the same, but not the manuring, the drainage, etc. Only rough or fragmentary information exists on these points. It is not possible, therefore, to say precisely how far the results achieved on one farm were possible on others, too, in the corresponding period.

Moreover, the farms almost always display differences as regards their plan of cultivation and the intensity of production for each product. This applies to both crops and livestock. The farm analysis summaries naturally include information on these points also, and differences on this kind must be taken into account when judging the physical yields. In many cases, however, insufficient data are known about the significance of these differences, and it is not, therefore, possible to indicate with sufficient precision the extent to which they are responsible for divergencies in the yields achieved by similar farms.

Since uncertainty exists on a number of points regarding the effect of the factors mentioned above, only a rough estimation can be made of the degree to which requirements concerning crops and livestock have been fulfilled in the cultivation process proper. Insufficient information is known regarding the cultivation of the various crops to be able to say what individual actions were responsible for divergencies between yields in kind.

As regards differences in the plan of cultivation (crops and livestock) as the cause of divergencies in farm results, these can also be judged approximately by means of the information regarding the yields and prices of the various products, the cost of the means of production and the results of the farm as a whole.

All manner of limitations also apply when one comes to judge the costs of the work done on the farm. Since these costs are largely dependent upon the plan of cultivation (crops and livestock), a direct appraisal of them for the farm as a whole by means of comparison with others is not possible.

It has already been pointed out when discussing the analysis of the yields, that there are more or less important differences in the quality of the soil, in the plan of cultivation and in the intensity of the production of the various crops, even between similar farms. In order to make some sort of appraisal possible, be it only an approximate one, the working costs are checked against certain norms. Since a rough yardstick has in any case to be employed for the analysis, use is made of these norms to appraise farms where it is not really permissible. The norms ought to be related to the size of the farm, type of soil, plan of cultivation, quantity of livestock, intensity of production, supply of labour, tractive power and implements (as are the actual costs of the farm work), and should also reflect the state of affairs resulting, under given conditions, if the work is performed efficiently. The data available do not, however, permit the construction of norms as precise as this. Those used are obtained by means of the calculations for standard farms mentioned in § 2, and are based on the working costs per product under "average" conditions. With the aid of data regarding the plan of cultivation of a given farm, "costs according to the norm" are calculated for the farm as a whole, after which the actual working costs of the farm in question are expressed as percentages of these "costs according to the norm". The differences between these percentages for similar farms indicate that certain farms perform the work more efficiently than others. These indications are only approximate, however, owing to possible differences in the conditions under which the work, or certain parts of it, is carried out on the different farms. Also owing to possible differences in working methods or in combinations of labour, tractive power and implements used.

Furthermore, insufficient details are recorded regarding the work on each farm to enable one to ascertain whether the differences are to be traced to certain processes and operations, or whether the general organization of the work is the weak point.

It is, therefore, by no means the case that the discovery by farm management analysis of what are often large differences between the various farms' results implies that the causes of these differences, or ways of removing these causes, in so far as they lie with the farmer himself, have also been discovered. The analysis of farm management and the comparison of one farm to another by which it is followed do not, generally speaking, yield ready-made ways of improving the remunerativeness of the farms. They do, however, provide an important basis for arriving at such an improvement. This basis can only be put to good use, if one has at the same time a thorough knowledge of the farm itself. This is a matter which the farmer must and can attend to, assisted, if necessary, by the Advisory Service.

Following on what has been said above, attention may be drawn to a special aspect frequently met with, especially among the smaller types of farm—in the Netherlands farms up to 10 hectares. On these farms there are often more hands available (members of the farmer's family) than the efficient organization of the work requires for tending crops and livestock.

By applying norms, this surplus labour can easily be calculated. All the information required is: a) per farm: particulars regarding size of farm, labour employed, plan of cultivation, amount of livestock, and b) per product: particulars for each section of the work regarding number of labour hours required for giving proper attention to the products concerned under an efficient system of working.

Full farm management analysis has shown that farming results are highly dependent on the labour performance, i.e. the ratio between the number of hands employed and the amount of work which has, according to the above-mentioned norms, to be performed. If the labour performance is low, that is to say, if there is little work per unit of labour, the management of the farm must be highly efficient, if satisfactory results are to be achieved. This is often not the case, for smaller farms, like larger ones, display great variations as regards efficiency.

The Agricultural Advisory Service is making increasing use of this possibility of ascertaining the labour performance in a simple manner. An attempt is being made to induce the farmers to adjust the organization of their farm management to the available labour supply, even though the advisory work lacks particulars for judging the efficiency of the farm management. On farms where the available labour is not fully employed, greater intensity of labour will, within certain limits, usually lead, via higher costs and higher yields, to an improvement in income per farm, for labour can in this case be charged to overhead costs; price and sale conditions will usually permit extra returns, larger in greater or lesser degree than the variable costs.

Budgeting on behalf of farm management

From the economic point of view, the aim of every agricultural undertaking is to try to raise profits and stabilize them at the highest possible level by using the means of production, land, labour, capital, according to an effective plan. The purpose of economic research in agriculture is to assist farmers in their task of choosing the most effective combination of means of production out of the many combinations which can make up a production plan.

It is not difficult, in principle, to discover the best combination for a given farm. Production economics clearly indicates the requirements such a combination must fulfil. Thus one naturally has to cultivate those crops from which the largest net surplus is to be expected. Each crop must also be cultivated to the extent that the cost of the last amount of means of production used is covered by the value of the extra product it yields, while this figure must be the same for every crop cultivated.

Thus the total integral costs and yields of the various products are insufficient in themselves to provide a basis for determining the plan of production. The splitting up of the costs into fixed costs (overheads) and variable costs is a necessary amplification, though this, too, is insufficient. The normal trend of costs and yields per product for various degrees of intensity of production must also be known, i.e. the differential costs and yields (input-output curves). The requirements here are far more detailed than those for the calculation of unit costs on behalf of Government price policy mentioned under § 2 above. Whereas, as regards these latter calculations, sufficient information is available for budgeting, this is not the case as regards farm management organized according to the principles of production economics.

The unit costs calculations arrived at in connection with the standard farms have accordingly to be used, despite their defects. If the necessary precautions are taken, these calculations can undoubtedly be useful for the purpose of farm management as well. They must, however, be looked on primarily as providing a model. In coming to decisions regarding farms in a given area, one can refer back to the data for the standard farm typical of that area. This typicality, however, refers to *average* production potential in a given area and to what is, on the average, *expert* farm management. On farms where these circumstances are more favourable or less favourable, the relationship between costs and yields will differ from that for the standard farm. In order to relate the information to a given farm, it is accordingly necessary to ascertain what modifications must be made to the standard calculations. The farmers can do this themselves in consultation with the Advisory Service. For this purpose the reports on the standard farms contain sufficient details regarding most of the sectors of farm organization and operation. Moreover, the farm management analysis discussed in the preceding pages provides all manner of departure points for judging the differences between a given farm and the standard farm.

The usefulness of the standard calculations does not lie in the fact that the farmer can make all sorts of estimates on the basis of them, sufficiently precise to enable him to come to better-founded decisions regarding the management of his farm than he could do by intuition. In certain respects this will, indeed, be so. In deciding upon the plan of cultivation, it is better to concentrate the attention on the expected behaviour of the variable costs. The standard calculations contain sufficient details to be able to come to a satisfactory estimate. In many other respects this is not, however, possible. There is generally insufficient information available to estimate the optimum intensity of production of given crops or the effective combination of labourers, tractive power and implements. One can try to make do by using various data obtained by the technical research. Results obtained with manuring and cultures on experimental plots, experiments with feeding stuffs fed to different types of animal, research into working methods and the like undoubtedly provide useful starting-out points. The data obtained by these experiments are not usually related, however, to the conditions prevailing on the farms themselves. Furthermore, it is doubtful whether the information holds sufficiently good for conditions other than those under which it was obtained.

It is, however, a good thing that experience is gained in drawing up estimates for farms in practical operation, as long as one remains sufficiently critical as regards the results of the calculations. For one is obliged to consider every sector of the farm management very carefully, yet for all manner of factors there are insufficient data available to enable a quantitative appraisal. It is highly doubtful, therefore, whether one succeeds in properly discounting the risks involved in various combinations, when making these calculations, whether one is able to take sufficiently into account the requirements as to the maintenance of the productivity of the soil and the way in which crops of various sizes fit in with production (competitive, complementary and supplementary effects). Pointers can be obtained on these matters by comparing the retrospective calculations of a number of estimates against the analysis of the actual farming results for the same period.

It is to be expected — indeed there are already indications to the effect — that farming circles, the Advisory Service and technical and economic research

will all alike realize that the many problems arising in practical farming can only be solved by common action. Co-operation will be necessary for posing the problems to be tackled and for deciding upon the method of research to be followed. The promotion of this co-operation is at the moment a matter of very high importance in the Netherlands.

§ 4 RESEARCH INTO THE CONDITIONS OF PRODUCTION

Farm management research only has been dealt with in the foregoing, the remunerativeness of the farm having been studied in its dependence on natural and economic conditions of production and on the way use is made of these conditions on the individual farm. In principle, this research reveals the degree to which a given factor influences a farm's remunerativeness.

This is undoubtedly important information for the struggle to raise the standard of prosperity in farming. More, however, needs to be known, if we are to improve the opportunities for promoting prosperity. Besides a knowledge of the *effect* of certain factors, knowledge of another kind is required, i.e. knowledge regarding the factors themselves, referred to in this context as the "conditions of production". Farm management research bases itself on the given conditions of production; thus, in order to judge the level of prosperity in a certain area, it is necessary to have a complete picture of the structure of its farming, that is to say, equal attention must be devoted to the conditions of productions as to the farm management.

This research, accordingly, tries to raise the level of prosperity in agriculture not by investigating the way in which the individual farmer manages his farm and how far he adapts it to existing conditions of production, but, instead, by *research* into these conditions which cannot be improved by the individual farmer himself, but only by government and agricultural bodies at various levels.

This research is consequently concerned with the economic aspirations of the agrarian population. A description of the farm management and the plan of production indirectly provides one with an impression of the level of prosperity. In order, however, to be able to judge whether this prosperity is based on secure foundations or not, it is necessary for the work of research to cover the physical and social conditions of production. This is done by ascertaining what the situation is on each farm in a given area as regards the various factors which go to make up the natural and social conditions of production. Such factors are, first and foremost, the type of soil, water control, land development and parcelling-out, tenancy and ownership, size of farms; next, the supply of labour, the share of the various categories of labour in the agricultural process, the quality of the labour, the outflow of farmers' sons and agricultural labourers to other trades; further, the equipment of the farms, the provision of credit; and finally, the social factors which can effect the production process — the community's mode of life, its norms and customs.

This enquiry into the conditions of production can reveal the degree of importance which must be attached to the various factors impeding a rise in prosperity. And this can be followed by an enquiry into the action that can be taken to alter these factors for the better, where this is, in principle, possible. A great deal of attention is accorded to this research work in the Netherlands.