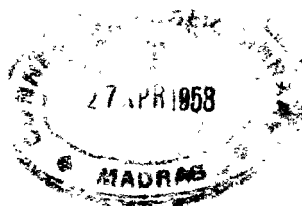


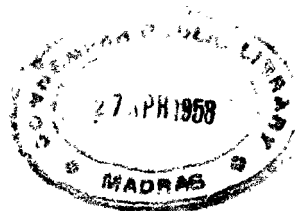
PROBLEMS OF FARM COSTS IN INDIAN AGRICULTURE

A Study in Methodology



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PREFACE

"The problems of calculating the cost of cultivation" was one of the subjects selected for discussion at the Twelfth Annual Conference of the Indian Society of Agricultural Economics held at Gwalior in November 1951. There was a general consensus of opinion among members and delegates who read papers on the subject and took part in the discussions that the study of this problem was of vital importance in the economics of Indian farming. A desire was also expressed that further research into the subject under Indian conditions was necessary and should be conducted.

It is recognised by agricultural economists that farm cost studies are an integral part of the whole subject of agricultural economics and cannot be left out of the scope of economic analysis and research. In fact, in the U. S. A. and the U. K. they formed the basis of research for the evolution of the principles of scientific farm management. Methods in agricultural economics have changed with the changing problems and the broadening of the scope of the subject but the importance of cost analysis for individual farms is still recognised.

In India, a nation-wide effort is being made under the Five-Year Plan to reconstruct Agriculture. The various reform measures and development programmes in the process of implementation have as their chief aim the reorganisation of the structural basis of agriculture, to facilitate the introduction of technological improvements and scientific methods of cultivation and application of economic principles. In this context of the changing pattern of agricultural economy envisaged, the study of farm costs assumes a significant value.

Though individual field studies on costs of cultivation have been carried out adopting various methods, no attempt has been made so far to have a comparative examination of the methods followed in other countries with a view to consider the practicability of accepting a standard or uniform method of calculation suited to Indian conditions. This consideration weighed with us in readily agreeing to the suggestions made at the Conference to have this problem studied under the auspices of the Society. It is hoped that this study, a preliminary attempt to present a systematised body of knowledge on the subject, will prove of special value to students of economic research, Government departments of agriculture, experimental farms, and other enlightened farmers who have the facility to

introduce and test the degree of accuracy of the methods suggested. This may also serve as a basis for further study and research on the subject.

The Monograph has been prepared in the Office by Mr. S. Thirumalai, M.A., Research Officer of the Society. Dr. V. G. Panse, Statistical Adviser, Indian Council of Agricultural Research, New Delhi, and Prof. M. L. Dantwala, Honorary Secretary of the Society, were kind enough to go through the manuscript and offer their suggestions.

MANILAL B. NANAVATI
PRESIDENT

Bombay,
1st January, 1963.



INTRODUCTION

The calculation of production costs is one of the fundamental problems in Agricultural Economics. Research into the past history of farming practices does not reveal to us the origin of the desire for knowledge about farm costs. Casual references to farm costs and the desirability of maintaining accurate records of costs are, however, found scattered in the literature on agriculture available from the time of the Roman period to the middle of the nineteenth century. None of these records, however, indicate carefully collected and compiled data on costs or a comprehension of suitable methods of attack on that subject. Following the rationalisation of agricultural methods and the establishment of agricultural colleges in the U. S. A., the U. K. and other European countries, from the latter half of the nineteenth century more active interest in the subject is indicated.

The demand for information about the cost of producing various farm crops appears to have been stimulated originally by the long period of low prices and small farm profits that were prevailing. The recognition by Governments of the need for protecting agriculture, through positive measures of land improvement as well as increasing the efficiency of farm management was also a contributing factor in obtaining data on costs of cultivation. Whatever may be the purposes and objects for which farm cost studies were instituted in different countries their importance and usefulness in interpreting the economics of farming were clearly established by the first decade of this century.

The importance given to costs in analysing economic trends continued till the end of the First World War. Costs were then conceived broadly in relation to the competitive prices. It was also assumed that the cost factor was a determinant of economic efficiency in the long run. But after the war and particularly during the thirties, with the shift in economic emphasis on the cause of the growing unemployment and depression, the concern about costs gave way to income. The fuller utilisation of resources occasioned by the World War II and the pent-up demand since the end of the war appear to have brought us back to consideration of costs although not as yet fully appreciated.* In any event, now the season of cost is upon every country. It would therefore be quite fitting and perhaps really be not just academic to enter upon a discussion of the problems of costs in Agriculture in this country when we are on the threshold of an era of planning.

The main objective of planning in Agriculture is the promotion of efficiency. Efficiency is the result of conscious and intelligent application by

* Theodor W. Schultz—Factor Costs in Agriculture, Journal of Farm Economics, Nov. 1947.

the farmers of the scientific principles of cultivation to obtain the maximum results in yield. In an under-developed country like India where farming is still a gamble in the rains it would perhaps be a task of great magnitude to introduce on a large scale, farm management as understood in the advanced countries. But the importance of scientific farm management and the gradual education of the farmers in the principles of the same through Government and non-official agencies should be clearly recognised in any scheme of re-organisation of Agriculture. In the Five-Year Plan prepared by our Government in the section on re-organisation of agriculture one of the main aims is stated to be "to increase production and to make cultivation more profitable by reducing unit costs and increasing yields.*"

This statement on Policy is rather incomplete and does not positively lay down the need for conceiving and introducing a system of farm management suited to Indian conditions and environment. It does, however, imply that Agriculture as an occupation should be run on business principles than as a mode of living as at present. In other countries as the U.K. and the U.S.A. the first emphasis in agricultural policy has been on farm management on accepted and sound principles.**

Though comprehensive in scope, the science of farm management is primarily based on the investigation into the economic aspects of farming, particularly the cost and income structure. For success in farming the application of the principles of agricultural economics is as necessary as that of the physical and biological sciences. While the latter are concerned with the 'whys' of agricultural practices, the former points the way to 'whats' and 'how much' in agriculture, that is, 'what to produce and how much of each to produce', so as to make farming most profitable under a given set of conditions. However, the technical problems cannot be separated from the economic problems. "Technical studies show what is possible, while economic studies indicate what is expedient."† Thus research into suitable types of farm management under Indian conditions should be preceded by an inquiry into the methodology of ascertaining the costs of cultivation under the diverse systems of farming prevalent in this country.

* The First Five-Year Plan—A draft outline, P. 97.

** Promotion of Efficiency. "The twin pillars upon which the Government's Agricultural policy rests are stability and efficiency." The main method of providing stability, however, is not enough. It is generally recognized as equally important to ensure that the industry attains the highest possible degree of efficiency. Indeed for the State to assure the farmer of stability without taking measures to promote efficiency would be to undermine the farmer's incentive to improve his methods and his flexibility in changing his system as circumstances alter and so ultimately to undermine instead of to promote the prosperity of the industry. The State therefore provides a number of aids to good farming, as well as under the AGRICULTURE ACT, 1947 creating sanctions that may be used to remove the chronically indifferent farmer or land owner who is not fulfilling his responsibilities to the land—Agriculture in Britain—1950.

† 'Farm Cost Accounts'—S. R. Misra.

The difficulties of pursuing cost studies in Agriculture in this country are often overemphasized due to the illiteracy of the peasant farmers. If the Indian peasant is illiterate he is certainly not deaf and not always dumb. His ear is now being assailed by the journalist and the propagandist, by politician and patriot, by the lawyer, trader and moneylender and by officials of half a dozen departments, all competing for his attention, custom or cash. Generally bewildered and sometimes dazzled he listens to each in turn but ever thinking of crops, prices and payment and the limited but inescapable necessities of life.† He is not oblivious to the concept of cost as it actually affects his income. The Indian peasant is admittedly intelligent. The student of research in agricultural economics, if only he can adapt himself to the rural environment and co-operate with the farmer, can easily obtain the required basic data and be an useful instrument in educating the farmer in business methods.

To understand the real nature of the present farm problems in India, we must examine the economic basis of the present farming system with a view to observe how far it is responsible for the low level of earnings on the land. In providing a clue to such understanding the study of farm costs assumes a practical value. This Monograph is nothing more than a first contribution towards a study of this vast problem, extremely important from the national standpoint as well as that of the individual farmer and the agricultural industry. The author has freely drawn from the published works on the subject and gratefully acknowledges the guidance received from others interested in the subject.

PART I
HISTORICAL BACKGROUND
GENERAL METHODS AND PRINCIPLES
OF COSTING IN AGRICULTURE

CHAPTER I

SCOPE AND METHOD OF STUDY

There are many different definitions of "Farm Costs." These differ primarily in the range of subjects which are to be considered in this field. All agree that farm cost is concerned primarily with the internal economy of the farm, but disagree as to just how far an examination of 'Farm Costs' should go into the study of other economic problems of production in agriculture. One of the most significant developments in farm cost investigations in recent times has been the undertaking of research in these related fields. There is no clear demarcation of boundaries in research studies of farm costs and other related problems of production in agriculture. A purely arbitrary division has been adopted by the different research institutions. Therefore, as the subject is comprehensive and lest there should be too much of straying into the related fields of studies it would help to define briefly and as precisely as possible the scope of this discussion on farm costs in Indian agriculture and the method followed in the treatment of the same.

At the outset, it may be made clear that the terms 'cost of cultivation' and 'cost of production' are used as synonymous for the purpose of this study though a nice distinction can be drawn between the two restricting the content of the former to include factor costs up to the stage of gathering the harvest and giving a broader definition to the latter including factor costs up to the stage of marketing the produce. The present study is concerned mainly with one of the fundamental methodological problems of empirical economic research namely, with the possibility of arriving at scientifically valid standards for the quantitative analysis of the various factors that determine production costs in agriculture or establishing some uniformity in conclusions regarding the same. A preliminary clarification of the connotation of the terms "Farm Cost" as distinguished from "Farm Book-Keeping" or "Farm Accountancy" is necessary for a correct approach to the problems that are covered.

Farm Book-Keeping and Farm Accountancy: The term "Farm Book-Keeping" or "Farm Accountancy" is applied to the maintenance of a systematic record of financial transactions of farming as a business such as crop production, vegetable gardening, fruit culture, or animal husbandry including dairy farming and breeding of livestock, poultry farming etc. This is a simple process of the application of the general principles of commercial book-keeping with suitable modifications to enable a farmer to ascertain at any time particulars of the business transactions and their cumulative effect on the financial

position of the undertaking. As such, farm accounting merely refers to the method of recording the primary data on costs of cultivation for purposes of analysis. This is no doubt an essential part of the study of farm costs. But "Farm Costs" are directly concerned with the method of calculating in precise arithmetical terms or units the functional aspects or operations in agriculture as related to the cost structure. It is a very complex process of ascertaining the method of separating, sifting, abstracting and reducing to units various composite factors that together determine the production costs.

The object of this study is to simplify the process of interpreting these factor costs in Indian agriculture and attempt a uniform methodology which will make the results of farm accountancy or farm book-keeping reflect the real financial position of the farm. The distinction between these two aspects of the problem in production cost should be clearly borne in mind though many of the earlier studies in other countries and India on the subject started only with farm book-keeping and have confined themselves to accounting procedure. The application of the principles of accountancy in interpreting the factor costs will give different results, while the application of the principles of economics will give different results. Though both are interrelated the results of the economic interpretation are bound to vary from those under commercial accountancy.

It may be noted here that in the accounting procedure usually followed, there are three main sub-divisions—"Financial Accounting," "Cost Accounting" and "Single Enterprise Accounting." The first which is also called the farm book-keeping is a system of accounting for determining gains and losses of the farm business as a whole. The second aims at examining an individual farm in as much detail as possible. It involves an analysis of all direct and indirect expenses and their distribution as precisely as possible so as to determine returns, costs and profits on each product. It aims at locating the various loopholes in the organization by critically examining the economics of the various component parts such as individual crops and other enterprises. The third is similar to full cost accounting except that in this case an account is kept with a single enterprise which is the most important or the major activity of a farm or an area. Each of these methods has a definite place and the testing of their suitability under different conditions also falls within the scope of our research. But these have not been elaborately dealt with as there are published works on the subject.

Real Costs versus Accounting Costs: The concepts of "Real Costs" or "Economic Costs" and "Accountancy Costs" lie at the root of many of the disputes that arise between economists and practical men when matters relating to the theory of farm costs are under discussion. Much of the conflict in interpretation will disappear if we hold to the definitions in the context of the purpose for which we are using the terms and the sense in which we imply them. By the "Real Cost" of a commodity or

service is meant whatever must actually be given up in order to obtain it; this is defined as being equal to what would be saved if it were foregone. A convenient alternative to the term "real costs" is the term "escapable costs"; to an economist, only a cost that can be escaped in any period is a real cost of any of the possible courses of action in that period. To an accountant, on the other hand, the cost of producing a commodity is equal to that part of the total cost of an enterprise or group of enterprises which can reasonably be attributed to its production. Accounting procedures would attribute to a particular enterprise the costs of production used wholly in that enterprise plus a proportion, determined by some conventional method of the costs of the indivisible factors of production which it uses in common with other enterprises. But all these might not be escaped if the particular enterprise were given up, so that the cost of an enterprise as calculated by an accountant will generally be higher than the cost of the same enterprise calculated by an economist.

The main point of distinction is that under the economist's method the real costs of each separate enterprise cannot be assumed or expected to give the total costs of a group of interdependent enterprises because some indivisible costs would not be charged against any single enterprise; a comparison must be made between each pair of possible alternatives, to grow or not to grow vegetables; to grow or not to grow both wheat and vegetables; to continue or to abandon farming and so on. Further, because most farms are riddled with joint costs and burdened with many inescapable costs the concept of real cost is of special importance in agricultural economics. There may also be a real danger in emphasising the accountancy aspect only of farm costs. In so far as accounting enables a farmer to improve the allocation of the resources at his disposal its benefits are undeniable but if a naive view of costings or of their results cause subsidiary enterprises to be abandoned in such a way that total revenues are reduced by more than costs, the sequel could be disastrous for individual farmers and the State in their programmes of maximising production and income. Similarly the concept of real costs makes it possible to explain the stability of total farm output during periods of depression. Although farmers are poorly paid during depressions, and accounting data would probably indicate that many of them were operating at a loss, any individual might be even worse off if he alone reduced his inputs of those factors of production for which no current costs are incurred. Thus the economist is concerned only with comparing genuine alternatives whereas accounting procedures may lead to comparisons between a hypothetical course of action and one that is really possible.* The elaboration of the points of distinction between accounting and real cost in farming has been done with a view to indicate the precise scope of our study. While the importance of farm accountancy is fully recognised and is given its due place in our study of farm costs, our emphasis is more on the economic aspect of

* B. A. Giles - *The Farm Economist*, 1950, Vol. VI, No. 8.

"Costs". In order to have a correct reading of the financial position of farms it would be very necessary to apply the two concepts according to the ends in view. In the treatment of the subject these two methods have been followed and the purpose of each has been clearly indicated in the appropriate place.

A historical review of the efforts in conducting research in farm costs in foreign countries and in India while providing interesting and instructive material should also throw much light on the development and improvement of methods used in such studies. This has also been therefore included in the purview of our scope. Besides, the general aspects of the purpose, utility and limitations of the farm cost studies have been touched upon briefly with reference to the peculiar characteristics of Indian agriculture. The method of collecting farm cost data according to a standard and uniform system is equally important and this problem has also been examined. An endeavour is made as far as possible to make the descriptive and historical portions concise and brief while elaborating only on points which need clarification and precision. The main part of the discussion relates to the comprehensive examination of the various methods used in calculating farm costs and the possibility of introducing a simple and uniform system in the calculation of costs in Indian agriculture.

CHAPTER II.

OBJECTS AND PURPOSES OF FARM COST STUDIES

Section I.

GENERAL

The objects and purposes of farm cost studies can be viewed from four different angles: (a) from that of the individual farmers and the farms, (b) from that of the National Agricultural Policy adopted by Governments, (c) from that of National Planning and (d) from that of economic theory and applied research. Taking the last aspect first, in theory, agricultural economics assumes or states some purpose or purposes in the economic organization in agriculture. All the data that are designed to illustrate the means of attaining 'economy' or 'profitableness' are concerned therefore with the central and final economic purpose or purposes of the operator. The purposes of farm organization may be individual or social. Among these may be noted only those that have direct relevance upon the investigation and knowledge of farm costs. The social purposes are: (1) to use the natural resources for the best possible result and attaining the highest possible standard of living for the social groups and (2) to provide the land-holding group or the total agricultural group the highest possible income per head. The individual purposes are: (1) to obtain the highest possible cash income, (2) to obtain the highest possible material standard of living, realisable only from a farm. All these purposes imply deliberate choice and positive determination on the part of individual farmers and society. The aim of investigation in farm organization will then be that of providing information and formulating principles which will assist farmers in attaining high standards of economy and efficiency in the application of scarce and valuable resources to the ends of material production and revenue returns.* The purpose of farm cost studies is to provide this basic information.

Secondly, the purpose of national agricultural policy of Governments is considered as significant in the study of farm costs, because so many farmers have found that their own individual efforts are not adequate to enable them to cope with modern economic development. The farming conditions are determined by various external forces controlled and regulated by government in accordance with a clearly or vaguely defined economic policy which again is not static but ever changing and has often an industrial bias. It is becoming

* A. W. Ashby, Process and Purpose in Farm Management, *Farm Economist*, Vol. VI, No. 6 1950.

increasingly evident that measures for improving the present farming efficiency involve a well integrated combination of individual adjustment and public action with the public action programmes furnishing a favourable setting for the adjustments that farmers can make on their own farms.

The increased emphasis on agricultural policy in recent years has served to direct many farm cost studies towards specific problems raised by current or contemplated government agricultural programmes. Consequently, the methods employed differ with the objectives and problems in view. External economic forces continue to shift rapidly and the achievement of efficiency in operating the farm unit is resulting in increased commercialisation of agriculture. Thus, rapid changes both in technological and economic conditions will make the job of organising and managing a farm a difficult undertaking in the future. Research work in farm costs will need to be greatly expanded if it is to furnish the factual and analytical foundation for the guidance that will be needed. Public programmes are designed to aid, encourage and facilitate adjustments that will increase the income and security of farmers and the conservation of agricultural resources. All these programmes are affected by the cost of farm management whenever they involve changes that affect operating units directly or indirectly. So the objective of farm cost research as a basis for guiding the formulation and application of action programmes on farms cannot be overemphasised.

In this aspect governments are mainly influenced by the objective of either protecting agriculture or taking decisions on matters relating to agricultural policy particularly in the sphere of adjusting prices, fixing the rates of taxation on land or other revenue considerations. The price support programmes and the system of subsidies for production of special crops adopted by many western governments are clear indications of the approach of the modern welfare state towards agriculture. One of the most important features of agricultural economics at the present time is the policy of fixing price well in advance of future production. There is one very important aspect of this development. If prices are to be fixed in advance and are to be fixed at levels which will be fair to all concerned then these prices must be based on the fullest and most reliable information. Much of this can only be provided by the farmers themselves and must be forthcoming to a much greater extent than at present if the objectives of the price fixing policy are to be attained. In any system of price fixing the question "What does it cost to produce?" and "How do such costs vary under different conditions or in different parts of the country?" are fundamental. Such questions can be answered only by means of costing studies conducted on a scientific method. In short a serious gap in our knowledge of agricultural economics is the lack of information on commodity costs which can only be provided by the full costing of the farm.

The farm cost data are valuable even in respect of the agrarian reforms. India is revolutionizing her land policy on the main criterion that land

should belong to those who actually till the soil. The amicable settlement of the issues arising from these reforms, such as the determination of an economic holding, fixation of land rents, compensation etc., depends upon correct compilation of the income derived from these lands. Determination of the income is possible only if the cost of production could be worked out on some standard uniform basis.

Again, major irrigation and land improvement projects have been taken on hand by government, both Central and States, involving a huge outlay. The determination of sale or rental value of the lands under command of these projects could be reasonably estimated if the data of cost of production of crops planned to be taken on these lands could be worked out by some standard method.

Similarly, Government policy in regard to the operation of many useful and ameliorative measures, for the agriculturist and agricultural labour, depends upon the availability of standard reliable data of cost of production. Crop insurance, cattle insurance, fixation of standard wages for agricultural labour and agricultural marketing are instances in point.

Much of the oppressive features of Government's agricultural policy in the sphere of taxation and revenue can be removed if costing data are available on a reliable method of calculation.

Thirdly, viewed from the angle of National Planning farm cost studies have a distinct purpose in furnishing data on specific aspects of agricultural planning. It must of course be recognised that in agriculture, most functional maladjustments are so deeply rooted in the very nature of this branch of production that the possibilities of their elimination are extremely limited, and planning can generally do no more than mitigate their effects. Within this overall limitation farm cost studies serve the purpose of assisting in increasing the efficiency of farm management and organisation in any scheme of planning in agriculture. The agricultural industry may be considered as rationally organised and managed only if and when the nature of the articles it produces, the systems of farming it uses and its technical methods of operation are such as to ensure the highest net return possible considering its economic location. The farm cost studies throw much light on this aspect of economic location of agriculture or the "spatial organisation" as it is called. By economic location we mean the combination of spatial factors which determine the farm prices of agricultural products and the costs of production on a given farm or in a given agricultural zone.

Another important aspect of agricultural planning in which farm cost studies serve a valuable purpose is that relating to intensification of farming. The relation between the intensification of farming and the profitability of agriculture constitute a basic element in the whole system of agri-

cultural economics. This can be ascertained only on information obtained from the operation and results of accounting of the individual farm concerned. Before working out plans for agricultural re-construction it will be necessary to find an answer to the following questions based upon the solid foundation of an empirical study of the real condition of the farm.

- (1) What is, according to the concrete data of farm accountancy statistics, the real influence exercised by the intensification of farming upon profitableness of agriculture?
- (2) What are the possibilities of further intensifications existing under different local conditions?
- (3) On what should intensification of agriculture rest under these varying conditions due account being taken of the special characteristics of the different localities?

Apart from this, the intensification of farming is not just a matter of mechanically increasing farm expenses and investing more capital; the increase must be rational and must be in accordance with the principles of scientific management. Farm costs help to judge directly the quantities of the material means of production used. The influence of the quality factors on farm returns can only be measured indirectly on the basis of accountancy results, by means of certain indices. These indices are provided by the imputation of the value of draught animals, of the relation between costs of labour, and the expenses for the purchase of seeds, fertilisers and concentrated feeds, by the net receipts per head of cattle and lastly by the consideration of certain special aspects of the relations existing between the net return and the increase in farm expenses.*

At the present time there is one other general aspect in national planning the purpose of which is served by the study of farm costs. The justification of an equitable distribution of incomes from farming among the owners or farmers, on the one hand, and the workers, the creditors and Government on the other, is being increasingly recognised. This is the result, as already observed, of the pressure of events consequent on the great progress made in transport and marketing, and a growing tendency to consider agricultural problems from the point of view of the national economy rather than from that of the farmer's private economy. The contribution made by agriculture to the economic welfare of the community, the revenues it brings in to the persons engaged in it and the return it gives on the capital invested in farming are all important facts which require to be ascertained.** This has given rise to the concept of 'social income' in agriculture and farm cost studies furnish the basic data for an accurate calculation of social income.

* Intensification of farming on the Returns of Agriculture by Joseph Desjarzes - *International Review of Agriculture* - 1943.

** Changes in the amount and distribution of farm income - *Ibid*, 1944.

The aggregate of all the incomes derived from farming is technically known as "social income" of agriculture; it represents the sum total of all the values obtained from a farm. It may therefore be defined as the expression of the creation of values. § It is calculated by adding together the wages paid to workers and employees, the interest on debts, the taxes and the farmer's income which consists of the return on the farmer's own capital and of the fair wage claimed (calculated but not actually paid out) for the work performed by the farmer and his family.

It will be seen that, once the farm accounts have been closed, the social income is very easy to compute. The social income has this advantage over other values used in determining the results of the operation of a farm that it shows the part played by the farmer and by all those who have co-operated with him for the running of his farm business. The Government does not appear here as a mere claimant, because the taxes, namely, the contribution made by the farm towards public expenses, appear as an integral part of income. The interest which has to be paid by the farmer to his creditors also forms an integral part of the income. The social income includes, therefore, the farm incomes as a whole and is not confined to an indication of their distribution according to economic, social and political requirements, as was the case with the values used in the past. It is therefore one of the most valuable means by which we can judge the results of agricultural activity from the point of view either of the private business interest of the farmer or from that of the national economy.*

Only farm costs can supply accurate data concerning the amount and the valuation of farm income. Farm accountancy alone can enable us to form an opinion concerning the extent to which underpayment in agricultural production depends on factors inherent to the farm itself, bad organisation, irrational direction of production, impractical use of the means of production and labour, lack of proportion between labour expenses and operating costs, too small area etc., or the extent to which this underpayment is related to general economic evolution, to economic policy, and to the economic system and can therefore be mitigated or eliminated only by Government action. What the farmers demand is a fair share of the national income and in order that national income estimates may be calculated on a fairly correct basis, extensive farm cost data should be made available. The purpose of farm cost studies in evaluating social income will become clear when it is noticed that the first Report of the National Income Committee in India (1951) refers to this point and observes that the problem of estimating the gross value of agricultural output is complicated by the fact that there is no census of agricultural production as such nor are there *authoritative and comprehensive studies of agricultural costs covering the entire country and all the crops.* †

§ Dr. H. L. Fench: Das Volkswirtschaftliche Einkommen aus der Landwirtschaft Berlin.

* *International Review of Agriculture*—1944—P. 34 E.

† First Report of the National Income Committee, April 1951—Page 20.

Finally from the point of view of the individual farmer, the ultimate object and purpose of farm cost studies is to reveal to him the financial position of the business of farming. It is obvious that it is only by extensive study of the economic side of agriculture by means of farm cost data that most of the problems of the individual farmer can be investigated in a scientific manner. They are an aid to the improvement of organisation of their farms and raising their income and standard of living.

As far back as 1927, realising the importance of farm costs the World Economic Conference adopted the following resolution.

"The fundamental importance of agriculture demands an exact knowledge of its situation. Such knowledge can only be gained satisfactorily through a methodical analysis of farm accounts. Such research would bring about a general improvement in agriculture. To achieve this purpose, it is desirable that in the different countries an exact system of farm accounting should be formulated. These accounts should be drawn up in every country as simply as possible, but by the method ensuring the greatest guarantee of accuracy so as to obtain comparable results for the different kinds of agricultural enterprises in any country, classified by climate, nature of soil, size of holding, systems of cultivation, principal crops grown etc. and so as to make it possible to study the influence exerted on the net return of agriculture by the factors of greatest importance in production and returns."

Section II

UTILITY OF FARM COST STUDIES AND THEIR LIMITATIONS

Some of the general purposes and objectives for which farm cost studies are undertaken have been indicated. A brief resume of the practical utility and the limitations of the same may be examined specially from the point of view of the individual farmer and his farm. Farm cost studies are at best a statistical method for assessing the processes and the results of the operation of a farm from the ordinary business point of view. The chief limitation is that cost accounts cannot be universally used since we have no facilities for dealing with a large number of farms. Financial accounts collected from a proper sample of farms offer perhaps the only method by which we can hope to get a fairly precise measure of the farming position all over the country.

The function that cost accounts can perform for the individual farmer and his farm is to aid him in the management of his farm rather than to enable him to compare the total costs and sale prices of his separate products. They can help to avoid waste and to compare the expenses involved in alternatives which may be open to him under the circumstances in which he is placed. From the economist's point of view, the compilation of cost accounts for the

purpose of trying to compare individual products costs and selling prices may in most cases be impracticable. But they may help in arriving at *marginal* costs. The analysis of costs may also be carried with further advantage in comparing prime costs and surpluses, and also the overhead charges, in respect of farms similarly situated. The comparisons may not yield valid conclusions on dissimilar farms operating under different conditions. The economist may however get information which helps him to advise farmers if he is familiar with their circumstances and environment. Cost accounting according to Dr. Warren provides only the means for comparing an exceptional farm with a more normal one. In the opinion of Dr. Taylor cost accounts should be used not as a basis of statistics, but as a means of helping the farmer to visualise his own problem. "We need to know the relative profits of the alternative crops and the relative costs of producing these crops."* The observations of Prof. Ashby on the point put in a nutshell the real use and limitation of farm cost studies. "It is not our business to tell a man how to run his farm. If we can give him information to assist him in checking up on his policy or action our functions cease. We should supply a basis for intelligent examination and criticism. When we have done that, we have done our work."**

The utility of farm costs can also be found in the analysis of why some farmers made higher incomes than others. The practices of the higher income farmers would themselves require maintenance of farm accounts or similar records. Such data of descriptive character could also be used for teaching and other general utility purposes. Besides, they provide the input-output data applicable to specific farm situations. For purposes of comparison they have to be used with caution as they seldom permit of valid generalisation. Because of the heterogeneity among the farms and the number of variables affecting net farm income, they merely show by means of cross classification the quantitative relation between the various factors that determine the farm income. The question of the critical differences in resource combinations and management practices which lead to widely different results is seldom, if ever, answered with statistical evidence.

The text books written on Agricultural Economics distinguish between three major uses of farm cost data: (1) in organising and operating farm production, (2) in selling and price programmes and (3) as a measure of economic change. The last two have been dealt with already. The uses of cost data in farm production are further distinguished as follows:—

- (a) In setting up farm budgets and pre-estimating the receipts and expenditures of alternative operating plans; and also in farm planning.
- (b) In determining the highest profit input of any input factor and the output or yield which maximises profit.

* Proceedings of the International Conference of Agricultural Economists, 1929.—P. 80.

** Ibid. P. 136.

- (c) In determining which farm practices pay best.
- (d) In choosing which kinds or types of productive agents maximise profits—animal vs mechanical (horses vs tractors etc.).
- (e) In determining what combination of lines of production maximises profits.
- (f) In determining ways of reducing costs and maximising profits at the same time.

The largest use now being made of cost data is in farm budgeting and farm planning. Professor Andrew Boss writes of this use of farm cost data as follows: Such data will serve a farmer "as a basis for making trial budgets of different combinations of his farm enterprises and forecasting probable results before settling upon his yearly production programme. In this way it is possible for him to fit his programme to probable labour and power supplies and to estimate in advance and provide for the needed feed and material requirements. Study of the results of past operations will reveal the weak and the strong enterprise that enter into his farm organisation plans and contribute to the net income. Knowledge thus gained should result in a steady improvement in efficiency of production.*

If the cost data are to serve such a purpose well they must conform to the following specifications :

- (1) They must keep physical costs and money prices or cost rates separate. Only if they are separate can they be adjusted to fit different cropping systems and farming practices, and to fit the changing prospective prices of crops, seed, fertilizer, sprays and wages of labour, from year to year. Farm budgets and plans always look to the future.
- (2) They need to be expressed per acre, per cow, and the like, more often than per unit of product.
- (3) Cost data for use in budget analysis need to be adjusted constantly for changes in technology.
- (4) The cost data for major variable inputs, like fertilisers for crops and feed for livestock, should as far as possible be in the form of a range of inputs with an accompanying range of outputs. They need to show how the outputs vary with the inputs.

The uses of cost data in production are always in farm planning either for next year's production programme or some longer time programme. Such planning must be on the basis of some set of prices. The farmer will be on safer ground if he can keep himself alert with respect to changes in them than assuming stability in prices and wage rates.

* Forty years of Farm Cost Accounting Records. *Journal of Farm Economics*, February 1945.

The advantages of undertaking cost accounts to the farmer and to the industry may be summarised as follows :—

- (1) The farmer can make direct comparisons between his costs of production and the prices he receives.
 - (2) His cost schedules show him how his final costs are made up. He can then consider modifications or alternatives from the soundest possible basis.
 - (3) By making the fullest possible use of his costs in conjunction with other farmers' costs he can make invaluable comparisons.
 - (4) The careful attention to detail required by keeping costing records is amply repaid by the increased knowledge of the farm business and the scope for increased efficiency.
 - (5) The industry has the benefit of cost figures which carry the fullest possible authority in addition to the wealth of information already enumerated which is of direct benefit to the costings farmer.
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CHAPTER III

HISTORICAL RETROSPECT OF FARM COST RESEARCH

Section I

THE U.S.A., U.K., AND CONTINENTAL COUNTRIES

In tracing the history of farm cost studies, it is not possible to decide exactly in which country the studies originated on a scientific basis. Isolated investigations on costs with different purposes have been carried out in the European countries since the second half of the nineteenth century. It would, therefore, be appropriate if a historical review is made country by country.

U. S. A.

The eighties of the nineteenth century marked a turning point in the history of the economic growth of the United States. The generation of the old pioneers was replaced by that of the modern farmers who became ever more closely involved in the meshes of a commercialized economy. World economic influences brought about a severe economic depression in the last two decades of the XIXth century with a head-long fall in the prices of agricultural staples. The adaptation of agricultural practices to the new economic conditions became the special concern of the individual farmer. The economic measures taken for achieving the desired adaptation culminated in an effort for reducing the costs of production. It is therefore not surprising that the calculation of such costs was a problem of the greatest interest to the sufferers from the agricultural depression. Consequently, enquiries were made into the costs of different farm products either by means of special investigations or in connection with researches bearing upon the technique of production (e.g., in connection with enquiries dealing with feeds, fertilisers, crop rotations etc.) for the purpose of making more accurate examinations and studies. As early as the middle of the XIXth century, the Federal Government had made some attempts at estimating production costs, but it was only in the nineties that such studies became numerous and were supplemented by those of many state boards and agricultural experiment stations.

These early enquiries, mostly made on the basis of questionnaires sent out by official crop correspondents, undoubtedly had many serious defects, but they led a whole series of men interested in agricultural sciences to concentrate upon the methods and problems of the determination of the costs of production. Thus an important step forward was made which paved the

way for the introduction of a more scientific and systematic consideration of production cost problems as a branch of the more comprehensive subject of farm management.

The year 1902 should be mentioned as a turning point in the systematic treatment of the studies on production costs. It was then that W. N. Hays, the first pioneer in the field of farm management research in collaboration with the Bureau of Statistics of the Department of Agriculture, worked out the so called "route-method" under which the same official visited daily a series of farms so as to make on the spot the enquiries needed for ascertaining the costs of production. As this method entailed considerable expense it was only resorted to as a temporary expedient but later on (in the twenties) it met with increasing approval and wider use. As the number of individual farms covered by the route method was necessarily limited, other means for farm-management analysis were tried. For this purpose the use of questionnaires was extended, the number of questions was increased, and the information thus secured was supplemented by personal enquiries made by the farmer. By these means it was possible to obtain a survey of the economic situation for a larger proportion of the farms of a given area. The introduction of this method known as the "survey method" was the contribution especially of G. F. Warren (1874-1938) who working at Cornell University (Ithaca, N.Y.) followed the suggestions of L. H. Bailey and J. Craig. After the completion of the enquiries on apple farms in New York State, by the survey method in 1903 a first large-scale farm survey was undertaken in three sections of Tompkins County, N. Y. However, it was only in 1911 that the final results of the studies could be published and the most suitable method of enquiry and the best form of questionnaire could be decided. It must also be mentioned that it was from this survey that the concept of "labour income" as a criterion of successful management first emerged.

The reorganization of the Office of Farm Management in 1919 under A. C. Taylor was followed by an upsurge in cost accounting studies and the peak was reached during the years 1919-23. Several State experimental stations and the official services of the Federal Government in Washington carried out a very large number of farm management enquiries organized according to the survey method. Of the agricultural experimental stations, Minnesota, Illinois and Cornell have most aggressively and constantly pursued farm cost accounting research. The U. S. Department of Agriculture, in co-operation with State experimental stations, has contributed to publications in this field more generously than is indicated by Departmental publications.

In the course of time many alterations have been made in the method of farm cost studies in U. S. In the initial years the emphasis was directed towards finding the costs as measured in money values on the assumption that money values will serve as a common denominator in making comparisons of costs, financial returns and profits from various crops and classes of live-

stock; that upon such comparison it would be possible to set up the highest profit crop rotation combinations and the most profitable system of farm management. Experience gained from analysis of the data recorded indicated that this measure itself was not entirely satisfactory. The factors of short term fluctuations in prices, variations in seasonal climatic conditions, types of soil and degree of soil fertility complicated the results and made accurate interpretation difficult and unsatisfactory. The measure of money cost, even when averaged out over a 3 or 4-year period, did not give a satisfactory base from which to project a good programme of farm operation. With the progress of research in the field of farm cost and in the search for satisfactory measures of cost, attention was turned towards determining the physical factors of cost encountered in farm management and operation and which entered into the making of crop and livestock products. Emphasis was laid on the physical quantities of the factors of labour, power and materials used in production with known or estimated yields and the acceptance of the prevailing prices for the determination of costs of production in any stated situation. In recent years, in the U.S.A., the original optimistic outlook on the subject of cost studies has been changed. Opinions have become much more guarded regarding the validity of the uniform application of the principles of costing. However, cost accounting studies have by no means disappeared. They still occupy a prominent place and account for about 1/5 of the total number of enquiries and studies.

It may be noted here that studies on the cost of producing farm products were initiated by old time general agriculturists, agronomists and animal husbandry specialists. The approach was naturally from the agricultural rather than the economic viewpoint. Craig and Taylor were the only economists who were at the time busy developing the principles of agricultural economics. However, the value and utility of the farm cost data to the farmers in the U.S.A. is indicated by the fact that several farm management service associations have been organised in the states where the members pay a fee in support of a fieldman and for the summarisation of their yearly record by experiment station analysts. This type of service has proved to be highly useful and popular among those wishing to increase the efficiency of operation.

ENGLAND

As a weapon for the organized study of the economics of farm management, the system of cost accounting was one of recent origin in England. Its birth coincided with the establishment of the Agricultural Economics Research Institute at Oxford with C. S. Orwin as Director in 1913. There had been earlier attempts to introduce its use to farmers as a system of farm book-keeping. The system was first proposed in the sixth decade of the XIXth century. Writing on farm accounts in 1858 Prof. John Coleman of the Royal Agricultural College, Cirencester observed: "Much has certainly been written about farm accounts from time to time, but to very little purpose, the plans

being either too diffuse for men actively engaged all day in the fields or too intricate for ordinary minds to comprehend." He had evidently in mind in making this statement the advocacy of a system of cost accounts. After enumerating some of the difficulties of the system he says, "it is impossible that men of ordinary abilities, and with much on their hands, could keep such accounts, and even when done, the probability is that the valuation would be incorrect and we would have a fictitious profit appearing in some accounts and an unnatural loss in others. Well indeed may practical men despair of keeping accounts when such unpractical systems are brought before their notice." Despite these and other criticisms Coleman saw some merit attaching to the ascertaining of cost of production.

Until the end of the XIXth century no published record appears to exist of an entire set of farm accounts worked on a fully departmentalised basis. The costs of individual enterprises found in the annual reports of the Royal Agricultural Society of England, were merely estimates of costs and were not the result of exact accounting methods. The cost accounting aspect was not however lost sight of. Dr. Fireain, writing in 1891 on the subject of 'Technical Education in Agriculture' regards book-keeping as the key to the farmer's position and stated that "a farmer who can properly apportion to the various sections of his business the shares of receipts and expenditure which belong to them has gone a long way towards solving the difficulties of his profession." How widespread was the use of a system of cost accounting among farmers in England at the time when Orwin again brought the question into prominence in 1913, is not known. However, he himself had been using the method at Wye for some years and he records the fact that several people, as for example, the Hon. Edward Strutt in Essex and Sir Daniel Hall in Sussex were already engaged in costing on the farm. The analytical method advocated by Orwin was first laid down in detail in his book "The Determination of Farming Costs" and later amplified in a second edition. This is the method mainly in use in England with some modifications.

The work done at Oxford and the system advocated by Orwin attracted a considerable amount of attention which was further stimulated by the fact that during the war, prices of corn were fixed and these were used as the basic data for taking decisions on maximum and guaranteed prices. This led to the setting up in 1918 of an Agricultural Costing Committee which was charged with the task of securing a wider body of evidence on costs than had hitherto been secured. The findings of this Committee, which were not of much importance, were made known in 1921. On the question of principles, however, it decided one or two fresh points. Cost of production was defined to include a charge for the unpaid labour of the farmer and his family at rates at which equivalent labour could be obtained in the district and also a charge for paid management, but no charge was to be made for managerial services rendered by the farmer or for interest on the capital employed. In

order, however, that results might be comparable between farm and farm, allowances for unpaid management and for interest on capital legitimately employed were to be noted separately in the cost statements.

The next development in cost accounting took place during the years 1922 to 1926, when as part of the research and advisory services of the scheme of agricultural education in England and Wales, agricultural economic officers were attached to various University and College centres to advise farmers on management problems and in many cases their activities have been devoted to the extension of costing work. With a view to securing uniformity in method, a Committee of the advisory economists and representatives of the Agricultural Economics Research Institute at Oxford and of the Ministry of Agriculture and Fisheries was set up to decide the principles and methods by which uniformity might be obtained. This Committee prepared a body of rules to which all cost accounting work should conform. They were in many respects similar to those previously suggested by Mr. Orwin and the spirit which actuated the Committee's decision was to get as near to the real cost as possible. It must not however be thought that these rules were the unanimous decision of the Committee. Dr. King in a separate memorandum submitted on the treatment of 'rent' hinted that he did not altogether accept the analytical method as a means of getting at the real facts involved in a study of farming efficiency and has since embodied his views on the whole question of cost accounting in his book "Cost Accounting Applied to Agriculture as an Aid to Productive Farming." The method Dr. King instituted involves the entire abandonment of the unit cost principle. After the early researches into costs, the further contributions in this sphere have been only in the adaptation of the original principles to specific purposes.

OTHER EUROPEAN COUNTRIES

GERMANY

In the case of Germany, farm accounting data have not been regularly made available. They are only available for the two years previous to the outbreak of the World War I, and after 1924-25. However, the value of the study is indicated by the fact that the first accountancy office was established in 1872 by Howard. Before the war of 1914-18 there were 30 farm accountancy offices engaged in analysing the accounts of 3,000 farms, most of which belonged to the category of large farms. The agricultural depression and the fiscal legislation in the post-war period gave a stimulus to cost investigation and the various agricultural organizations actively encouraged accountancy as it considered it the most effective way of helping the farmers in their struggle against the difficulties of business and life. By 1942 there were about 300 farm accountancy offices in Germany controlling the results obtained on more than 40,000 farms.

SWITZERLAND

In Switzerland the Secretariat of Swiss Peasants published the first results of farm accountancy at Brougg in 1901. Their usefulness in solving the technical problems and questions of agrarian farm policy became quickly evident and other foreign countries became interested in the Swiss method of study. Accountancy offices on the model of Brougg office were established in Denmark, Sweden, Norway, Finland, the State of Baden and Bavaria. Immediately after World War I, accountancy offices were established in Poland (1926-27) Hungary (1929), Lithuania, Estonia and later in Rumania, Scotland and Bulgaria. The statistical analysis of the results of farm accountancy commenced in Hungary in 1929. It is to the late Dr. Ludwig Juhos, Director of the Higher School of Agriculture that Hungary owes the introduction of Dr. Ernst Laurs' farm accountancy system on the basis of which investigations were carried on to ascertain the economic situation of peasant farms in the country between 1929-1938 * All these countries have done much valuable and pioneering work in the study of farm costing which has now become an integral part of their farm organization.

Section II

INDIA

While the U.S.A., U.K. and the Continental countries had advanced far in the study of farm cost accounts and the application of uniform principles and methods, decided upon to ascertain the financial aspects of the farming situation in the respective countries, there is no evidence of an organized effort to investigate this problem in this country until 1923. Whatever figures of farm costs, receipts and profits of farming existed prior to 1923 are generally found in the land records of some of the states, the reports of state departments of agriculture and the Government experimental and demonstration farms. They contain elaborate data on costs of cultivation ascertained on the rough and ready method of estimation. The ryotwari land revenue settlement of Madras is based on the estimation of net produce from the land and the Madras land settlement records abound in estimates of costs, receipts and profits of agriculture even for a period before 1860. In Bombay, the early attempts for land revenue settlement (called the Pringle settlement) were based on the determination of profits of cultivation and some of the estimates so made by Pringle refer to a period as early as 1828. Thus, though farm cost data are available for India, they have neither been collected on a scientific basis as an independent investigation with the set purpose of determining the financial aspects of the farming business nor their importance and use in improving farming efficiency have been realised. In fact research in farm organization is still in its infancy in India so that paucity of materials and

* Monthly Bulletin of Agricultural Economics & Sociology, April 1941.

data bearing on costs makes it difficult to arrive at definite and precise financial results.

In 1920, the Indian Sugar Committee drew attention to the fact that no reliable information was available regarding the cost of production of sugarcane in India and emphasized that an enquiry would be of value in deciding in what areas the sugar industry had the best chance of development and would also be of importance to the industry as giving accurate data concerning the cost of its raw materials. The necessity of keeping detailed farm accounts was discussed by the Tariff Board on Sugar which considered it a question of primary importance to give the cane grower a reasonable return for his labour and outlay, ensure that the area under cane was maintained and guarantee adequate supplies of cane to factories. Consequently, the Indian Sugar Committee put in a strong plea for the determination of reliable figures of cost of production of cane by the growers in the main cane growing tracts of India. The Imperial Council of Agricultural Research decided on their suggestion to conduct an enquiry and proposed to complete it in one year with the survey method. At the same time the Indian Central Cotton Committee found itself equally ignorant on the cost of production of cotton and requested the Council to include cotton also. The proposal was accepted and it was decided that the enquiry should not only be confined to sugarcane and cotton but should also include all the crops grown in rotation with them. It was also decided that preference should be given to cost accounting method over survey method for the collection of data. The enquiry was conducted for three crop years ending 1935-36 and the results were published in 1938. Though this enquiry was the first of its kind and an important independent study sponsored by Government providing much useful and basic data, the results arrived at suffer from the confusions and inaccuracies of heterogeneity. They furnish no information on costs even in relation to the size of holdings.

From the year 1925-28 studies in the cost of production of important crops of the Deccan were conducted with a view to ascertaining net profits or losses and suggesting economies after the end of the boom period of World War I. The Department of Agriculture, Bombay, initiated a plan of investigation in 1928 under P.C. Patil, Professor of Agricultural Economics, College of Agriculture, Poona, who for the first time attempted an exhaustive farm cost study in which opportunity costs (i.e. costs not directly incurred) are calculated and allocated in consonance with cost accounting principles avoiding arbitrary assumptions as far as possible. "The Principle and Practice of Farm Costing with Farm Studies" by P. C. Patil (1938) is perhaps the first independent publication on the subject as a whole.

In the Punjab, the Board of Economic Inquiry constituted in 1919 have been conducting a systematic series of farm cost surveys since 1923-24 which are more in the nature of a collection of specific enquiries furnishing basic data on a method chosen by them than a scientific interpretation of the finan-

cial position of farming business as a whole in the area. Besides, much valuable work has been done in India on village surveys by Dr. H. Mann, Prof. Gilbert Slater, Mr. J. C. Jack and others, in some of which, data on cost of cultivation have been obtained. Recently there have been many cost of production studies of individual crops and specific areas carried out by research workers, the most important of which being those conducted by the Gokhale Institute of Economics and Politics, Poona.

During the period of World War II with the gradual introduction of a controlled economy in the country, the problem of calculating the cost of production of crops came to the forefront as a part of the agricultural policy. In 1948 the Department of Economics and Statistics of the Government of Uttar Pradesh initiated an inquiry primarily aiming at collecting data on cost of cultivation of some important crops in certain selected villages of the State. It is understood that both at the stage of collection of data and their compilation and analysis, the need was felt for an authoritative and agreed decision on many points of calculation. However, no systematic effort has so far been made on an all-India basis to decide the methodological problems involved in calculating costs of cultivation in Indian agriculture and interpret the data on some agreed uniform and comparable method. The Government of India, it is understood, in a recent communication to the State Governments have emphasized the importance of conducting such inquiries and have also furnished them with a number of schedules for collection of the statistical material. The main features of this scheme are: (1) that the inquiry may be conducted in the villages selected for their agricultural labour inquiry employing the same staff, (2) that the cost accounting method may be adopted which means that an investigator will be posted in each village or villages to maintain the day-to-day accounts of the farm operations of selected farmers and (3) that the inquiry may cover a period of 15 months constituting a crop year. The entire cost of the scheme is to be met by the State Governments from their own funds. It is not known what action has been taken on this proposal by the latter. Actually, therefore, we are yet to make a beginning in farm cost research.

CHAPTER IV

METHODS AND PRINCIPLES IN FARM COST RESEARCH

Section I. ACCOUNTING METHOD

The evolution of methods has proceeded on two, though not clearly, distinct lines: (i) relating to the collection of farm cost data. (ii) analysis of this data according to accounting principles. The application of economic principles has received only secondary consideration.

In the early period of the studies, in order to avoid confusion, the term analytical accountancy or book-keeping by double entry has been generally used instead of the word "cost accounting." In the U.S.A. the expression 'cost accounting' though used, was certainly not understood to convey the meaning that the ascertainment of the unit cost of products and of their respective money values represented the essential feature of the method. It was taken as equivalent to double entry or analytical book-keeping as prevalent in the European countries. For purposes of clarity, the expression "detailed accounting" was suggested when accounting of all farm receipts and expenditure (in cash and kind), whether of the farm as a whole or of its separate branches, are to be referred to. This method artificially splits up the unit of the farm and affords the possibility of ascertaining not only the gross return and the production costs of the whole of farming enterprise, but also the gross return and the production cost of each of the branches of production. Thus originally only a method of accounting procedure was adopted instead of a thorough system of cost accounting as understood in the strict business terminology. Book-keeping by single entry has also been used as a method of calculating costs as it entails less expense. Under the latter only external transactions of the farm are dealt with while book-keeping by double entry covers all the transactions within the farm itself and also describes these systematically. In the case of simple book-keeping there are two different types of studies, viz., (1) that based upon the cash book and inventory and (2) the other resting upon a wider basis of information, this latter being distinguished from analytical cost accounting only by the absence of the labour journal.

The utility of analytical accountancy as a scientific method of calculating costs was questioned by early writers as Howard, Aereboe, Stieger and Nicolai. According to these writers it is not the composition of each of the branches of production which must be made clear but that of the whole organization of the farming enterprise. They also raised the objection that the book-keeping farm is always almost above the average so that the results

secured cannot afford a correct picture of the situation in agriculture. Dr. Laur tried to answer the above criticisms, observing that this question did not even arise. The main question for consideration and discussion according to him is not the principle of the estimation of the value of the products exchanged within the farm but *the method of proceeding to this estimation*. To refuse to admit the need for estimating the value of products which do not reach the market, would be to renounce any comparison between the results given by the annual balance of accounts on the one hand and those given by the calculations of the products first mentioned, on the other hand. Analytical accountancy itself is based on such calculations. The obvious fact that opinions must differ as to the form and extent of these calculations justifies the adoption of the fairly accurate method of analytical accountancy which is not bound by any special method of investigation but makes use of any of the methods according to the particular case, basing them more securely. Therefore, according to him, as an instrument of scientific investigation book-keeping by double entry is to agricultural economy what analysis is to chemistry. To the argument that it requires much more time, he points out that the alternative methods of calculation required as much time, if not more. This form of accountancy on the contrary implied the closest relation between 'costing' and 'calculation.' In the opinion of Dr. Laur when the decision has been made to give up mechanical and formal valuations and bring to each case that arises, a judgment on the value, in money, of the marketable products and of the contributions in kind we shall be compelled to give book-keeping by double entry its rightful place. The obvious conclusion is that analytical accountancy offers the best method for interpreting the results of cost investigations when once these calculations have been appropriately made.

Method of Dr. Laur

Dr. Laur devised his own elaborate and strict method of analytical accountancy which is still being used in many of the farm cost studies all over the world. In his method the necessary records to be maintained are the land register, an inventory, a journal in which is entered all the farm expenditure, a labour register for entering the labour of men and of teams and a stores or supplies book for checking the movement of materials. At the end of the working year figures relating to the same branch of production must be brought together to ascertain if there is any profit or loss. Every group and every transaction in livestock must have a separate account. In each one of these accounts which will vary in number according to the size of the farming enterprise, all the accounting operations relating to the branch in question must be entered. In entering these accounts the practical difficulties of calculation experienced are those relating to the apportionment of labour costs which have to be divided between the accounts in accordance with the particulars recorded in the labour register. The total team expenditure must be divided by the number of work days to obtain the cost per

day. All the accounts must bear a share of the labour or team costs in the proportion shown by the respective registers. Secondly, the exact distribution of the other expenses is also not possible because the products of the farm are a connected whole and the different enterprises interlock. The production costs are also closely connected. A conventional procedure was therefore found necessary to be formulated in estimating the proportion of costs to be carried over to each of the accounts. In order to allocate the share in the expenditure, reference can be made either to the work days, to the capital employed or to units of measures and weight. In many cases, however, these methods of allocation may not be also adequate. As for example, how can the production cost of cattle raising be divided between the returns in the form of milk, growth of the animals, calves, work of the animals and manure? In these cases, according to Dr. Laur, recourse will have to be had to the gross return and distribution of the undivided real expenses proportionately to the different gross returns provisionally estimated.

The closing of the accounts also presents difficulties. For the closing of one account, the results of several other accounts must be made available, i.e., the accounts though maintained separately, are closely interlinked and cannot be disentangled arbitrarily. In such cases, for the first year individual judgment can form the only basis and the value per unit of certain products are calculated utilising the figures obtained the year before or average figures. The procedure for closing the accounts is as follows :—

1. Accounts relating to crops will be closed before that of livestock transactions.
2. Costs of labour and of teams must first be known.
3. The estimate of the value of the feeds given to the work animals will have to be provisional, as the production cost of the forage may not be available earlier. The difference between this provisional value and the real costs can be established only later, and
4. Interest on debts, depreciation charges, cost of insurances and the general administration expenses will have to be calculated.

Besides the inventory and the journal which are essential records for the purpose of analytical accountancy, there are :

- (a) the account of the family property,
- (b) the household accounts,
- (c) distribution accounts, subsidiary accounts, which enable one to distribute among the different branches of production the expenditure which cannot be directly assigned.
- (d) revenue accounts, subdivided into:

- (i) production account used to calculate the return on the basis of production costs and self-balancing.
- (ii) Profit & Loss Accounts which are divided in their turn into accounts of the contributions in kind and in service, market accounts and stores account.

The balance of each of these accounts constitutes profit or loss.

Finally come the recapitulatory accounts which are made up by the single entry system and give the final results, i.e. the net return, the family capital return, the operator's income, the family labour earnings, etc. Under the method of Dr. Laur, the statistical returns which are necessary to be compiled and maintained for indicating the results of revenue or returns accounts are :—

1. the areas cultivated,
2. aggregate production costs, also per hectare,
3. quantities of seeds used,
4. man work days and team work days,
5. intensity of manuring,
6. yields in kind expressed in quintals in starch units and in cash,
7. relation between production costs and gross returns,
8. net returns,
9. profit or loss on total farm assets, and
10. the prices.

Similar statistical returns are made for livestock transaction accounts separately.

The method of calculating production costs in the U.S.A.

The method adopted in the U.S.A. is highly analytic and comprises in addition to registers, the maintenance of card indexes, bulletins and schedules. The farmer usually prepares the inventory with the assistance of a valuer. A plan of the farm in the fullest possible details is prepared by both. For making returns of the work performed two types of schedules are used. The operator on his part enters in a schedule his own work and that supplied by the workers on a daily wage, by seasonal or job labourers and by the animals. The farm workers who are regularly employed maintain a second schedule showing the daily return of the work done by them with or without animals. These returns together with the financial statements form the basic data for the calculation of labour costs. The most difficult part of the work

for the farmer is that of obtaining the returns of the feeds given to each class of livestock. For this purpose at the end of each month he fills up a sheet showing the stock numbers and the particulars of average daily ration supplied. With the figures furnished by this return, that of the purchases, sales, crops and by the inventory, the actual consumption of stockfeeds is ascertained. In addition, the bulletins contain information on the distribution of work between parcels of land and the different forms of activity, on the quantity and value on the spot, of the feeds consumed by each animal, on the crop obtained from each field, on the number of times a machine has been used for a special operation, and on all the products of the farm which are consumed by the farmer's household or delivered to the family of the owner.

The second stage is that of classifying and condensing the information contained in the above returns at the Accountancy Centres. The procedure is that of first classification and then of closing the accounts. The inventory is closed first and next the work returns are dealt with. The condensation of the data at the end of the year is done with skill to yield the following results:—

- (a) the yearly total of the hours of work of men and animals,
- (b) the monthly totals of work done by each regular worker, by the owner, by the temporary workers, as well as the totals of work done for neighbours, etc., in exchange and of work done without pay, and a comparison of the resulting position with that described in (a),
- (c) recapitulation of all receipts and expenditure and grouping them according to their origin,
- (d) quantities of feed consumed by different kinds of stock,
- (e) statement of the average number of animals of each class and of each sub-class so as to enable the calculation of the number of stock units,
- (f) assembling supplementary notes on the crops,
- (g) grouping, totalling, and distributing of labour expenses,
- (h) production accounts showing the letter designating each field, the main crop and the by-products.

The following eight measurements are joint and cannot be accomplished without the others :—

- (i) Calculation of interest charges.
- (ii) Return of the quantities and value of the feeds given to stock and of the other products consumed on the farm during the year.
- (iii) The distribution of the upkeep of buildings, etc.
- (iv) Distribution of transport costs

- (v) Calculation of the annual cost of the farm machines.
- (vi) Calculation of the labour cost of grazing.
- (vii) Calculation of labour costs.
- (viii) Cost of animal labour.

When the accounts on the above operations are closed the sums appearing on them are distributed and for this they are grouped in a distinct account known as non-classified expenses, i.e., those not directly chargeable to any operation, general management expenses.

On the receipts side, the return from each field and for each kind of live-stock is recorded. Next the calculation of profits and losses is done followed by the calculation of expenses, receipts and profit per acre and per unit, of the quantities of seeds, fertilisers per acre, of the gain per hour, of work per acre. Finally the calculation of labour costs is made and a rational interpretation is given to the whole data. As in the previous method, the first stage is that of detailed analysis and the second that of synthesis.

In both the methods it is important to note that a farm is considered as a unit for purposes of calculations of costs.

Method adopted by the Agricultural Economics Research Institute at Oxford

In actual collection, compilation and analysis of data the method adopted by the Oxford Agricultural Economics Research Institute (established in 1913) has a close resemblance to that followed by the American Offices which undertake investigation of production costs. A certain number of typical farms are selected for study and the data are collected on the following points :—

- (a) Labour of men and animals employed during the year.
- (b) Daily consumption of stock feeds classed by quality and by kind of stock.
- (c) Cash transactions in detail.
- (d) Amount of receipts and expenditure; the value of the farm products consumed by the household is reckoned on the side of receipts, as if they had been actually sold.

To these returns are added the inventories at the beginning and end of the year. On the basis of this method the Institute published in 1937 a study on the cost of milk production in England and Wales during the year 1934-35, obtaining information from 631 farms feeding in all 20,545 cows.

Method adopted by the Central Office of Farm Accountancy and Rural Economy in Paris

This method called the method of Rimailho calls for 'special notice on account of its high degree of precision. It is applied by the *Société Agricole de Comptabilité et de révision* with headquarters at Paris. Here the farmer is freed from the labour of elaborate book-keeping. His entries are reduced to a minimum. The Office of the Society extracts the relevant information from the data supplied by the farmers, makes the necessary entries and at the end of the year presents a complete accountancy result on the production costs of the different enterprises. To each enterprise there corresponds a letter with a coefficient attached, to each piece of land a figure. These figures and letters in their turn correspond to an account. Each implement has also its symbol. For registering the items "work, material, cash," the farmer uses a daily sheet on which he enters on the one side the work of the day and on the other the incomings and outgoings of materials. He also records in a sheet the wages paid to labour and the cost of the animal and machine traction. The third sheet shows the receipts and expenditure of all cash transactions. At the end of each month the farmer sends to the office the day sheets, the pay sheet and the statement of receipts and expenditure. Then it is entirely the work of the Office to assign a value to the work days and the quantities of materials utilised, then in distributing the outlay of work, of material and of cash between the different accounts opened in the course of the year. These two operations are carried out simultaneously. All the work days being classified in each account, the number of work days of different categories of workers and of draught animals during the month is totalised and the cost of the work day is calculated. Each work is assigned the value corresponding to the unitary cost of the work day of the worker or draught animals, then a value is given to the quantities of materials utilised during the month which are then grouped by account. Next, the expenses of the month in labour, materials or in cash are transferred to the ledger. At the close of the year for each account is added the total of the expenditure in subsidiary work, materials and cash; the total of the subsidiary accounts is distributed over the production accounts according to certain rules before the final production costs are calculated.

Method of Uniform Reduction

This method which is in general use in a number of countries is particularly followed by the Accountancy Office at Soissons. In this method it is possible to calculate production costs without the necessity of keeping accounts by double entry. A beginning is made by taking the difference between the gross return and the aggregate costs of production (farming expenses plus interest on capital) i.e., the profit or loss on total farm assets or of the actual profit expressed as a percentage of the gross return. The figure.

obtained is used as a partial check on the price which the farmer has received for the products sold. The production cost of the different products is equal to the sale price realised multiplied by this coefficient. The costs are distributed uniformly over the components of the gross return.

The advantage claimed for this system is that every time it is desired to make an enquiry dealing with a large number of farms, since the figures obtained balance there is no place for any subjective estimates which are the weak point in analytical book-keeping. But the one limitation is that the method of uniform reduction gives satisfactory results only on farms directed exclusively to two or three enterprises. It cannot be applied in the case of more complex farms as it cannot give full value to the more productive branches where the margin between returns and costs is larger.

Among the principal methods followed each one may be suitable for particular types of farming or a combination of methods may have to be chosen according to the local factors or environment. Book-keeping by single entry may give satisfactory results for small or medium sized farms; similarly, book-keeping by double entry for large scale cultivation. The method of Dr. Laur is of course the most strict one and conforms to all principles, and is characterised by a high degree of precision and objectivity. As ultimately the work of analysis and final calculation of production costs will rest upon the departments of Government or other institutions especially constituted for the purpose, it is the one method that can be adopted with suitable modifications and which combines in itself the advantages of presenting an accounting procedure as well as a method of calculation of data based on estimates and derivations.

Clip-Card System of Book-Keeping

A new system of recording farm accounting has been suggested by Mr. A. L. Jolly* to minimise accounting labour. The author has developed a clip-card system of accounts which he claims is a flexible system and can be adapted to various types of farms. The system consists essentially of double entry accounting on statistical cards in place of the double entry conventional procedure of noting the value of the transactions in both the appropriate accounts. On the card this value is entered once and the two accounts are identified. The cards are perforated round the edge to permit clipping. All the transactions worth noting can be entered in a uniform way on the cards. The obvious advantage of the use of this system is a more precise appraisal of the transactions. Every card demands clear-cut decisions. The disadvantage of the system is that the scope is so wide and the possible useful applications on a particular farm so numerous that at the outset the farmer may be tempted to include too many details; but if he has complete control

* "A New System of Farm Accounting"—A. L. Jolly. *Journal of Farm Economics*, Aug. 1948.

over the accounts he is keeping the burden in entering details would be much simplified in this new form of farm book-keeping.

Section II

METHODS IN COLLECTION OF DATA

In the previous section we have dealt with the analytical methods employed in the calculation of farm costs. In the collection of primary or basic data the investigations in the United States and other European countries reveal that the research worker has at his disposal four well organized methods, namely :—

- (i) farm business surveys (by personal investigation, the route method, mail questionnaires, enumeration by census, detailed surveys, etc.),
- (ii) the farm financial and production records,
- (iii) detailed farm cost production studies,
- (iv) enterprise cost of production studies.

In addition, there are various intermediate methods combining the features of these methods, adapted to specialised cultivation projects.

The Representative Method

The various methods used however have their basis in varying degrees in the representative method which constitutes the essential basis of scientific estimation and plays a particularly important part in the methodology of statistical research. Where it is not practicable to have precise statistical data regarding all the different branches and aspects of agriculture and agricultural operations for the whole of an area or zone it is especially important in connection with questions bearing on price, consumption of agricultural products, upon costs and returns, to use the representative method exclusively in order that the estimation based on samples may be fairly accurate or may have a low margin of error. A resolution passed by the 16th session of the International Institute of Statistics (Rome 1925) in connection with the report of the Commission on the representative method included the formal definition of the two basic forms of the representative method viz., the random sampling and the purposive selection methods. According to the Commission's report the method of random sampling is only applicable where the circumstances make it possible to give every single unit an equal chance of inclusion in the sample. Its particular advantage lies in that one can always be sure of the degree of accuracy with which one is working as any precision required can be obtained by including a suitable number of units in the sample. Its weakness on the other hand lies in the difficulties of carrying out in practice the strict rules which are demanded by the application of the law

of large numbers. Regarding the method of purposive selection the report considers as its advantage the fact that it is capable of being applied to practically every field of research even where the conditions of selection at random are lacking.

Apart from its purely statistical function, the representative method constitutes an essential instrument of empirical economic research fulfilling two principal functions of which one is that of permitting estimates to be made of certain quantitative or qualitative characteristics of economic collectives and of changes taking place in these characteristics and the other that of investigating the structure of such collectives. An example of the two types of functions can be gathered from the application of this method to the collection and analysis of cost accountancy data in agriculture. The commission on the representative method referred to above however took a pessimistic view of the possibilities of application of farm accountancy data in the investigation of the economic problems of agriculture. The report observes :

"Such investigations, which as a rule, are due to private initiative or undertaken under the auspices of agricultural organizations are, however, compelled to work on a very slender foundation, namely, comparatively few working accounts which could be procured through voluntary channels. It will always be possible to dispute whether and to what degree this account material can be regarded as being representative and this must naturally to a great extent reduce the usefulness of the results."

Looking to the distant prospect of being able to procure mass material consisting of work accounts in such quantity and quality that real representative investigations can be made, the problem arises whether we cannot recommend the use of the representative method as the most practical one within the limit of the accuracy of the results that can be made possible. It is with the clear recognition of this limitation that the representative method is now widely used with variations even in farm accounting research.

Application of the Representative Method

In order to ascertain the degree to which farm accountancy data, which are naturally available only for a relatively very small proportion of the total number of farms, should be considered as representative samples of the whole, specific investigations have been carried out in many countries on the Continent. The earliest of these were in Switzerland by W. Pauli in 1913, who, on the basis of the results of farm accountancy for the year 1909, examined the problem of the representative nature of the available data in connection with the determination of the cost of production. The main question was of the size of the samples which ensured sufficient precision of the results. The method adopted was that of measuring the stability of the series. The results of the investigation revealed that when dealing with

costs of production of a homogeneous group of farms such as dairy farms, sufficiently stable values of the averages of the samples could be reached with samples comprising no less than 15 farms. When dealing with an aggregate consisting of heterogeneous elements, i.e., with farms engaged in different branches of production and different systems of farming the samples, to possess sufficient stability, should comprise no less than 100 farms. Therefore, the Swiss researches at Brougg have generally been based upon a combination of random sampling and purposive selection.

In Czechoslovakia a very thorough examination of the representative character of the results of farm accountancy was carried out by Stanislas Kohn using the same methods. The general conclusion arrived at by Kohn was that the value of farm accountancy data as material for economic research was unavoidably, somewhat, compromised by the fact that, as a rule, the farms whose accounts are available naturally represented a group of higher efficiency than the average so that the generalisation of the conclusions arrived at by the representative enquiry based on such a sample required great circumspection and the taking into consideration of various relevant factors.

In Poland Mieczyslaw Sowinski who carried out important investigations on the same lines strongly emphasized the importance of what he calls the 'typological method' as distinguished from the usual representative method. According to him too much attention is paid to the increase in the number of farms whose accounts are used in the research and too little to the essential factor of the proper choice of typical farms. His careful analysis of the results of the existing accounts of farms in Poland led him to the conclusion that these results showed a dispersion which should be considered as excessive and that precisely because the selection of farms was based on the wrong principle and could not secure the representative character of the results. Therefore on the basis of his enquiries he advocated a method of selection on farms which would combine the typological principle and that of random sampling half the total number of accounts to be used being chosen according to the typological characteristics and the other at random. It should be noted that some such combination is inevitable and is actually adopted in practically all the representative investigations on farm accounts, as, though the principle of random sampling is generally recognized as possessing theoretical advantages, the nature of the material and the character of the object of study make its exclusive application impossible and necessitate a deliberate sifting of the data.

Finally as a result of these studies and the enquiries made by Josef Deslarzes of the Bureau of Agricultural Economics and Sociology in 1933 and 1942 on the material available for various countries the following general conclusions on the use of farm accountancy data in empirical economic research were reached :-

1. Farm accounts constitute a unique source of material for economic research in the sense that there exists no alternative possibility of investigating the details of the structure and working of the agricultural industry.

2. When compared to the survey method, the entries in farm accounts are absolutely genuine figures; besides, they have the advantage of being less costly and giving a more extensive and more reliable information.

3. The particular objection to the use of farm accounts is that the practice of exact book-keeping is more or less confined to those farms who manage their business on more rational lines and their efficiency is, therefore, above that of the others, so that this fact alone renders farm accountancy data incapable of serving as representative sample of the structure and conditions of agriculture in general.

4. While it must be admitted that this objection carries much weight it is clear that with the gradual expansion of the practice of farm accountancy it tends to lose some of its strength. This is proved by the rapid expansion of book-keeping among the peasants in most of the European countries and in the U.S.A. Further the fiscal methods used by Governments have contributed to this extension by making income-tax and other allied assessments adjustable on the basis of the book-keeping entries of the tax payers. The agricultural depression, by the emphasis it puts upon the necessity of exact calculation of the relations between prices and costs as well as the development of active marketing and price policies by Governments, also acted in the same direction.

5. Again the objection referred to above is valid only in connection with certain problems particularly with the actual condition of the country's agriculture at a given moment. It falls completely to ground in connection with numerous other problems concerned with the dynamics of agriculture and with the influence upon it of various measures of intervention and of other external factors. In fact, here the fact that the available farm accountancy data are obtained from farms which on the whole are better managed than the average and that therefore they possess greater elasticity in their adaptation to changed conditions may even constitute a definite advantage because the effects of the factors investigated may come more clearly into light in their case than in that of the more sluggish mass.

6. As to the method of selection of the sample, while the advantage of random sampling should be recognized from the theoretical point of view in the investigations in which farm accountancy data constitute material for the sample, the method of purposive selection should be preferred. Considering the nature of the material and the relatively limited number of farms for which it is available the question of suitable controls and that of the minimum number of units necessary to ensure the sample sufficient precision is equally

important. Therefore, as a rule, a purely mechanical combination of random sampling and purposive selection though it has been recommended and used, is neither expedient nor rests on any valid theoretical grounds. On the other hand, 'randomization' of the samples formed by purposive selection such as that suggested by Neyman is seldom possible in the case of farm costs, as the number of farms is mostly too small to prompt this stratification of the sample. It would appear therefore that the best results can be achieved by straightforward purposive selection on condition that it is checked by suitable controls and based on a good acquaintance on the part of the investigator with the general structure of the agricultural industry in the country or region concerned.

Section III

GENERAL ECONOMIC PRINCIPLES APPLIED IN FARM COST CALCULATION

There are certain economic principles under which costs are calculated. But their application is seldom made clear separately. Some of them are concerned with the fixation of cost structure with reference to the specific purpose for which costs are calculated, as for example, price policy, rather than with the actual internal problems of the farm in determining costs.

Marginal vs Average or Representative Costs: Whether in cost accounting studies in agriculture, the principle of marginal or average costs should be followed, has been a subject for much academic and fruitless discussion. As they have no bearing on the internal organisation of the farm it is not necessary to discuss under costs, as has been done, the theoretical abstractions of the relative principles. For the purpose of calculating the costs of cultivation purely from the point of view of improving the efficiency of farming enterprises through effecting economies, the question of marginal costs versus average or representative costs has no particular relevance. Both the principles have their practical value when related to the specific purpose or the object of a State in fixing prices for agricultural commodities under a defined policy. In the normal run the price recommended for any commodity must serve the dual purposes of adequately remunerating the farmer and acting as an incentive to increased production of that product. Where the object at the moment is to give a stimulus for increased production through price increase the marginal principle may be applied and where the price is to be fixed at a level which will not unduly hit consumers the average cost or representative cost principle may be applied. It is purely a question of reconciling the conflict between the interests of producers and consumers in Government's price fixation policy which will depend upon factors other than purely economic. In general, in the case of countries like India, where subsistence economy on family farm basis still dominates the greater part of agricultural activity, with intensive application of labour and low application of capital,

the aspect of either total cost, or marginal cost, or average cost loses its dynamic significance as there is no question of retrenchment, or decreasing production in the case of losses or expansion or increase in production in the case of profits.

Bulk Line Cost: With reference to the average cost of cultivation on account of the difficulty experienced in finding a useful and reliable figure of average for fixation of price, etc., the modern theory has accepted the principle of 'bulk line' cost, i.e., prices are to be fixed at a level, not of the highest cost, but at that unit cost where the largest volume of the goods can be produced. This theory is also not free from limitations. It is sufficient to know that bulk line has been determined in the past through the use of the cumulative curve, i.e., the curve showing the percentage of the total product produced at a definite cost, but there has been no agreement as to what percentage of production should be covered by the price expected; while some think that it should be as high as 85% of production, others would have it at a lower figure. Besides, the fact that there is a large variation in costs between different farms in the same year or period of accounting and that costs change from year to year in the same farm limits the possibility of arriving at a satisfactory bulk line figure.

Alternative Price System: In the American agriculture the economic principle of 'alternative price system' of charging cost to a given enterprise has been widely used in order to enable farmers to make the best choice among the different methods of production on the different farm enterprises. By 'alternative price' is meant the price that could have been obtained for the commodities or labour put into the enterprise had they been disposed of in some other way opened to choice at the time. The alternative price, rather than the actual cost of the home produced commodities going into the production of another commodity was used because only by that method it is possible in cost accounting to arrive at the relative profitableness of the different enterprises involved in the farming business. The use of this system serves to separate each of the major enterprises so that each might be judged on its own merits.

Physical vs Money Basis: The expression of cost of production in terms of hours of labour, bushels of seed or grain or on such local terms of measurements are possible but burdensome and difficult to apprehend quickly as the farm operators interchange the different forms of power and capital with labour. Cost accounting can be made more serviceable to them in the analysis of their business conditions if all the costs are reduced to a common basis and expressed in monetary terms even though actually many of the cost items involve very little direct cash outlay. But figures of money cost of production are inherently untrustworthy. The proper valuation of those items like farm labour, animal feed, home-grown seeds

and other produce is so difficult that it often explains much of the variations noted in the cost calculations. The difficulties are summarised as follows by Merill K. Bennett :—

“Farm cost of production, whether money cost or quantitative cost, vary widely from farm to farm and area to area in the same year, and from year to year on the same farm or in the same areas. It is erroneous to suppose either that farms in a homogeneous area incur uniform costs or that the low cost producers of one year remain low cost producers in the next year. Variety, not uniformity is characteristic of farm cost of production. Consequently, average costs are not to be accepted as representative and conclusions drawn from comparison of average cost are usually questionable. There is reason to believe though conclusive proof does not exist, that both differences and changes in costs are due quite as largely as to uncontrollable natural causes—weather, diseases, and pests affecting costs through yield, as to causes controllable through good management.

Money cost of production can be compiled only by the adoption of certain arbitrary rules of accounting procedure. As is observed by many workers in the line, joint products are so numerous in agriculture that allocation of costs becomes a serious problem. Non-cash items predominate in agriculture and valuations have to be made on a certain basis.”

Therefore, in addition to the process of reduction of costs to money basis, quantitative measures will also be necessary to determine how the costs will vary under different price levels from period to period and from year to year. The farm operator in using the cost data for determining the organization of his farm must obviously take into consideration the ways in which farm practices have changed since these data were gathered in so far as such changes affect the relative amounts of the cost factors involved in performing some farm operations.

CHAPTER V

CLASSIFICATION OF FARM COSTS

Before proceeding to pose the methodological problems arising in the definite fixation of the content and quantitative determination of the various elements that comprise "farming costs" and the inter-relationships between them it is necessary to classify the elements of costs under certain broad and accepted principles:

Usually the classification adopted is :

- (i) Combined or total cost vs Single input costs, like feed costs and labour costs.
- (ii) Combined costs or Unit costs. Unit costs may be per unit of output or per unit of some input factor, such as per acre of land, per pair of bullocks, per cow, etc. Ordinarily, unit costs refer to costs per unit of output unless otherwise specified.

Over and above these broad classifications they are divided into Fixed or Overhead costs relating to fixed capital or investments and Prime or Variable costs. A further distinction is made between cash or out of pocket costs or non-cash or imputed costs. Imputed costs are those for which no direct cash expenses are made and, for which, if the money costs are to be derived some value must be imputed. The term 'Joint Costs' is again used to refer to costs of products which inescapably arise from the same production process like cotton and cottenseed or milk and meat. Some economists also use the term 'supplementary costs' when two or more products use the identical productive agent at different times during the year. Much of the use of human labour, bullock labour and machines on diversified farms come under the category of 'supplementary costs'. If the costs of productions are projected to include marketing costs there is need to distinguish between the necessary, historical and fair price costs. Usually farm accountants prefer the application of historical costs in connection with selling programme and prices. Historical costs mean costs incurred in the past in respect of such process or items.

In this chapter the discussion is confined to general principles of classification and the other details are dealt with at the appropriate places where the cost elements are examined (See Chapter VII). The prevailing conditions in the agricultural economy of the country, the systems of ownership or tenures and the diverse types or methods of farming determine the cost structure. The elements of costs vary according to the basis of classification of farms. For purposes of simplification the cost structure may be studied under (1)

ownership cultivation, (2) tenant cultivation, i.e., farms taken under different systems of lease. The case of smaller groups of tenant-land owners and owner-labourers may have to be decided according to the degree of predominance of land ownership or tenancy in the farm. These may be omitted from consideration if the size of the unit for calculation is too small.

FIXED OR OVERHEAD COSTS

In agriculture the overhead costs bear a high ratio to prime costs and their importance should be well recognized. This explains why agricultural output is often inelastic and reacts to price changes differently than industrial output. In the long period, possibly, if the price does not equal the average cost on the marginal farm, the farmer may dispense with as much of each of the factors of production or may himself change his occupation. This is not certainly true in the short run as some overhead costs have been incurred in the past which he cannot modify or avoid when he decides on his present output or even if he ceases to produce. He has control over only the prime costs which he can decrease or avoid according to his decision on contracting output. The dividing line between prime and overhead costs is the length of time or period allowed. In the *very short periods* the costs which can be avoided are: (i) the expenses of marketing the produce, such as freight charges, middleman's commission, etc., and (ii) the cost of labour employed in harvesting. These costs will therefore be the only prime costs and the rest, having been incurred already or must be incurred whatever be the output, are the overhead costs. In the *ordinary short period*, in addition to the above two elements of costs, it would be possible to avoid: (i) if not all, most of the hired labour, (ii) the purchase of feeding stuff for the livestock, (iii) purchase of fertilisers, (iv) purchase of fuel for power driven machinery, if any. In the *period of middle length*, costs such as the purchase of breeding stock, if they are bought, the cost of labour and feeding stuffs in rearing them, the purchase of machine and equipment can be gradually cut down though these are independent of output in the short period. In the case of the owner cultivator, the costs which must be termed overhead, in any except the long period, are those incurred in buying the land, the expenses of draining and servicing it, and in putting up the farm buildings.

Whether the element of the earnings of the farmer and his family should be considered as overhead or prime costs is to be determined. As the farmer is indispensable for running the farm, his earnings are treated definitely as overhead costs in the very short period and prime costs over a longer period, when the farmer and his family have alternative opportunities for employment available. Even in the short period, the earnings of the farmer and his family are on quite a different basis than the other overhead costs as even though the farmer may not wholly dispense with his or his family's work on the farm he may vary the output by altering the amount of work they may do.

In the calculation of farm costs the expenses necessary to be incurred or incurred in bringing back to cultivation the land which has been left uncultivated over a period is also taken into account. This type of land deteriorates in the sense that it grows weeds and bushes. To bring it back to cultivation the farmer has to incur certain costs. The importance of such costs to the farmer depends on his expectation of a future recovery in prices. If he hopes so, the practice is to deduct this extra cost from the prime costs. This is in contrast to the practice in industry where the machine deteriorates more when it is in use than when it is idle. Therefore the cost of this deterioration is added to and not subtracted from the prime costs.

PRIME OR VARIABLE COSTS

The relative importance of overhead to prime costs differs from country to country and from farm to farm. As a rule, where farms are of large size and are at the same time specialised and where the employment of hired labour and purchase of stock and material are high the prime costs will be considered of great importance. In an undeveloped and under-developed economy where the size of farms is small, farms are owner-operated, hired labour is used sparingly, home-grown produce only is used for feeding livestock, for manuring, etc., the overhead costs are more appreciable. Thus overhead costs tend to be higher in small scale enterprises of farming, as in countries like India, whereas prime costs are relatively higher in English agriculture which has a larger ratio of farm labourers to owner-cultivators. On a calculation made in the Western countries it is found that in a peasant farm where all labour is family labour and farms are generally integrated, prime costs are very much less than half of the total costs and sometimes even probably less than a quarter.

The importance of variations in the proportion of prime to average costs may also be noted. They affect agricultural output in two ways: (1) by altering the number of farmers engaged in agriculture as the prices fall and (2) by determining the changes in the amount produced by each farm. Due to the peculiar nature of the agricultural occupation, when prime costs are only a part of the total costs, prices may have to fall very substantially before the farmer gives up the occupation. The shorter the period allowed fewer the items that would be included in prime costs and therefore it is less likely that the farmer would give up his farm. Even in the case of a price rise, except in the extreme case of a system of completely organised commercialised farming, it is only very slowly that the number of farmers can be increased. As for the effect of overhead costs on the quantum of production, they have no relevance to the farmer's decision on current production. He will take into account only the relationship between receipts for his product on the one side and on the other his prime costs and the efforts he and his family will have to incur as he varies his output. If prices fall, the farmer may dispense with only those marginal units of his hired and purchased factors of

production which are a small part of the total costs; the savings open to the farmer through decreasing the output are small, with the result that the output is not likely to contract much. Similarly when prices rise there may be some increases in output through hiring or purchasing of more prime factors; but due to the operation of the law of diminishing returns production may not increase appreciably.*

ELEMENTS IN FARM COSTS

Turning to the elements in Farm Costs, the very first problem in farm costing is the valuation of the total assets of the farm and the expenses of servicing land and other physical capital, as machines and equipment. Though a quantitative inventory of the capital items can be made with exactness the real difficulty arises when a fixed value has to be set against each item, as generally no records of actual purchase costs are kept and no other source is also made available for determining the exact cost of, particularly, land.

The cost of servicing land and capital equipment and charges of a capital nature are included under overhead costs. These are rent, interest, depreciation and maintenance charges on fixed capital, rate of obsolescence, insurance charges, taxes and rates, organization and supervision charges. Under prime or variable costs are included the charges of labour, manure and fertilisers, seed, the part of feed and fodder that goes into production. There are a series of agricultural operations differing with the type of farming and the nature of cropping and the breakdown of the cost elements according to these operations is necessary and will be indicated later. In addition, the expenses of marketing and distribution are added under variable costs.

* Vide Economics of Agriculture by R. L. Cohen. page. 101.

PART II

INDIAN AGRICULTURE AND FARM COSTS METHODOLOGICAL PROBLEMS

CHAPTER VI

INDIAN AGRICULTURE AND FARM COSTS.

Section 1.

CONDITIONS IN INDIAN AGRICULTURE

It is well known that farming differs from other occupations in several ways. Crops and livestock are biological products which take time to grow and mature. There are also natural hazards in farming viz., weather, insect pests, diseases and other factors which affect the growing conditions of both crops and livestock. Fire, floods, tornadoes, grasshoppers, locusts, drought and many other disasters are all common factors affecting agricultural production and income. While the difficulties of applying commercial costing principles to agriculture as a business unit is by itself a difficult process, the problems of calculating costs of cultivation in Indian agriculture are complicated by the peculiar characteristics of the agricultural structure and farming methods adopted by Indian cultivators under diverse systems of ownership and land tenures.

One distinguishing feature of the agricultural economy of this country and that of the U. S. A. and of the U. K. is that in the case of the latter farms have emerged as commercialised enterprises and are the creation of the modern industrial system. This is also true of the large capitalistic estates of Latin America which are dependent on native labour for cultivation and development. The pattern of agricultural development in these countries has followed the demand of the world market for agricultural products and have consequently been organized for the purpose of meeting such demand. As such farming for these countries is an essential business proposition, i.e., a business venture to be started or abandoned according to the prospects of profits or losses it offers without any special bonds grown out of tradition by the size and constitution of holdings inherited from the past or the age-old methods of cultivation. In such farming enterprises it is easier to apply scientific principles of costing and evaluate the results. But in India and other under-developed countries, where the system of subsistence farming is predominant, land utilisation has not reached a point of scientific adjustment. The structural mal-adjustment in agriculture when compared to the other sectors of the whole economic system is one of the major factors preventing maximum utilisation of land. It is necessary therefore to focus attention on the primary problem of increasing the size of the subsistence farms and improving their organisation. It would be then possible to introduce successfully the rationalised methods of agricultural development. The

application of accounting principles can also assume a practical value only at that stage when the unit of agricultural operations satisfies the minimum requirements of scientific costing.

In the present set-up the main problem is to find out a scientific and rational method by which, under the peculiar conditions existing in Indian agriculture, costs of cultivation can be calculated on a comparable basis. Primarily, this would mean the examination of the degree of accuracy that can be claimed, under these peculiar characteristics, for the cost data that are necessary for analysis. Indian Agriculture is still a way of living, the farm being a family home than a business unit. While in other countries substantial help is derived from the notes and memoranda kept by farmers, such notes and memoranda are absent in this country. While the number of literate farmers is small, even the educated among them have not cultivated the habit of following the economics of farming and keeping a regular account of farm operations to that end. The investigators have, therefore, to rely almost entirely on the personal knowledge and memory of the farmer for the determination of various cost elements in his past operations. However, it must be admitted that though this is a very serious handicap, the one relieving feature is that, the farmer is usually intelligent enough to be able to recapitulate quite clearly the details of his dealings and his operations. In India it would be the function of the investigator or agricultural economist for some period of time to compile these data from the facts gathered from the farmers and prepare the analytical summary of the farming operations and derive the cost elements.

For purposes of scientific calculation and international comparison where possible, we have to choose the term 'farm' as the unit of agricultural operations. But cultivated land in India is seldom classified into or spoken of as farm. The main reason for this lies in the absence of many of the characteristics usually associated with typical farms in Western countries. In this country the agricultural units are not compact blocks fenced on all sides and are not operated with proper and systematic attention on costs and profits, systems of rotation and grouping and fertility of lands. There are only subsistence farms, the tiny fragmented holdings cultivated with considerable difficulty by the farmer to eke out his small livelihood. Some of these may of course comprise large areas and include even some big estates. There may also be some units with the characteristics of farms of Western countries, but by and large, the largest majority of these may be called only 'subsistence farms.' The point to be decided in calculating the cost of cultivation is whether farms as understood in other countries is synonymous with holdings in India. Though an assumption of synonymity may serve the practical purpose of our study and simplify the method the distinction between the two must not be lost sight of. It is assumed that the agricultural economists are familiar with the different concepts of the farm as understood, in the West. For purpose of cost-studies in India the term 'farm' may be used with a clear

and comprehensive definition, indicating the type of production, area, tenure the amount and kind of labour employed, nature of ownership and machinery and equipment used.

In the method and technique of farming adopted in India there is hardly any specialisation in its different branches. In the majority of cases the farmers do not follow a proper and conscious system of rotation; the scope for it is also very limited. Only 20.2%* of the total cultivated lands in India enjoy irrigation facilities of some kind or other so that mono-culture or single cropping is the usual practice. In consequence, the dependence on a single crop increases the risks of loss on each farm. Under existing conditions what is technically called "full utilisation of lands in each farm" can hardly be achieved. Inadequate and uneconomic utilisation greatly increases the production costs in farms even though their sizes may be fairly large. Besides, the cultivators in India follow the practice of maintaining animal stock in excess of the requirements of the farm capacity, at least a pair of bullocks and a cow, sometimes supplemented by other animals like goats, hens, etc. These animals form part of the farm and they are mostly maintained with the products obtained from the farm. This practice may serve to reduce a part at least of the cost of production in the use of tractive power. But actually as the animals are not properly fed and maintained, the yield or return from these animals is normally low and therefore they remain to the farm a permanent liability instead of a profitable asset. Similar is the case with the draught animals which are fed on meagre and unbalanced diet resulting in weakness and inefficiency. They are poor in working capacity which is an important factor limiting the economies arising from an increase in farm size. All these internal factors in Indian farm organization affect the cost elements, increase the ultimate costs to a very great extent and lower the efficiency of the farm. Our primary object should be to take note of the inherent limitations of an unorganized and non-commercialised agriculture and attempt a simple and uniform method for (1) collection of cost data, (2) scientific interpretation of the component parts of cost structure and (3) devise ways and means of educating the farmers in following the method determined as suitable for cost calculation.

The above purposes will be served if unanimity of agreement is reached on the following points : —

1. Definition of farm costing,
2. the number of cost elements to be included,
3. the method of valuation used in each element of cost,
4. the process adopted in allocating various elements of cost, and
5. general method followed in collection of cost data.

Even if agreed conclusions are reached on the points referred to above they cannot be deemed as applicable for all time. With the general deve-

*The percentage for un-divided India was 24.5.

lopment of agriculture on sound principles of organization and management, with the introduction of legislation affecting ownership and tenure of land, with the adoption of modern methods of cultivation and introduction of mechanization, the elements of cost will change and the interpretation of certain basic terms will have to be modified suitably.

Section II.

APPLICABILITY OF METHODS TO INDIAN CONDITIONS

In Chapter IV the various methods that have been followed in the study of cost of production in agriculture in the advanced countries like the U.S.A. and England, as well as other European countries both in respect of the analysis of cost data as well as the collection of basic or primary data have been extensively summarised. The two questions which arise are whether uniformity in method can be achieved for the purpose of cost accounting studies in agriculture in India and whether any one of the methods described above and adopted in Western countries will suit our purpose and object. There is a wide divergence of opinion among economists, statisticians and field investigators in India regarding the advantages and suitability of the methods referred to as applicable to conditions here. The present magnitude of illiteracy among the peasants, the prevailing habit of not keeping any accounts, and the conservative attitude of the peasant in not disclosing facts, compel one economist or investigator to advocate and choose the cost accounting method as the only one suitable and another to choose the survey method. The investigations so far carried out in this country have been based either mostly on the survey method or on the combination of the survey and some form of accounting method. Ultimately it is the method that is chosen that would reflect the accuracy of the data and analysis of results. A stage has been reached when the old haphazard method of studying farm costs should be given up and the need for selecting an appropriate and uniform method should be recognised.

The virtual absence of recorded data in the form of notes and memoranda and the complete reliance on the memory of the farmer for his past operations may not present a serious handicap if the investigator has prepared a scientific schedule of questions that would cover all the items to be included in the cost of production. The farmer usually remembers individual items and can enumerate them precisely if questioned one by one. He gets confused only when he is questioned about a number of separate items in one calculation or about the total costs. Defects in the structural organization of Indian agriculture, the small and fragmented holdings and the variety in ownership and tenure may create difficulties for the investigator in following a single method for extracting precise details of cultivation expenses from the farmer. It is also necessary to keep in view the possible changes that may be effected in the structural basis as well as the operating or functional part of the agricultural system by the various measures of agrarian reform adopted and proposed for improvement of agriculture. Under the present

conditions, apparently the survey method which has been actually followed in the studies of Indian agricultural economics, has no doubt certain advantages of comprehensiveness, cheapness and expeditiousness. Certain modifications have also been suggested and made in this method, regarding the spreading out of the time during which a certain investigation is carried out and increasing the number of visits made to the farmer by investigators. In other countries the investigators visit farms and get the entire schedule filled usually in one visit. Experience in India has shown that the work cannot be satisfactorily carried out equally quickly. In the absence of recorded data it is necessary to adopt many devices to ensure accuracy by means of personal questions and cross-questions during periodical visits.

The survey method with all its modifications and forms, may not be the reliable one for obtaining a dependable and full picture of the cost-position in the agricultural industry. Now that cost accounting in agriculture has developed as a separate branch of science and full details and exact analysis are required for the purpose, the survey method can be followed only with the full cognisance of its inherent limitations. (See Chapter IV). It is true that in order to make quantitative estimates, both representative and precise, the measurement should be made on a sufficiently large number of units selected at random from the population and from the tract to which the results are to apply. Therefore the problem in India will be first one of collection of data on a representative basis. A detailed cost accounting enquiry would be prohibitively costly and this cannot be undertaken on a wider scale but to ensure reliability in results for the specified objects in view this is the only method that can be safely recommended. In order that the representative character of the units examined may be ensured we may profit by the methods of research followed in other European countries where the system of farming is more or less akin to that in this country, namely, that of peasant farming. For some length of time, until the farmers have been educated and have been enthused in the art of managing farms on a scientific basis applying commercial principles, rendering the maintenance of farm accounts and records possible the work of actual analysis and compilation of farm cost data and statistics should naturally devolve upon specialised institutions or persons that may have to be specifically appointed for the purpose. On this assumption, the obvious advantage lies in choosing the purposive selection method or the typographical method as adopted in Poland for the purpose of gathering cost data in India. When the country is sufficiently advanced in the field of agricultural development and when there has been a reorganization of the structural basis of the agricultural industry on economic criteria with economic holdings which would yield comparable units for purposes of calculating the cost of cultivation, the random sample method will serve the purpose. With regard to the method of analysis, for the same reasons, we may profitably adopt Dr. Laur's method with suitable modifications to make it simpler. It would be futile to hope at this stage that any method that is advocated can be directly applied by the farmer himself.

At the Twelfth Conference of the Indian Society of Agricultural Economics (1951), some Economists have suggested the adoption of a carefully planned stratified random sampling method as desirable for purposes of collection of data. The objection to and the limitations of this method have already been referred to (See Chapter IV—Sec. II). It has also been suggested that the survey method should be tried in the areas in which crop-cutting experiments have been sanctioned by the Government of India. The plan of sampling adopted for that survey is the stratified plan of random sampling with the taluka as the strata, the village as the primary unit of sample within a Taluka and a plot of 1/100 acre as the ultimate unit of sampling, within a selected field. Three fields in each village and one plot in each field are selected for the experiment. While there may be no objection to the confining of the enquiry in the first instance to areas or zones where crop-cutting experiments are made by the Government of India, the stratified random sampling method for reasons explained may not serve the purpose in view. (See Chapter IV—Sec. II).

A useful suggestion has for long been made in connection with collection of primary data. Since agricultural holdings in this country are very numerous varying widely in size and methods of cultivation, the first and foremost problem is to divide the country into homogeneous economic zones having general similarity of conditions in respect of (1) organization of the farms (2) operations in agriculture and (3) natural factors. In this task a comprehensive study of economic geography in various tracts is essential. All data such as those furnished by agricultural statistics, the census reports, departmental reports, settlement reports etc., may be carefully analysed and used for such purpose. Further much information of economic interest is also contained in the report, journals and reviews of the agricultural, veterinary, irrigation and co-operative departments. Some information on the social conditions of the people in various parts of the country is also available in enquiries conducted by various universities and colleges, some official or non-official institutes or societies and private individuals. Through these published material a co-ordinated picture of the country based on agricultural conditions, such as rainfall, temperature, soil, crops etc., transport and marketing facilities, distance from consuming centres, density of population, area under improved variety of crops, use of improved seeds, fertilisers and use of modern machinery and implements etc., can be drawn with the object of having distinct economic zones. This division can be made only by the Central Government or a Central Research Organisation through proper planning methods. The advantages of such division must be accepted in providing a greater degree of accuracy for cost of cultivation data in respect of uncontrollable factors and comparability. It is hoped that this suggestion will receive the attention of both the State and Central Governments in their programme of planning for Agricultural Improvement.

CHAPTER VII

METHODOLOGICAL PROBLEMS OF COSTING IN INDIAN AGRICULTURE

The difficulties in formulating a standard method or procedure for fixing the elements in the cost-structure and the probable solution to the same can best be understood and clarified by posing the various complex problems involved in determining farm costs and examining their conceptual limitations and appropriate uses with reference to Indian agriculture. The discussion on this interpretative aspect will also bring into full relief the factors that explain cost variations. In the process of explanation, the application of accounting as well as economic principles have also been indicated, as both of them are necessary to evaluate the real financial position of the farm business. The interpretation of terms and method of analysis suitable for Indian agriculture is suggested at the appropriate part of the discussion.

Much of the confusion in the discussions on cost in agriculture arises from certain general assumptions. One of the basic assumptions in farm management research is that the farm is an indivisible organisation. All farm functions have been thought of as being under a central control and as being performed by a single organisation. Even the home has been treated as an integral part of the farm. There is justification for this viewpoint in all situations where agriculture has been organised still on the traditional pattern with its indivisible and peculiar characteristics. Because of the interdependence of the farming enterprises and the possibility of errors in framing estimates and approximations involved in segregating the costs of each individual enterprise, some of the leading farm accountants in the U.K. consider that it is impossible in most cases to determine satisfactorily either the cost of production of specific products or the profit or loss of any individual branch of the farm. Thus the late Dr. J. S. King of Scotland in his book "Cost Accounting as Applied to Agriculture" holds the view that in general the individual farming product has no final cost that is determinable independently of the cost of other products and that the individual products are not the real natural divisions upon which the classification of expenses rests.

The method of accounting on the other hand implies the possibility of segregation of "functions" for the purpose of finding out the cost of production of an individual enterprise. From the experience of all countries which have made progress in the line, it has been proved that a reasonable separation can be made for all practical purposes. Thus it must be clearly understood that cost-accounting is based upon a functional approach to the problems of farm

management. It must also be admitted that with the gradual commercialisation of agriculture different functions are performed by different agencies, thus making it possible in such cases to have a direct functional approach to farm cost-studies. However it is sufficient for our purpose to note that the vital problem is one of separating the functions in the farm organisation and apportioning cost according to a method. To a great extent functions are identical with what are called "farm operations."

As observed in the beginning, originally the Analysis of individual farms, the Route method and the Survey method held the field and the statistical estimates were of a simple description; later on improved mathematical statistical methods were introduced. More especially in the twenties reliance was placed on the analysis of the several factors by simple, partial and multiple correlations as a means whereby the complicated structure of farm management could be explained in its details. Undoubtedly such use of mathematical statistics was at times carried too far, justifying complaints of this method being misapplied. In recent times these exaggerations have been avoided and recognition has been given to the fact that the farm is an organisation affected by a whole series of imponderable and unmeasurable influences of a personal and psychological description, and that one should not place undue reliance on the results of mathematical methods alone. We have therefore to benefit by these experiences and avoid too complicated and technical methods of analysis which cannot improve the accuracy of final results.

GENERAL PROBLEMS

1. *Accounting Period*

What shall be the period for which costs should be calculated and accounts closed? Can there be uniformity in fixing up a period for all types of farms under diverse methods of cultivation? In order to conform to strict accountancy procedure some period or other must be chosen and fixed. Fundamentally this problem is the same in the whole of agricultural enterprise either in India or elsewhere. For the sake of simplicity, (i) a period of *one year* can be chosen from a convenient point of the starting of the agricultural operations, or (ii) accounts can be made up for the whole of the cultivating season. As is well known, the cultivating season will differ from crop to crop, including also the subsidiary crops and might extend to a period over one year.

Apart from this there are certain conditions which limit comparability from year to year or period to period. Farming moves with seasons and economic cycles. A single year's calculation may not be normal as regards character of the season and general economic conditions. It is essential therefore for comparability that the final conclusions should be based on an average of a series of years. For all practical purposes it would suffice if

investigations are spread over the full rotational period normally practiced in the selected representative area. Another difficulty in calculating costs over a fixed period is that certain of the farm operations are never repeated in the same proportions year after year, as for example, manuring and heavy preparatory tillage may be done only to certain crops in the rotation. Heavy ploughing may be given once in 2 years or 4 years and the land manured at the same interval. When the land is prepared for one crop it is to the same extent also prepared for the crops that follow. Hence the whole rotation forms an unified process of production and the production of one commodity depends to a large extent on the production of another in the rotation. If a period of one year is taken on accounting principles it would be difficult to work out the full results of cost accounting which can be gathered only slowly over the whole period. Even if the rotational period is adopted, no uniformity can be obtained as that will vary with the cropping. Comparability must therefore be restricted to holdings of similar cropping.

Regarding the period the obvious solution seems to be to take the rotational period for working out the full costs but for the purpose of accountancy procedure the basis may be fixed as a period of one year with a breakdown of the figures arrived at for the whole rotational period. The time factor will not very much affect the validity of the conclusions reached if the results of cost accounting over the whole rotational period have been taken into account in apportioning costs during the accounting period. What is important is that the period must be clearly mentioned and adhered to in all calculations.

In the U.K. (the Ministry of Agriculture and Fisheries) very nearly all the accounts relate to a financial year closing within the seven months from Michaelmas to the end of the following April and roughly two thirds of the accounts are closed at the end of the calendar year or towards the end of March and April. In India the agricultural year is from July 1 to June 30, for purposes of assessing land revenue. But the financial year of Government starts from April 1 and closes on March 31. From the point of view of the agricultural operation, the financial year of Government is not suitable as at the beginning and the end of the period, farmers are busy in the field and the operations are not complete. Some Agricultural Institutes have switched over to the financial year of Government for purposes of cost calculations in order to have uniformity. But this has not been an advantage; the object being the study of costs in the interests of agricultural efficiency, the agricultural year in India may be fixed as *the accounting period*.

2. Physical Basis and Unit of Calculation

This is the most important and basic point on which there should be some unanimous decision. It has already been explained (in Chapter VI) that the agricultural holdings in India do not constitute "farms" in the sense

in which they are conceptually understood in other countries or in the science of agricultural economics. Regarding the first aspect of physical basis, it is to be considered whether we have to take the holdings as governed by factors of occupancy or tenancy or merely on geographical or area considerations. By itself this is not a complex problem to decide. The physical basis will depend on the specific object for which the costs of cultivation are required. It is sufficient to explain the object and adopt a suitable physical basis and include the cost elements appropriate to the basis chosen according to a specimen form that may be prepared.

Regarding the second aspect of the unit of calculation there is a wide difference of opinion and here again confusion arises more from the diversity of objects and approaches. Whether a holding or farm is on a proprietary basis or tenancy basis, the operational costs may be governed by the same factors. It is regarding the overhead costs or fixed costs that differences may arise as to the proper apportionment of the same. The main question is whether the unit for study or calculation should be the field on which the crop is grown, as recommended by some* or it should be a particular crop or it should be the entire holding. Those who recommend for purposes of calculation, the field as the unit, exclude from the cost structure items such as the upkeep of farm equipment and depreciation and rents and rental value of land, interest on working capital, etc. which are common factors to farming as a whole. Their contention is that nothing of these enters into the picture in evaluating the relative costs of production of individual crops. Though for purposes of comparison it may be a simple procedure to calculate costs for specific crops, even the costs on the operational part of it would not reflect the true cost position of the enterprise either from the major objective of a farm cost study as that of improving the efficiency of the farm or from that of other purposes which have been sufficiently explained in a separate chapter. The limiting of the unit of calculation to a particular field or crop detracts much from the value of real cost accounting study. If farming is to be considered as a business and the results of the operations in so far as costs are concerned are to be analysed on commercial principles, naturally the whole farm enterprise should form the unit and not a single part of it.

The next main point of distinction is between the "holding" and the "farm." In America as well as in some other countries the family farm is taken as the unit as it serves the purpose of a small individual business unit. The family farm as understood by them possesses two major identifying characteristics. First, unlike the subsistence farm it provides the family satisfactory living and in addition a chance to accumulate savings for old age, and second, unlike the highly commercialised farm, the family farm depends very largely on the labour and management of farming family with some ex-

* Dr. V. C. Panse; vide his paper on "Statistical Problem in the Study of Cost of Production of Crops." The Indian Journal of Agricultural Economics, March, 1952.

change help from neighbours to carry on its productive activities. The main feature is that the family farm operation does not depend on hired labour.

In a different concept, the family farm is grouped into two classes: the functional and the purposive. The 'functional concept' is intended to describe the fundamental ways in which family farms differ from other kinds of farming. The 'purposive concept' describes the kind of farm that will advance certain desired ends such as adequate income, continuity of tenure or employment of family labour. The essential functional differences would seem to lie in the relationship between work and management, as suggested by Dr. C. F. Warren, rather than in the relative number of the family and the hired workers on a farm, although these two are interrelated to some degree. * "Even with three hired men a farm may still have the characteristics of the family farm. The farmer and his sons work with the men." An English definition of the small holding—an establishment similar in many ways to the small family farm—expresses about the same idea but also excludes the use of hired labour. ** "Generally speaking, the medium sized farm differs from the small holding in that firstly the occupier needs to employ wage labour and secondly there is a certain division between manual labour and the work of organization." A separate classification is also made of the family-sized farm based on the degree of control and direction over the worker.

Thus, it is recognised that as there are individual producing units at any one time possessing some of the characteristics of one system and some of another and that over a period of time there may be some change in the entire system it is not possible to find a single precise definition of a farm. To meet specific needs several purposive definitions may have to be in use each of them correct so long it is consistent with the functional concept. A farm may not be called a family farm, only when most of the labour is employed under conditions similar to industrial employment. Such a flexible concept if accepted would not provide for any lower limit to the size of the family farm. Subsistence farms, part-time farms and other small-scale units of production or family enterprises can be included as much as larger family units.

In Sweden where conditions of agriculture were similar to those in India, a committee which went into the question of the agricultural problem in its entirety in 1946 resolved the question of defining the size of the holding by introducing the terms 'base' farms and 'norm' farms. The base farms are those of the minimum size for complete farms, i.e. family farms which the Committee estimated at between 25 to 50 acres of cultivated land, the size which it favoured for social reasons. If a similar classification is attempted for the holdings in India it will be possible to find out what size of holdings, proportion of arable land to other types and what sort of production would

* C. F. Warren—"Farm Management" P. 240.

** Edgar Thomas—"Economics of Small Holdings" P. 2.

be most suitable for different parts of the country based on the cost of cultivation data that may be obtained. This will also give a sort of background for individual planning by farmers dealing with the size of layout and operation of the farm.

Summarising this discussion, three definitions are possible on family farms:

- (i) Family farm is one on which the farm operator makes most of the managerial decisions and regulations in farm work and on which his relation as employer of labour is minor relative to his other functions.
- (ii) Family-size farm is one which is operated by a family of average size and managerial ability and will permit reasonably efficient use of labour-saving equipment and of the family labour force over the life cycle of the family.
- (iii) Socially desirable family size-farm would be that which would permit a reasonably efficient use of labour saving equipment and of the family labour force over the life cycle of the family provided that the average management of labour and management return are adequate to maintain a socially accepted level of living.

From the above, it would be clear that no particular affinity can be traced between the agricultural holdings in India as they are constituted and farms as properly understood in Western countries. Noting these distinctions our aim is to arrive at a standard definition for purpose of uniformity. At present there is no alternative but to take individual holdings whatever may be the basis as the unit and call the same the "farm" irrespective of size without confusing them with the precise meaning normally attached to it. The results of investigations on this basis will reveal the leeway to be made up in raising our agricultural holdings to the concept of a "family farm" which should be the standard unit of calculation under peasant farming conditions. Secondly, the question on the size of the holdings or farms is relevant only insofar as comparability is concerned. In itself, it is not the size alone of a farm which decides its importance but also broadly speaking the amount of human energy rationally utilised by the farmer as well as the scientific and technical capacity etc. For calculation of costs of individual holdings with a view to raise their efficiency under the existing set up, the size is not a very important factor. Even the peasant farm is considered above all as a family business. On a peasant farm, of the three factors of production, land and labour, are as a rule, of greater importance than capital. The farmer in this case aims at rather earning an income as remuneration for work accomplished, than as interest on capital invested. With these qualifications we may take the unit of calculation in Indian agriculture as a holding equivalent to a "farm" defined as follows :

The holding for the purpose of calculating costs of cultivation shall be the real or existing unit, the sum total of all the fields, whether in one block or compact area or lying scattered either within the same village or in two or more neighbouring villages accessible to management and control under cultivation, belonging to the same person, whether as owner, tenant or both, resident in one village or in any one of the villages covered by the fields or outside, tilled and cultivated personally and/or through hired labour. Such a comprehensive definition of a holding as the unit will satisfy the requirements of Indian conditions. Firstly, the aspect of the size of the unit is clearly taken into account as also the status of the occupier, conditions of tenancy and the geographical distribution. The variations in cost elements will become clear when indicated according to the above definition.

In this connection, we may refer to certain technical problems that may arise in the calculations. Even though a holding may be taken as a unit irrespective of the actual size the apportionment of area grown under mixed crops will present a practical problem. As a matter of fact, except in certain defined regions, the area under cultivation of mixed crops when it is confined to one or two different varieties of crops like cotton and millet, may be spread over a number of items in small bits such as, gingelly, pulses, vegetables, etc. or there can be a type of inter-cropping in the fields in perennial crops like cocoanut or fruit trees. In the case of mixed crops the question of area under each crop may be determined on any one of the following principles :

- (i) The number of plots of each component based on the quantity of seeds used.
- (ii) The space occupied by each component where they can be easily measured as millets, grown in mango garden, or
- (iii) Where it is not possible to ascertain on the above two basis it can be calculated on the basis of the yield of the different components as between pure and mixed in the adjacent plot.

The second and third principles may be suitably combined.

These practical difficulties may arise only in the case of very tiny holdings where the farmer has no system of regular rotation of cropping. In such cases it is certainly not possible to arrive at any precise results.

COST PROBLEMS

The main problems in the determination of farm costs can be studied in four stages. The first stage is that of Evaluation (including depreciation) of farm stock and effects. The latter constitute the process of investment and the ascertainment of the return on the same. In this part we may also include

all fixed costs or overhead costs incurred and which require to be fairly apportioned. The second stage is that of apportionment of manual, animal and mechanical labour costs, equipment charges, manurial residue, etc. This comprises practically all the variable expenses. The third stage is that of apportionment of costs between joint products (including crops sown together). This relates to the technical problem of the method. The fourth stage is that of the determination of the position of the factors of Rent and Interest in farm costs. It would be futile to enter into a detailed description of all the other minute problems and attempt to analyse them as that would lead to no end.

FARM INVENTORY AND EVALUATION

The term 'farm inventory' connotes the lists taken usually at the beginning and end of the year or at stated intervals, of farm property, with values affixed, including supplies and produce on hand, together with a statement of the amount of cash on hand and money owing to or owned by the farmer. For convenience the inventory is divided into groups to show (i) Fixed Equipment i.e. Real Estate and Buildings etc. (ii) Floating or Movable Equipment i.e. (a) Livestock, (b) Machinery and Tools, (c) Feed, Produce and Supplies (iii) Receivable Debts (bills) and (iv) Payable Debts (bills).

The very first task is that of taking a quantitative inventory of all the farm assets and then determine the procedure according to which their value should be ascertained. The problem of evaluation is of special importance to the cost accountant, as through improper evaluation i.e. showing unusually low values at the beginning and too high at the end, the net returns may be manipulated as very high or low and this will reflect unreal "profits" and "losses." Therefore the method of evaluation chosen should be as far as possible suitable to the nature of the asset and consider the data available on the same regarding the original purchase cost and the factors that have accounted for its appreciation or depreciation over the period.

Farm Lands

Several methods have been followed in evaluating the value of farm lands, i.e.

- (i) Cost or purchase price.
- (ii) Market price.
- (iii) Capitalised rent value.

In the application of these methods to Indian agricultural conditions, the main difficulty encountered is with the land that has been inherited. The cost or purchase price, though a proper and correct procedure, cannot be applied in cases of inherited lands as no cost figures are available. Greater number of holdings are handed down from father to son for generations and in all such

cases it becomes impossible to find out the original cost of land. It is also probable that the productivity of the land might have deteriorated or improved affecting its value. Apart from this, the original cost may be too high or too low depending upon the conditions under which lands were acquired and the prices prevailing then. Where it is possible to ascertain from recent records the date of purchase of the land, obviously the first method is the best basis for evaluation.

The current market price basis may prove to be quite practicable though it has no special virtue as the prices may be again too high or too low. Such valuations may not be easy in every case as for example, when a fruit garden of oranges or mangoes has to be valued, it usually happens that the cost of raising the garden up to maturity is paid within the first few years of its productivity and although the farmer may have realised his cost, the garden is still an asset and must be valued at a price at the annual balancing. There is also the difficulty in some areas at fixing up this market value because there may not be keen competition for the purchase of land in that locality and there may be few or no transactions in farm land. Such cases may of course be rare in India. Some suggest as a workable basis the normal values current in the locality as the original price to be carried forward from year to year adding the cost of permanent improvements made during the period of investigation. They recognise that the limited supply of land in India and the excessive pressure of population on land introduce the factor of speculation and it is not really possible to distinguish between the normal values and the actual exchange-value. In the absence of a method to isolate the speculative and sentimental portion that makes up the difference in the two values of land, it is suggested that the best that can be done is to fix the normal values as far as they could be ascertained under a given set of conditions, and assess separately wherever practicable, the permanent improvements made allowing for the usual depreciation depending on the length of the period of use of the improvements.*

As the real object of farm valuation for cost purposes is to ascertain the investment value and reflect the normal return from the land the third basis may be accepted in the case of inherited lands. It is calculated by dividing the net return by the rate of interest. For example, if the annual rent for a piece of land is about Rs. 70/- per acre and the annual expenditure, i.e. land revenue, etc., come to about Rs. 10/- the net rent is about Rs. 60/- per acre. If the rate of interest in the locality is 6% the value of the land would be Rs. 1,000/-. From the economic standpoint this method seems to be not only simple but fairly accurate in reflecting the actual position. It is also suggested that for the preparation of the inventory the capitalised rent value can be taken while for calculating cost of production of crops the rent of the land

* T. G. Shirname: vide his paper on Cost of Production in Agriculture. Twelfth Conf. of the Indian Society of Agricultural Economics, 1952.

can be charged. The difficulty in the application of this basis lies in allocating the earnings produced by the entire farm property—land, buildings, stock, equipment and labour to each of these factors of production with their respective share of the earnings. Besides due to the caprices of the season and variation in production results, the net rent may be more variable and inconstant than the market value basis. It is important to note that whatever be the method chosen and adopted the values taken in the inventory should not be changed from year to year unless of course some major improvements have been made which have to be accounted for. Otherwise the land values between inventories would only show an unreal loss or gain. In regard to land taken for reclamation or improvement, no rental value can be assigned as it had not been put to any economic use previously. However the inventory should show a valuation as determined by the capital sunk in reclamation or improvement plus a cost-estimate for the original use of land if any.

Fixed Durable Assets

1. *Land Improvements* : Farm buildings, wells, roads, fences, drain, etc. :

There are at least four ways in which it is possible to speak of value in respect of fixed durable assets: (a) by reference to the capital originally invested in them; subject to a rate of depreciation capable of various interpretations (b) by reference to the costs of reproduction or replacement at existing prices, (c) by reference to the sale or market value and (d) by reference to the imputed economic value. The general procedure in the valuation of improvement is to use actual cost figures where they are known or take replacement costs where they are not ascertainable. Again there should not be any change in the valuation from year to year except in regard to additions and depreciation. The method now in practice may be uniformly followed. N.B. : In land valuation it is necessary to re-value the wood trees such as babul or sisal scattered in the fields. Similarly fruit trees or other semi-permanent crops should be valued along with the land they occupy as a part of the make-up of the land value. The value of permanent pasture land may be determined on the basis of the number of cows and other cattle which it will carry along the pasture season in accordance with the prevailing local rate of such type of land.

2. *Equipment* : These consist of machines, agricultural implements and tools which are relatively small and have a short period of life, as compared to land and buildings. The original cost method should be preferred in most cases because of the nature of these assets and the fact that it is possible to know their original cost price. A certain rate of depreciation may have to be allowed varying with the life of the assets. Replacement costs are rarely used except in cases where no record of original price is available. It is also necessary that each implement, tool and machinery should be separately listed and valued. The rate of depreciation allowed will depend upon the

care bestowed on keeping them and utilising them. In India under the self-sufficient economy where these tools and implements are manufactured in the village itself by the local artisans, for the proprietors or tenants in return for certain fixed grain or other kind of payment, it is difficult to appraise their values. However, such an economy is gradually breaking down; in cases of locally manufactured implements the method of valuation suggested is to work out how much it costs to make an implement or tool and fix up the inventory value, taking into account, the number of years used, repairs done, the existing condition and the probable future usefulness. In this regard another problem is whether minor tools and utensils of the value of Rs. 10/- or less should be capitalised as they are short lived equipment wearing out within a year. Of course the procedure should be clear that any part of expense on equipment which wears within a year and is replaced every year should be treated as a current expense and must be charged to the profit and loss account and should find no place in the inventory.

3. *Live-Stock*: The term 'livestock' refers to all breeding stock, work-stock and animals raised for milk, meat, wool, etc. such as work-bullocks, cows, buffaloes etc. The various factors which determine their value are: cost or purchase price, sex, age, kind or species, breed and pedigree, individual efficiency i.e. draft or carrying capacity in the case of work-stock and production capacity in the case of milk stock, the amount of use each animal is put to, its weight and size and the general condition of each animal. The different kinds of live-stock maintained on a farm are broadly grouped into two categories for valuation purposes i.e. (i) *Trading stock*, kept for sale (dry cows and buffaloes to be sold after calving, calves purchased with the object of resale as adults, lambs, surplus breeding stock, poultry etc.) (ii) *Fixed or regular stock*, kept for production purposes (draft animals, dairy and breeding herds or flocks of sheep and goats etc.) and not offered for sale.

In Western countries the valuation of both trading stock and productive stock are equally important. Though in our country we are mainly concerned with arable farming and the evaluation of work-stock i.e. mostly plough bullocks, we cannot ignore the method of evaluation of other categories of stock which are kept in some large farms or may be that the system of mixed farming may spread in the long run. We have to provide for such cases in our cost-calculations. Usually the breeding stock is valued at cost i.e. purchase price plus the expenses of their maintenance from the date of purchase to the date of valuation. The stock bred on the farm is valued at cost of rearing; if this is not possible it is valued a little (10%) below the market price. Though it is not possible to say how far this method is reliable, it suits the practical purpose as the best of alternatives. There is a difference in approach between the experts in the U.K. and their Continental and American colleagues. The former do not make any allowance for changes in the market value of live-stock, as they consider them as instruments of further production and value each animal at its cost at the time when it reaches the producing stage. The valuation

is kept at the same figure from year to year. The trading-stock reared on the farm is valued either at expenditure incurred or market value if it happens to be lower than the actual cost. Purchased animals are valued at their cost and when animals advance in age and decline in productive capacity it is noted for the charge of depreciation at prescribed standard rates which enter into the annual cost of the maintenance of live-stock.

The problem of evaluating the work-stock is practically analogous to that of equipment and the same broad principles discussed there will apply. The distinction lies in this that the work animals usually appreciate in value from the age of about 3 years till they are about six and there is also a period of comparative stability in their value. These facts may have to be given weight in the calculations. Therefore the first requirement will be to make a definite classification of livestock on the basis of type, kind and use and then value the same on any one of the methods indicated which yields utmost accuracy.

Under Indian conditions the chief problem is that of valuing working bullocks which are either purchased or farm-bred. The difference in the quality and working capacity of the cattle and the varying methods of breeding from region to region make it difficult to prescribe a standard base of valuation. In the case of farm-bred cattle, the problem is still more complicated because of their being neglected and left to fend for themselves on free and stray grazing till they reach the earliest period of productive capacity. It is obviously impossible to have even an approximate cost of a farm-bred bullock mainly fed on free pasture. However, in such cases, the best method is either to have a rough estimation of the cost of rearing the cattle up to the earliest productive stage with reference to the local conditions or fix the market price for the type of animal less 10% as the cost. In the case of a purchased bullock the actual cost (including the cost of driving from market to the farm) must be taken with due allowance for depreciation based on the remaining estimated useful life of the animal on the date of purchase. In the absence of information on the cost and age of a bullock or work animal, whether purchased or farm-bred, the value should be estimated at a figure that would equal the fair market price. These are the methods usually followed and they may be adhered to in this country also.

(i) *Defective stock* : The defective stock (such as a cow with one or two defective teats or with loss of one or two quarters of udder etc.) should be valued at the local market price, as they are not fit to be valued at the standard figure.

(ii) *Young stock* : The inventory should naturally include the animals which are raised during the year. They are valued at either (1) value at birth, if any, plus the cost of rearing to date of valuation or (2) market value on the date of valuation taking into consideration weights and ages of animals.

(iii) *Breeding stock*: Bulls, rams or boars kept for breeding purposes are treated as work-stock for valuation purposes. In the case of purchased animals, the skin or meat value at the end of the working life is estimated and deducted from the purchase price. They may be entered in the work-stock register or separately.

Purchased Farm Supplies

All supplies such as feeding stuffs, fertilisers, seeds, fuel oil, etc. in stock on the date of valuation is estimated as closely as possible by counting the number, measuring or weighing the quantities and valued at cost-price plus the charges of carrying them to the farm.

Farm Produce and Crops

There are stocks of farm produce on hand, such as grains, feeding stuffs, *bhoosa*, straw, silage, etc. milk and milk products, etc. held for sale or use on the farm. In the case of products held for sale the appropriate basis is the "farm value" i.e. market price minus the probable cost of delivery to market. In the other case the basis used is the cost of production or if this is not available the harvest rates, the wholesale prices prevalent in the locality at the time of harvest. Badly damaged or immature crops are best valued at the local market rates. In evaluating the silage, the basis adopted may be the cost or the estimated price of the green stuff, such as green maize, or *churree*, etc. put in the silo plus the cost of ensiling i.e. the extra charges incurred in chaffing and filling in, and a rated depreciation for the silo. Milk and milk products may be valued at cost of production or the wholesale local rates and wood or fuel at the local market rate. Whichever basis is adopted it is necessary to note that the price charged for seed, grain feed, silage or hay is the same as that shown in the previous year.

A real difficulty is experienced in evaluating fodder crop on cost of production basis, as the cost of bullock labour unit is unknown. In some cases where the fodder is not usually purchased or sold, it has no market price. In order to meet this difficulty it is suggested that the cost of production of the fodder crop may be calculated on the basis of cost of bullock labour unit in the previous year. The objection raised against the market price basis is that an excessively high or low market price of an intermediary produce may give quite a wrong picture of the financial results of an enterprise. This is illustrated by the example of a dairy farm where the fodder is produced for the milch stock and not for the market. Where there is a wide variation in its cost of production on the farm and its market price due to the latter being higher, the results based on higher price basis will show a very much reduced income from milk. Therefore, it is rightly pointed out that in deciding the basis of evaluation for farm produce on either the cost of production or market price the main question to be decided is whether the commodity is

mainly for sale or for use on the farm. In the case of the former the market price basis may be preferred and in the case of the latter, the cost of production basis. In the case of imputing value to wild grass or pasture crops collected with family or hired labour the basis of the wage rate of hired labour may be adopted.

Standing or growing Crops : The crops standing in the fields are usually valued at cost of production up to date of valuation which is the best method under the circumstances. The cost will include all expenses of cultivation, irrigation, manuring, seeds, etc. since the last crop.

Unthreshed Crops in stocks : These may be valued on the estimation of the yield and assigning value to it at market rates, making allowances for cost of threshing, winnowing, carting, etc.

Farm-yard Manure : The farm-yard manure must be valued, whether in pit or as applied to the fields. From the point of view of manurial value, the admixed earth and moisture are of much less importance than the organic matter or humus contained in the manure. The evaluation of farm yard manure is indeed a difficult problem particularly when they are produced on the farm itself. The best method may be to value them at so much per cart load as prevalent in the locality at the time of stock taking. Even then the estimates may not be correct as the weight of farm-yard manure and compost fluctuates widely depending on factors such as degree of wetness, the amount of earth admixed, nature of dry refuse used for compost making and the degree of decomposition undergone by the manure. The basis of cost price may not be practicable in this case, though advocated by some. Regarding the residues the underlying principle is that of taking the initial cost and then allowing for depreciation.

Cultivations and un-exhausted improvements : The term cultivations refers to expenses incurred in operations on fields which remain un-sown on the date of valuation, such as summer ploughing etc. Similarly there are improvements effected on a farm during a year which are not exhausted within that year and their effort last for a longer period e.g. residual value of manures, levelling the fields, making embankments and irrigation channels, digging *kutchha* wells etc. In such cases the initial cost divided by the number of estimated year's life should give the figure of annual charge to be deducted at the end of each year from the value of the improvement. The value of the unexpired benefits is thus carried forward. At the end of each year the value of un-exhausted manure and improvements are estimated as above. In the case of lands reclaimed, the expenses of clearing, fallowing or heavy manuring are temporarily capitalised and written off over a period. If the reclamation is of a permanent nature, the expenses are included in the value of the land.

Debts (Bills) Receivable and Debts (Bills) payable : The first comprise the amounts of debts owed by others which are entered at their face value, excluding bad and doubtful debts. This also includes farm income due but not received but excludes other investments in lands etc. not ordinarily considered as part of farm business. The second include all debts as loans, mortgages etc. incurred in carrying on the farm business. The long-term and short-term debts are separately listed. Debts contracted for household and personal reasons are excluded.

We have thus far dealt with the main problems that arise in evaluating the items under Farm Inventory. In brief, it may be noted that the basic principle underlying evaluation is to have "market" or "cost price" whichever is less. Often "farm values" i.e. value of farm produced commodity at its market price, minus the cost of carriage to market or value of the commodity not produced on the farm at the 'market' price plus its cost of carriage from the market to the farm are used. The controversy is with regard to the latter, while all agree on cost-price as the basis for farm produced commodities. The whole approach should be judged from the object in view. If it is to know how much the product has cost, evaluation should be on 'cost' price. If it is to know the value of assets created by the work done, the 'market' price or the 'farm value' is more suitable.

OVERHEAD COSTS

The second part of the first stage of Evaluation, may be said to pertain to the posing of problems in the analysis of overhead, fixed or on-costs, whatever may be the exact term used. These are indirect costs as opposed to direct costs i.e. they cannot be determined or traced to particular given units or products nor do they vary directly or exactly with output. They render a service not only to a particular quantity or crop but also to other quantities or crops. Sometimes the exact value of such costs may not be definitely known and it may have to be arrived at by imputation. Thus overhead costs present serious problems for all industries and much more intensely in agriculture because indirect expenses make a large part of the farm expenses. The problems are both of analysis, estimation and that of distribution. Though in the second stage below the problems of apportionment are considered separately, in so far as fixed costs are concerned they are dealt with here itself wherever necessary for the purpose of continuity and clarity.

These costs are mainly

- (1) rent for land and buildings,
- (2) interest on investment in equipment and livestock,
- (3) obsolescence and that part of the depreciation on buildings, machinery and livestock which does not vary with their use.

- (4) insurance on buildings, equipment and livestock,
- (5) taxes on real estate and personal property,
- (6) wages for the operators and other family labour (charges for organisation and supervision).

The last four items are taken up leaving the first two to be dealt with separately at the fourth stage of our examination, as there is much theoretical controversy on the same and the points require to be carefully detailed and studied.

Depreciation : Depreciation is the decrease in value of an asset through wear and tear. The wear and tear of farm assets like buildings, equipment, work-stock, etc. are gradual and depend upon the amount of service taken from the asset, care or attention given to it and the timely repairs made to it. Obsolescence occurs when an implement becomes out of date through the invention of an improved and efficient one. This item has assumed special importance in the Western countries in the last half-a-century with the introduction of tractor-cultivation. In Indian conditions this item may be ignored except when calculating costs of farms using tractors and machinery. Since it is very difficult to ascertain obsolescence with any degree of certainty the alternative method of allowing a higher rate of depreciation on equipment of new type than the old types, may meet the purpose in a rough manner, without making a special provision. This will depend on the type of farm for which costs are calculated.

The serviceability and value of an asset diminishes as depreciation continues till it becomes completely exhausted or is reduced to junk value. Usually depreciation is calculated on the following broad principles. In the case of assets such as short-lived implements or tools which wear out completely in less than a year, the whole cost of the implements is charged. If, on the other hand, their life is two years the cost is divided. But if they have some junk value, then the annual depreciation charge is taken to be equal to the initial value, less the value as junk, divided by the number of years an asset is likely to serve.

The problem in the case of equipment that have a long period of life or service is whether all the years should bear an equal charge or the depreciation charge in some years should be more than the others. In order to determine this basis, the most common methods adopted are: (1) annual valuation at market price, (2) straight-line method (fixed instalment or original value method), (3) sum-of-year digits method, (4) the compound interest method and (5) the Diminishing Value method (Diminished balance).

The first method is simple but gives highly unsatisfactory results because it introduces unreal values through fluctuations in market prices, and the fall

in market value of an item of equipment in the first few years may be very considerable. The straight line method, the easiest and simplest, consists of dividing the total depreciation i.e. the original value minus the junk value of an asset *equally* between years of its estimated life e.g. if the original value of a cart is Rs. 100/-, the junk value Rs. 10/- and estimated life 10 years, the total depreciation would be Rs. 90/- and the rate of depreciation Rs. 9/- per annum. In the sum of year digits method, depreciation is obtained by multiplying the total depreciation by a fraction, the denomination of which is equal to the sum of year digits and the numerator to that of any given year. The compound interest method is a complicated one and is based on the assumption that the depreciation fund will be re-invested in the farm business and will grow there at compound interest. The depreciation charge in this case is composed of two parts (1) the annual depreciation i.e. wear and tear; and (2) the interest earned during the year on previous depreciation charges which are taken to be at work in the business and earning interest there. By the diminishing value method, depreciation is calculated on the residual value of the asset at the end of each year. Judging the merits of these methods for practical application, it may be noted that each has its own limitations and the choice should depend on the nature and serviceability of the asset. The second method does not take into account that the value of an asset may fall more rapidly in the first few years and then decline slowly. In the third method, depreciation charge in the early years is very low, but when the order of fractions is reversed, the results are more or less similar to the fifth method. In the fourth method the calculations are complicated and the same difficulty or low depreciation in earlier years is experienced. Only the method of Diminishing Value possesses certain advantages which makes it applicable for general use: 1. it allows a higher charge of depreciation in earlier years than in later years, 2. the cost of service can be made about the same throughout its working life because as the equipment grows old, the depreciation charge will become lighter and lighter, whereas the repair and replacement charges become heavier and heavier. Whatever method is adopted, it should be such as to give the true condition and value of the asset at any time. This may not however be related to market value in the case of certain assets such as machinery and implements because their efficiency in service may be still higher whereas their market value may fall considerably. Therefore it is suggested that the guiding principle in calculating depreciation should be that of uniform cost of service, in different periods of an asset's life without attaching undue importance to those methods which give only the true condition with reference to the market value of the assets in different years.

The application of these methods in respect of some of the farm-assets in Indian Agriculture may now be examined by way of illustration.

Machinery and Implements The characteristics are (1) the depreciation is heavy in earlier years, (2) repairs and replacement costs become heavier and heavier as they grow old, the cost of service being made about the same

throughout their working life. The Diminishing Value method seems suitable in such cases. The method advocated by Mr. Orwin is to depreciate each implement individually by assigning to it a life and finding out the depreciation by dividing the cost or value by the number of year's life. But this straight line method ignores the nature of the changes in the value of such assets as seen above. If kept with care and under proper repair, some of the implements would retain their use value irrespective of age. It is desirable in such cases to fix up a limit of depreciation for each implement and when this limit is reached not to charge any further depreciation but carry forward from year to year the same value. Repairs and labour expended on the care of implements may be made a charge for the year. In England, the Ministry of Agriculture have related yearly depreciation rates of machinery and implements to known conditions of physical deterioration and likely degree of obsolescence. Regarding allocation, the total cost of care and depreciation is usually distributed among the different farm enterprises in proportion to the amount of bullock labour used on each since the latter is very largely associated with the use of implements. This was followed by the Punjab Board of Economic Enquiry. But such a procedure may not satisfy certain kinds of implements; therefore it is better to distribute them in proportion to human labour units separately wherever this is preferable. In the case of implements used for a specific enterprise or crop, it is reasonable to allocate the whole charge to that account. Where a farm equipment is kept but used only rarely for farm purposes, this may be shown separately and brought into account only in the final profit and loss statement.

Work-stock and Productive stock : In these cases the wear and tear are according to age as well as capacity for work. The ideal method suggested is to divide the total depreciation charges of an animal between different years according to the amount of work done in each year. In the absence of reliable data on the above, the straight line method may be followed.

Buildings : The life of buildings to a large extent depends on the repairs and the rate of depreciation may be worked out according to the straight line method, taking this fact into account.

In conclusion, it may be emphasised, that all the methods suggested can reflect the true condition of the asset and the proper rate of depreciation only if the estimate of the life of each asset is carefully made in the first instance. Therefore it is necessary that all the factors that influence the life of an asset (including external factors as climate, soil conditions etc.) should be thoroughly investigated and recorded as also the amount of use or days of service per year of the asset. In India is it possible for a small cultivator to keep a record of all these details? This is a common and permanent problem in Indian agriculture and a way must be found to collect and compile such data. Whether it is actually possible or not, the necessity for the same cannot be overlooked from the point of view of accuracy.

In countries where the Income-Tax Law is applied to agriculture, depreciation is allowed on the various assets at the scheduled rates fixed. An important question when such laws are introduced in this country in all the States, will be to decide whether the valuation of fixed capital assets for the purpose of depreciation should be on the basis of real value or replacement cost or exclusively on the basis of original money cost. This is a matter of current controversy even in other countries and may be left out of the discussion.

Insurance on Buildings, Equipment and Livestock : In India the problem of crop insurance or other types of insurance of farm property has at best a theoretic significance as they are not generally in vogue as an organised system. When such conditions as are necessary for the introduction of insurance in farm business, have been created, this would naturally form a separate charge under expenses debited to a separate insurance account. The principle of apportionment should be that followed for depreciation.

Taxes on Real Estate and Personal Property : In India the taxes paid will include besides the land revenue, water rates, cesses, surcharges, penalties, etc. Though all these may be shown separately, to distinguish between cost of irrigated lands, and un-irrigated lands, all the charges may be grouped under the head taxes and apportioned according to the principle recommended for joint-costs. In the case of personal property unless they have some use for farm business, taxes on the same may be excluded.

Wages for the Operator and other Family Labour : (Supervision and Management charges). In the case of family-managed holding, which form the majority in this country supervision and management of agricultural operations are carried out by family members, hired labour being employed only for seasonal operations when necessary. The difficulty of imputing a value to such work of the farm operator has resulted in the total exclusion of the charges from the costs as a separate item, but showing them as included in the net profit. This is the method adopted in industries since 1945, where the Tariff Board has not been allowing managing agency commission separately but allows a 10% return on block value which according to it should be sufficient both for a reasonable dividend and adequate remuneration of the managing agents. This does not seem to be the correct procedure, as actually, such labour should be accounted for separately to reflect the real cost position. The position of a managing agent in industry has no comparison with that of the farm operator in family-managed holdings. The main problem is that whether this function of supervision and management constitutes a separate function or not. If it is recognised that it does, then they must be separately accounted for. How far the management charges, not actually paid, are cost? The case for including it in profits is: the wages of management arise out of the services rendered by the operator in the direction of his business. He takes the risk of making profit or loss and remuneration for management cannot therefore be anticipated. Any method of

valuing unpaid charges will be unsatisfactory and arbitrary and the rewards of management must, therefore, be reflected only in the profits which occur to those, who, by virtue of their superior skill, actually earn them. It would not therefore be desirable to charge anything for the management services of the farmer in finding out the cost of production of any crop or enterprise.

The above argument though it seems plausible ignores the main issue. The functions of supervision and management are distinct. The fact that the operator performs them entitles him to remuneration separately for that work. Whether payment is actually made or not begs the question, because the holdings are family managed. The issue is partly one of segregation of functions and separate accounting. Further the element of risk-taking and efficiency are points related not only to this function but common to the whole enterprise. They are abstract elements which are legitimately reflected in the net profits. Supervision and management charges must therefore form a separate item in costs to show the real position. The procedure or method of accounting is now to be decided. There are three methods (i) a uniform allowance (ii) a percentage on total cost (many cost accountants allow supervision charges at 10% of the working capital), or (iii) farmer's own estimate. Will such arbitrary methods be reasonable or should the remuneration be based on the measurement of the function and if so whether that is possible? Efficiency of management cannot be directly measured. But the factors that make up for efficiency can be taken into account in imputing a value. These factors are one (i) quantitative—the man-days spent of the operator as well as his family members (ii) qualitative—the type of work and the nature of performance (including any exceptional capacity shown). It is possible to calculate the former but the latter must be an estimate. Another difficulty mentioned is how to evaluate the man-days when operator follows also a subsidiary occupation. This is not insuperable because the man-days spent on each can be worked out with the least possible margin of error. The method that is best suited, but necessarily arbitrary, is to have a minimum uniform rate for supervision and deduct from or add to it a further amount that would roughly indicate inefficiency or exceptional ability based on the peculiar conditions of work on each farm.

CHAPTER VIII

PROBLEMS UNDER PRIME OR VARIABLE COSTS AND APPORTIONMENT

The variable costs which relate to the expenses of current operations in agriculture may also be termed as processing costs or operating expenses. Under Indian conditions these comprise mainly of labour and service charges, human, animal, or mechanical, for different kinds of operations. Besides, there are costs of materials used (a) seeds, (b) manure, or fertilisers and (c) other consumable stores, (d) cost of marketing wherever incurred and miscellaneous expenditure.

LABOUR COSTS

The labour requirements of the different enterprises vary according to the nature of operations or the system of cultivation employed and the time taken by each. In cost accounting the two methods adopted are: (i) to classify them as man labour units, animal work units and units of equipment use for the cost of production of the whole enterprise or show them under different operations such as ploughing, sowing, harvesting, etc., or (ii) to note down the items of costs by field operations such as ploughing, etc., and show corresponding costs of human labour, bullock work and equipment use. These methods are of course not free from estimates and have to wait for the allocation of cost figures until the end of the year or at least until the end of the cropping season. It is preferable to adopt the second method for purposes of recording and in the final stage the costs of the items of human labour, bullock work and equipment used need not be shown separately but shown as a single item of labour expenses.

Human Labour: (Manual Labour). The daily routine of farming provides a variety of operations. The existence of a large labour force in agriculture in this country accounts for less specialisation of task on the farms. The farmer and the hired workers may be found engaged in varied activities even in the course of a single day. This creates a special difficulty in recording and calculating the work-output of human labour on a *unitary* basis. Manual labour is drawn from: (i) permanent labour paid either in kind or in cash for a fixed period as a week, a month or a year or the end of the cropping season, (ii) casual labour (for specific work), (iii) labour taken on loan and exchange labour, (iv) labour of the farmer and members of his family. The manual labour of these types expended for different enterprises or fields should be directly recorded against them.

Ordinarily hired labour can be distinguished by the method of payment. When paid daily, the amount can be easily allocated; when payment is made either weekly, monthly or annually or on some other periodical basis a procedure for apportionment has to be devised. In the latter case there may not be work on all the days of the period fixed for payment. The best method of distribution is to find out the actual number of days of work during the year or period and then calculate the cost per day. The hired labourers are paid usually not only cash wages or grain wages but are also provided with boarding and lodging and other perquisites in kind. This must also be added to arrive at the exact amount of wages paid. In the case of labour hired for specific enterprises on piecework basis and paid either in kind or cash, the wages must be charged to the account of the particular enterprise for which labour was performed. Even in these cases the quantities of labour units should be invariably recorded to facilitate the ascertainment of quantitative costs.

The next point is whether cost of cultivation should include labour obtained on loan or exchange. Labour obtained by loan or exchange is common and should be treated like family labour for purposes of calculation and should be recorded separately. There may not be any net addition to the total quantitative labour units but this may give an idea of the extent of exchange or loan labour used.

The farmer's own and his family labour forms by far the greatest labour force used on subsistence farms. The problem of a satisfactory evaluation of the same remains yet to be solved and merits careful analysis. Some have gone so far as to suggest that the problem involves the application of certain theoretical principles on 'value' in the interpretation of the value of family labour. It is the normal practice to evaluate farmer's labour and that of his family members on the basis of the wage rate actually paid to long term or permanent labour. While this principle may seem sound it results in the inflation of the operating expenses and therefore of depressing the net income as it has very often been noticed that family labour is applied in excess of what would have actually been required had hired labour been engaged. This is particularly true of Indian agriculture where seasonal unemployment and under-employment of family labour are regular features because of the very uneconomic holdings and excessive pressure of population on land. According to some economists, to take the prevailing local rates as the basis is tantamount to accepting the wage standards of a small minority of labourers and applying them to the farm population as a whole regardless of whether the gross income from agriculture can permit of such wage standards. For example, they argue that if all the farmer operatives and their families were not to work on their farms and just offer themselves to be hired in the market the local rate would be entirely different from what is considered for the calculation and in fact there will be no cash market at all for this labour. This was the basic view held Dr. T. F. Main, once a Director of Agriculture

in Bombay. But this is purely a hypothetical consideration and has no direct bearing on the problem.

This procedure has also been considered to be unsatisfactory in comparing the return on the investment in agriculture with that of any other industry. For purposes of comparison certain adjustments are necessarily to be devised for eliminating the excess units included on account of the use of family labour over what would have been considered adequate if hired labour were to be employed. But against the fact of excessive charge for family labour must be noted the efficiency and quality of work performed by it which is distinctly superior to that of hired labour particularly in countries like India where there has been very little mechanisation of agriculture. Where the various agricultural operations are performed with machines, the chances of lower output of work than that scheduled or of performing it in an inefficient way without being noticed are relatively much less. This objection may also be ignored.

According to Adams, family labour should be charged at the amount it would cost to have the same work done by hired labour. His suggestion however offers no practical help as, without a proportionately very large amount of extra labour which is contrary to the main objective of simplifying the cost accounting procedure, it is not easy to estimate the hired-labour-unit equivalent of the family labour units for various operations.

In the valuation of the labour of individual members of the family, the difficulty of calculating the labour value of a woman or a boy may arise. In such cases the rate should be fixed at the lowest compatible with the work done. Some research workers exclude the labour of the farmer and his family completely from the cost structure and treat it as profits. This is not sound as, if the same work were to be performed by hired labour it becomes an element of cost and if costs under different conditions are to be comparable they must have the same basis. So the cost figure must include the labour of the farmer and his family. The difficulty is only one of a proper method of valuation. Should the rate be the cost of hired labour for the same work or should it be at the rate at which it can be put to some other alternative use? The decision should depend on a comparison of work done on farms with and without the given unit of family labour but otherwise having similar conditions. For practical convenience and simplicity in accounting procedure, family labour must be charged at rates prevalent in the locality for permanent hired labourers.

Animal Labour: (Bullock Labour). The recording of the work of the animals (bullocks) is similar to that of manual labour. The total hours of animal labour are also determined exactly in the same way. Sometimes bullock labour also is obtained on loan. It is not correct to exclude it as it is often done but it should be recorded as is done for human labour. The charges

for animal labour include depreciation in the value of bullocks, the cost of feed, labour, veterinary charges, equipment, use of buildings, etc., besides the hours of bullock labour spent on themselves. Credit is also given in the bullock account for the manure produced. The net cost of bullock labour is then divided by the total number of hours of bullock labour in order to find out the bullock hour rate. The total cost is calculated at the end of the year. The actual apportionment of cost between various enterprises is done in proportion to the time spent on each or the animal labour used by them.

The difficulties experienced in calculating the cost of bullock labour arise from the following :—

Usually bullocks consume the fodder produced on the farm with their own labour; to know the cost of one, the cost of the other must also be known.

In Great Britain, the Agricultural Costings Committee (1918-1921) suggested that in the first year of starting this work, only the estimated figure may be used and in subsequent years the preceding year's cost can be used. Dr. J. S. King, however, in his "Note on the Determination of the Cost of Horse Labour" has recommended that this difficulty could be surmounted by first calculating the cost of horse labour per working day by ignoring the horse hours spent for the benefit of the horses on the credit side and the value of the time on the cost side and then using this figure for determining the cost of home grown fodder and finally the total cost of horse labour. In this method the cost per working day remains the same. The following example will illustrate this method* :—

Supposing the total number of working hours, ignoring the time spent by horses on themselves is 'y' and its cost is 'x', the cost per working hour will be $\frac{x}{y}$. If the number of hours spent by the horse for their own benefit is A, its value would be $A \frac{x}{y}$ and the cost per working hour $\frac{x}{y}$ as shown below :—

$$\frac{x + A \frac{x}{y}}{y + A} = \frac{xy \times \frac{x}{y}}{yy \times \frac{x}{y}} = \frac{x(y + A)}{y(y + A)} = \frac{x}{y}$$

Subsequently in his book "Cost Accounting Applied to Agriculture" Dr. King decided in favour of using the "farm values" based on the market prices of equivalent food in other forms, published by the Ministry of Agriculture and Fisheries in its journal every month. This was to avoid the theoretical and practical difficulties inherent in an attempt to base costs of home grown forage fed to horses, upon cost of production and also to hold the scales evenly between those farmers who sell their oats and buy in horse forage as a matter of policy and those who feed their own home grown oats. Such a pro-

* *Vide* Arian Singh: His Paper on Cost of Cultivation of Crops: Indian Journal of Agricultural Economics, Vol. VII No. 1. P. 79.

cedure cannot be followed in all circumstances. In a locality where there is an organized market for forage crops, and farmers sell them frequently, the 'farm values' are the easiest and therefore well suited for the purpose. But in a place where no market exists for forage crops and where there is no actual sale, to introduce market price in the intermediary stages of the process of production is bound to give unreal losses or gains in one enterprise at the cost of another. The first method recommended by Dr. King in his note may therefore be followed uniformly.

The Indian Council of Agricultural Research applied the same principle as that for evaluating human labour as a practical solution to the serious difficulties in computing the actual cost of consumption. This cost was arrived at by taking into account the food consumed, items such as shoeing, veterinary attention, upkeep, depreciation of shelter, interest thereon and also investment on animals. On the credit side were noted the items of manure obtained and work done outside the holding. The balance was divided by the total number of days worked in the year to get the figure for the daily cost of bullock labour. The actual loss suffered by the death of an animal was charged to the debit side of the account. Here the difficulty is one of maintaining a precise account of grass, other fodder and concentrates consumed by the animals daily or of the manure obtained from them. A cultivator invariably maintains a certain amount of young stock and a few milch cattle in addition to work bullocks. These are housed and fed together. Any realistic apportionment of the cost of feeds consumed, of the manure produced or of the upkeep and depreciation of shelter as between the work bullocks and other animals appears to be impossible except in controlled conditions or through experiment. Therefore, as a substitute, the prevailing rates of hire for work animals for cultivation are taken as the locally established resultants of all the factors mentioned above. An objection to this procedure of using higher rates of evaluation of bullock labour is that the hire would include the profit of the owner and would therefore be an inflation of the cost of bullock labour. This element may not however be appreciable in its relation to cost of production of different crops. It would however be beneficial to investigate what adjustment is needed to the higher rate to bring it down on par with the actual cost of bullock labour by collecting ancillary data in the selected holdings.

(i) *Cost of Feed:* The cost of feed and fodder forms the most important item in calculating the cost of bullock labour. The problem here is one of calculating the cost of *bhusa* and green fodder which are produced on the farm itself and fed to the bullocks. Should they be charged at the prevailing market rate or the harvest rate or their cost of cultivation or should the quantity thus fed be deducted from the gross outturn and the net outturn taken into account in calculating the cost per maund. The cost of production method is the least objectionable and may be adopted. The equation method suggested by Mr. J. K. Pandey is a little complicated. The Indian Council of

Agricultural Research followed the procedure of fixing their value at the prevailing market prices but charged those crops which were specifically grown for animal feed at cost of production. But they have not indicated the actual method of arriving at this cost of production. The Punjab Board of Economic Inquiry charged such feeds at prices at which the cultivator purchased the landlord's share of the produce and compared such prices with the cost of cultivation. This again is not a correct way as the figures of cost used are based on prices charged by landlords and not on the actual cost of cultivation.

There had been considerable controversy on this point in the U.S.A. and the U.K. The general principle adopted in the U.S.A. and the Continent is "opportunity cost" or the 'value' of their alternative uses to which the commodities could be put under equal or nearly equal circumstances. The farm accountants in the U.K. on the other hand have preferred the cost of production as the only sound basis for valuation. If the cost of raising animals and their products is to be correctly determined it is reasonable that all the items of cost must be charged on amounts actually paid or expended.

In the case of a livestock farmer, production of feed and fodder is determined by the requirements of the animals. If they are produced economically they may add to the profits of the livestock enterprise; if not, they will show the weakness for this branch of livestock management. The market price basis of valuation followed in the U.S.A. is based on the ground that if the cost of production is taken as the basis, the livestock account is unnecessarily burdened with the profit or loss incurred in the production of feed and fodder; i.e., either the crop or cattle account may show fictitious profits or losses. It was this difficulty which led the experts in the U.K. to adopt the method of valuation at cost. Similarly, the Danish farm accountants adopted a different system of determining the profits and losses of livestock farms. Under their method all expenses excepting the cost of 'home grown feeding stuffs' are charged against the livestock receipts and the balance is taken to be the return for farm grown feeding stuffs. As a general principle, therefore, if the object is to find out the cost of production of any commodity in order to compare that cost with the price obtainable in the market then the basis of valuation of all farm produced articles used in the production of that commodity should be the cost of production and not the market price.

Apart from home grown fodder crops, the bullocks are fed sometimes on grass obtained in the process of weeding. If the quantity is appreciable, i.e., adequate to afford some basis of calculation it should be taken into account and evaluated on 'farm value' basis. The value of grass thus arrived at should be deducted from the weeding costs.

There is also the question of valuing grass cut by the cultivator himself. This should be done on 'cost of production' basis, i.e., the estimated value of the labour units spent in cutting the grass.

(ii) *Other Costs*: The cost of upkeep of work-stock, as already indicated, would include depreciation, labour, shoeing, housing, etc. Regarding depreciation, in the U.S.A. the experts value the work horses from year to year and on this they do not take into account the changes in the market values of animals. In the U.K. on the other hand the procedure is to value the animal at cost or purchase price after assigning to it a working life, depreciating it annually by dividing its value by the number of years of probable life irrespective of the fact as to whether the animal actually depreciates or appreciates in market value. If appreciation is allowed then the cost will include the profit due to appreciation in market value which is never realised. Besides it will give a false impression of low unit cost. Therefore, the method followed in the U.K. gives a comparatively accurate result. Whenever a bullock is sold at prices higher or lower than its inventory value or whether an animal dies, the profit or loss thus incurred should not appear as an item in the calculation of costs of bullock labour but should be accounted for in the final profit and loss statement.

As for labour charge, it forms a very small portion of the total cost and it is usually not recordable when the bullocks are taken out for grazing. If they are kept in the yard it is often impossible to record such time because any member of the family may be attending to them at short intervals. The item of shoeing is an expenditure which should be directly charged as it is done occasionally. As regards housing, an annual charge needs to be made since it does not form part of the costs. The small equipment like ropes, etc., required for bullocks made locally may cost only a little. Such equipment, if included in the general equipment, implements, etc., need not be specifically charged against the bullock account.

Two minor problems have been raised in the maintenance cost of bullocks: (i) whether the droppings (dungs) by the bullocks be taken into account? and if so how? The Punjab Board of Economic Inquiry and the Indian Council of Agricultural Research have both deducted their value from the maintenance costs. It is reasonable and correct to make the deduction. But the question 'how' has not been answered. The best method is to value the collection of droppings at their 'farm value'. The second question is whether the cost of maintenance of bullocks during the off-season and the work done by the bullock outside the holding should be taken into account? While there is no diversity of opinion on including the cost of maintenance during the off-season under costs, work done outside the holding is deducted. This is the procedure followed by the Indian Council of Agricultural Research, and is quite practicable and reasonable. There is no reason to exclude the value of the items under bullock droppings and work done outside the holding as profits accrued from their maintenance.

Another difficulty in calculating cost of bullock labour is that no separate records of consumption of bulk fodders are available as the farmers usually

feed all the animals together. In the Punjab this difficulty has been obviated by apportioning such feeding stuffs fed to all animals in the following manner:

A bullock, cow, buffaloe, horse, etc. above 2 years	..	1 animal unit
A camel above 2 years	..	2 animal units
A sheep or goat	..	1/5 animal unit
Young stock between one and two years.	..	1/2 animal unit
Below one year.		ignored.

The above is only a rough and ready method but may be used as a basis with variations to suit local conditions until a basis of investigation on a more precise formula can be formulated for the purpose.

EQUIPMENT CHARGES

The principle of apportionment of equipment charges is the same as that for manual or animal labour. It is quite possible to maintain a complete record of machinery hours of work but often this is not readily available. The preliminary requisite is to have the record of used time for each type of machinery, implement and tool, which would no doubt be useful for an investigator of costs. From the practical point of view the shorter method of apportioning cost of bullock drawn machinery and implement on the basis of bullock hours is used on the assumption that when machinery or implement is worked bullocks are also worked. As in other case, the charges for special equipment used for specific crop or enterprise should not be divided between various enterprises but should be charged to the enterprise concerned. Regarding the farm buildings their cost is apportioned amongst the various enterprises in proportion to the use being made of the same. These charges would include depreciation, repairs, replacement, interest, etc.

MANURES

All manures and fertilisers that are purchased are charged at cost. The difficulty is with the manure produced on the farm itself. In the U. K. the cost of farm yard manure is calculated from the tables prepared by Voelcker and Hall and brought up to date as regards the unit value of food residues. The livestock is first charged with the cost of feed consumed by them and the value of manurial residues along with the cost of labour specifically required for the handling of manure is then taken to be the cost of farm yard manure. Generally no charges are made for the home grown straw and the litter which enter the formation of farm yard manure.

On the Continent, the method used by the Danes is elaborate. They attempt to find out the units of manurial elements—nitrogen, potash and phosphoric acids in the food residues and value the units at the current unit price

of the artificial fertilisers. Allowances are made according to prescribed rates for the quality of manure obtained from different types of livestock, for the efficiency of storage, and for the fact that the unit value of farm yard manure is lower than that of artificial fertilisers. Farm yard manures so valued are often charged to the crop to which they are applied in proportion to the nitrogen content of that crop. If an artificial fertiliser is also applied to the crop it is assumed that the whole of it is used by that crop and a reduction equivalent to the nitrogen content of the fertiliser is made from the total nitrogen content of the crop for determining the nitrogen contents of the farm yard manure absorbed by that crop. In the case of leguminous crop a deduction is also made to correspond to the amount of nitrogen taken up from the air. Both these analytical methods are based on certain assumptions and cannot be uniformly applicable in all farms. The English method of evaluation was directly evolved for the purpose of fixing tenant right values in respect of unexhausted residues of manures. The straw is not given any consideration in their procedure. In countries where straw forms the largest part of animal feed, obviously the method should be so modified as to include residual values of straw as well. The Danish method takes into full account the value of straw. Where the use of artificial fertilisers is unknown to a great majority of farmers the use of unit value of prices may be too artificial and unreal. Under Indian conditions the cattle are left to roam in the fields and common grazing areas which offer a large portion of feed. The determination of the exact quantity of manure obtained from the cattle becomes impracticable on most of the farms under these conditions. Another wasteful habit present in the villages is the use of cattle dung as fuel and the quantity thus consumed may not be accurately estimated. The only practicable remedy is to get estimates from the farmer of the quantity of manure actually obtained from the farm livestock. The manure is rarely directly applied to the field from the yard and the method of storage, if any, is proverbially wasteful. The only possible workable idea of evaluating farm yard manure in Indian farms is to base the same on 'farm value' with which the farmers are more familiar. As in the case of feed and fodder the difference between the cost of production and the market price will cancel each other as the items will appear on both the sides of the account, the livestock account and the account of the crop for which the animal manure and the work would be utilised. The Imperial (now Indian) Council of Agricultural Research evaluated such manure at its sale value at the nearest place where it could be sold, less the cost of transport to such place. This seems to be the most reasonable method to the alternative of ignoring such farm yard manure on the ground that it does not cost anything to the cultivator.

At what rate should green manure utilised by the cultivator be evaluated? The Indian Council of Agricultural Research decided to evaluate it at cost of production without explaining the method by which this was arrived at. The cost of production basis with a clear working out of the method should be followed.

Residual effects

The second problem under manures is that of valuation and apportionment of the cost of residual effects of manures and fertilisers. The latter vary with the nature of the soil and locality, the season, cropping and precipitation, the amount of fertiliser applied, the amount of irrigation given to the crops and the kind of cultivation—intensive or extensive. The productive residues with which a cost accountant is concerned are :

- (i) artificial manure,
- (ii) farm yard manure,
- (iii) cleaning costs and beneficial cultivation.

In the case of artificial fertilisers which have been proved by scientific demonstration to have no residual effects the usual practice is to charge the entire costs to the crop to which they are applied, but in some of the fertilisers like mineral phosphates, lime, basic slag, etc., it is found from experience its effect lasts for a longer period and residues must be calculated. There can be no scientific certainty about the proportion in which costs should be spread. The case of farm yard manure is the most complicated in point of fixing the proportion of residual effects on subsequent crops. According to Adams, the cost of manures having residual value should be distributed to crops in proportion to the benefits they derive. As an example he suggests that in a four-year rotation on a retentive clay soil the proportion might be 40-30-20-10. In the U.K. the method of distribution of cost of manure and of cleaning cultivations between crops and years has been laid down by the Agricultural Costings Committee (1918-21) in the body of rules drawn by them. They have taken the duration of effect of farm yard manure as three years with the following proportion of cost for guidance :—

1st year	....	....	....	50%
2nd year	....	....	....	30%
3rd year	....	....	....	20%

Mr. Lawes and Mr. Gilbert have also drawn up a set of tables for the compensation due to the outgoing tenant for unexpired manurial value of the feeding stuffs that had been consumed on the farm during the previous three years, and these tables are in the main still used. In the Northern States of the U.S.A. where erosion is not likely to be heavy these costs are allocated on the basis of 40% of all the expenses for the first year, 30% for the second year, 20% for the third year and 10% for the final year. On the other hand in the Southern States where the rainfall is heavier, the proportion is 60% for the first year and 40% for the second year.

In India investigations on an extensive scale have not been so far made on this question. Therefore, it is inevitable that the method of apportionment chosen should be an empirical one or a mere approximation depending on the conditions mentioned which vary from tract to tract. In the costing investigations made in the Bombay State several years ago the following method was adopted: In the heavy rainfall tract, for example, of rice, full value of the farm yard manure was charged to the crop to which it was applied on the assumption that the large quantity of water standing in the field for a considerable period hastens the decomposition and renders most of the plant feed available for the standing crop. For sugarcane which stands irrigated in the field for about 12 months and lucerne and other irrigated crops which give yield for a period of years 70% of the cost was charged for the year of application, 30% being carried forward for the following year's account. In the case of dry or unirrigated crops, 50% was charged to the first crop, 35% to the second and 15% to the third. Indeed in the case of heavy crops with scanty rainfall farm yard manure may sometimes act as a detriment to the crop during the first year by absorbing considerable amount of soil moisture and under such conditions it would not be correct to charge even half the cost of the manure for the first year.

The Punjab Board of Economic Inquiry used the proportion of 50%, 30% and 20% for the first, second and third crops sown on the same field. According to Mr. Patil, in India, the full value of the farm yard manure should be charged to the crop like rice in the heavy rainfall tracts; for sugarcane and lucerne he recommends that 75% of the value should be charged to these and 30% to the succeeding crops; in case of dry crops 35% to the second crop and 15% to the third crop. In case the crops are followed by a heavy crop like sugarcane the costs should be allocated at 50% to the first crop and the remaining 50% to the next crop. These percentages have been quite arbitrarily fixed for purposes of convenience in evaluating the residual value of manure to successive crops. If calculations in the form of tables, as prepared in the U.K. are drawn by our agricultural economists in regard to the residual effects of manure on various successive crops under different degrees of soil erosion, apportionment of the residual value of manure can be obtained with greater accuracy than at present. A uniform proportion of allocation for all tracts being impracticable, the guiding principle should be the degree of soil erosion, the rainfall and the nature of the crop.

Beneficial Effects: The cultivation required for the production of some crops leave a beneficial effect on the crops that follow in rotation. Similarly crops like sweet potatoes are only grown for their value as cash crops and the cleaning effect is merely incidental. In such cases the major portion of the cleaning costs should be charged to the particular crop, the following crops should be charged at rates in proportion to the estimated benefit received by each. The problem of leguminous crops which also leave beneficial effects requires investigation for purposes of apportionment.

SEEDS

Under the item 'Seeds', the farmer uses the seeds grown on his own farm and sometimes borrows on specific and definite terms involving in many cases a return in kind of a larger quantity. For the seeds used from the farm, the cost can be calculated at the prevailing market rate or harvest rate or cost of cultivation. The Indian Council of Agricultural Research has adopted the method of charging it at market prices. As explained in the item under home-grown produce, it is always preferable to use the method of cost of cultivation or the farm value. This procedure, however, does not take into account storage charges and also assumes that the cost of cultivation was the same as in the preceding year because the seed utilised was from that of previous year. It is the general practice to charge the actual cost of cleaning the seed but any special charges for cleaning at the sowing time is charged directly to the crop concerned. Sometimes the price of seeds is kept a little higher in order to cover expenses under storage, removal of dust, etc. There are some crops such as sugarcane and lucerne where the seed applied once produces two or more crops. In such cases the apportionment should be as in the case of residual values in manures, i.e., according to the proportion utilised by each crop.

CHAPTER IX

PROBLEMS UNDER JOINT COSTS, RENT AND INTEREST

Usually the farm products are not grown separately but jointly, such as wheat and wheat straw, cotton and cotton seed, maize and maize starch, etc. The term 'joint' means that they are products of the same operation or set of operations, the costs being incurred for the whole of the latter without reference to the resultant products which are two. How should the cost for each of the resultant products be determined? This is a very intricate problem. Some treat the subsidiary product as only a by-product and charge the entire cost to the primary product while others do not altogether ignore the by-product. In the U.K. after trying various methods the general procedure followed is to treat the secondary product as a by-product and assign no part of cost to it. The following methods are followed :—

- a) Charging the by-product at market price and then deducting it from the total cost in order to obtain the net cost of the primary product, i.e., treat the by-products as credits calculated at market price.
- b) Apportionment of the total costs according to the market values of the joint products, i.e., allocation of costs on the basis of percentage receipts from the sale value of the joint products.
- c) Apportionment of the total costs according to the feeding value of the products.
- d) Apportionment of the total cost on some pre-determined fixed basis.

Where there is a market for these by-products and their market value can be ascertained it would be possible to use either of the first two methods. A certain margin of error must of course be allowed in such cases, as these by-products are not meant for sale but only for farm use. The imputation of market value to the by-products will thus give an unreal cost. Further the first method implies that the market price of the one component is taken to be its cost of production. In periods of abnormal price relationship the price of the secondary component may be comparatively quite high and may thus give a wrong proportion of the cost of production of the main product. This is illustrated by an example quoted by Prof. G. D. Agarwal^o :

^o Vide his Paper on the Subject. 12th Conf. of I. S. A. E., 1951.

GOVERNMENT AGRICULTURAL FARM, KALYANPUR, (KANPUR)

Years	Cost of production per maund (in rupees per acre)			Market price of bhusa per maund. Rs. per acre
	Grain (1)	Grain (2)	Bhusa (3)	
1936-37	2.30	2.46	0.57	0.62
1937-38	1.71	2.12	0.42	0.72
1938-39	2.31	2.50	0.57	0.67
1939-40	1.48	1.83	0.37	0.65
1940-41	1.16	1.92	0.29	1.00
1941-42	2.18	3.16	0.54	1.34
1942-43	0.96	2.76	0.24	2.00
1943-44	0.88	5.39	0.90	5.00
1944-45	3.66	6.10	0.91	3.00
1945-46	0.84	4.73	0.21	4.00
1946-47	2.39	4.99	0.59	3.00
1947-48	3.99	6.56	0.99	3.00
1948-49	1.66	7.66	0.41	6.00
1949-50	9.25	11.30	2.31	5.00

1. When *bhusa* is charged at market rate.
2. When *bhusa* is charged at its cost of production apportioned from the total cultivation expenses on the basis of its price ratio to the price of grain
3. Cost of production of *bhusa* apportioned from the total cultivation expenses on the basis of its price ratio to the price of grain.

When the cost of production of barley is calculated by deducting the market value of *bhusa* from the total cultivation expenses, it is, in spite of considerable rise in the cultivation expenses, less in 1945-46 and 1948-49 than that in the prewar years when the cultivation expenses were very low.

It is suggested by him that as an alternative the apportionment should be done on the basis of the ratio between their market prices which should not be varied according to the fluctuations in their prices but fixed over a period on the basis of the relation between their prices during a normal price period. Though this seems to be an improvement it is likely to introduce complications with reference to the choice of the normal price period as well as the effects of changing price levels on the price relationship between the main and the by-product.

The third method has a very limited scope in this country. In order to overcome these difficulties the Agricultural Costings Committee, Great Britain (1918-1921) adopted the fourth method of fixing a predetermined basis. The cost of straw was fixed at 1/7 of the total cost of production exclusive of the cost of marketing wheat, barley or oats. The essential objection to the application of a uniform fixed basis is that some crops do not seem to be equally important in the farming economy and the relative importance of each of the two products obtained will vary in different farming systems. Under Indian

conditions the relative importance of the by-product could be fairly determined and hence the method adopted in the U.K. of fixing a determined basis of allocation would be suitable. In the alternative, the second method may be preferred.

MIXED CROPS

The apportionment of the cost of mixed crops i.e., several crops sown together in the same field, e.g., wheat and gram, presents great difficulty. The specific expenses on any one of these can of course be charged directly, but joint costs or other expenses may have to be distributed on the basis of

- (a) the value of the produce of the different crops;
- (b) the quantities produced of different crops;
- (c) the area sown under each of the crops, and
- (d) the respective total costs of cultivation of different crops.

The last method amounts to the allocation of the common expenditure in the same proportion as the separately calculated or the known expenditure of each of the crops. This can be worked out on some methodical basis. The equation method is unworkable because unless the expenditure known to have been incurred separately on each crop is a 'constant', i.e., it does not include any item to be evaluated at cost of cultivation, the result will be inaccurate. The area basis seems to be the most suitable alternative. Here the difficulty is one of determining the exact area sown in each of the different crops in the same field. In the U.P. in respect of some important mixed crops a formula has been in existence for a long time in compiling figures of areas sown under different crops. This formula is recognized by the Agricultural Department. The area under each of the mixed crops is determined on the basis of either (i) the quantity produced of each crop, or (ii) the quantity of seed utilised for each.

In the first case the proportion of the actual yield of each crop to the 'normal yield' is worked out and then the area in the field of the different crops is ascertained in relation to such proportions. The assumption here is that the weather conditions will have a similar effect on all the crops sown mixed in the field. To some extent this may or may not be correct. Further the utilisation of 'normal yield' is also open to objection regarding accuracy. The determination on the basis of the quantity of seed utilised gives a more satisfactory solution. Here also the assumption is that the seed weight per unit of area for a crop remains unaltered when that crop is sown mixed with other crops. If in any specific case this assumption is known to be not true to facts, the results given by this method can easily be modified suitably in the light of the available data.

RENT, INTEREST AND MISCELLANEOUS EXPENSES

The problems relating to the inclusion, determination and apportionment of rent and interest in farm cost assessment have been the subject of keen controversy for a long period now amongst the cost accounting experts as well as economists. Much of this controversy is the result of differences in approach and in the purposes for which cost assessments have been made. The main points to be decided are (i) whether rent and interest are 'costs', (ii) whether they determine the price of the product, (iii) whether rent and interest can be separated in agriculture, (iv) on what basis should they be determined if they are to be included as costs and on what basis should they be apportioned among the individual enterprises of a farm unit. We may first confine ourselves to 'rent' though the general points of its inclusion in cost equally apply to interest.,

Rent: In economic theory, as conceived by Ricardo, rent on land is the part of the product of the land received by the owner or the compensation he receives for the utilisation of the natural and indestructible forces of the land. Thunen who approached the concept from the point of view of accountancy stated: By rent on land I mean whatever remains of the income on the estate after deducting interest on the value of buildings, capital invested in crops and all other perishable capital (livestock, machinery, etc.) i.e., all capital which may be detached from the soil, this remainder truly representing rent. Farm accountancy, therefore, makes it possible to calculate exactly the rent on land by deducting from the net return the interest service on all destructible capital. The economists, however, disagree on the validity of justifying rent as cost. Ricardo's theory has been supported by Thunen, Mill, Bannstark, Roscher, while it is opposed by Say, Rodbertus, Jones, Carey and Laur. According to the opposite school rent is not a direct product of the capital and of the land, but is generated by the combined activity of the factors of production. All the factors contributing towards the formation of gross return contribute also towards the constitution of rent. Investigation into the evolution of land rent in Denmark, Switzerland and Poland have conclusively shown that farms provide the owner of the land with a rent which does not depend solely, as Ricardo claimed, on the more or less favourable position of the land, but above all on technical conditions, on animal and vegetable forces which contribute to the production, on wages and also on the relations between the prices of articles required by agriculture and those of agricultural products or overpopulation and on the intensive demand for land caused by it. This much, in brief, on the evolution of the concept of rent.

Examining now the treatment of rent in total farming costs two types of rent may be distinguished. One is the economic rent and the other contract rent. Farm rents fixed on an annual or periodical contract basis cannot be escaped within the rental year or period although reductions may be allowed by the rentor during the periods of depression and to that extent the cost may be escaped. Therefore, generally, contract rent is an inescapable cost

until the term of the contract when of course it becomes escapable. From the point of view of the independent tenant farmer, the rent has to be paid as it is an entrepreneurial cost. Consequently in accounting procedure the full rent charged is invariably treated as cost in the determination of the financial results of the farm. In the analysis of the pure economist, contract rent also should not be treated as cost even in the short run; probably he may agree to term it as an institutional cost but not as real cost. In the long run, when the contract ends or where the period is much longer than that of the rent contract, rent also becomes real cost to the pure economist. The contention is that even from the individual farmer's point of view for short period planning, rent and certain other costs have been fixed and are inescapable; therefore, rent and other costs of a similar nature should be disregarded. In the short run it is advisable to continue production as long as gross revenue exceeds escapable costs and for this reason the use of the concept of the economist may prove to be more realistic than that of the accountant in taking decisions on current production policy. This argument implies that for short period farm planning there may be cases where rent may have to be ignored as an element in cost.

The difficulty arises with that of the owner occupier. Whether his cost assessment should include rent? If the owner occupier were to lease his land to another producer he will in fact receive an income for it which is of the nature of 'opportunity' cost. Hence, when a producer who uses his own land is not provided a return, after all his other costs including returns to management have been accounted for, equal to the amount which he would receive by leasing it, he is losing the opportunity of recovering his income from his investment on land. When a tenant who pays rent to the owner for the lease of the land must enter this payment among his production cost, why should the owner be forbidden to include it? Actually, the farmer who purchases the land pays the former owner a capitalised rent. From the national point of view also if rent is not taken into account he is making an inefficient use of the land resource. Therefore, it is argued that the owner occupier should also include rent in his cost assessment. As against this, the classical argument is that rent represents only the measure of value of production due to variation in situation and inherent capabilities of different soils, i.e., it is a differential return. Therefore it cannot constitute an item of cost. They further state, that from the social point of view, interest on investment, which includes rent from land as well, is an income and not a cost. An objection from the accounting point of view in including the interest charged on owned capital is that the farm may show a loss when profits are in fact earned. C. S. Orwin in his book "Farming Costs" observes that if it be accepted that the cost of an article can be nothing more than that which is paid for it, it is perfectly clear that interest on capital is not a charge against cost. Interest on the farmer's own capital must always be an allocation of profits. Interest on borrowed capital must be charged as an item of cost. Interest on capital owned may be taken as a part of profits. But such a

procedure presents considerable difficulty in comparing the relative profitability of different enterprises. One of the main objects of cost accounting is to compare costs of various enterprises. If the accounting method should be made easy for such purpose, the elements involved in the computation must be equivalent. Further, conditions on the farms vary. Some farms are rented for cash, others on a share of produce basis, some others pay interest on capital and there are others who have farms free of debt and with owned capital. It is reasonable to suggest therefore, that a charge for owned capital and for the use of the land should also be included in the elements of cost. With the inclusion of rent the differential advantages claimed by various classes of land may also tend to be equalised. There is a suggestion that cost figures should be worked out with and without interest on investment. Such a procedure would certainly be useful in comparing conditions on farms.

As to the prevailing practice, *some costing experts allow interest as cost but not rent; others include both, while there are some who include rent but not interest.* The American and Swiss accountants, in general, include both rent and interest as one sum, designated as interest on capital investment, irrespective of whether the land is owned or not. The rate of interest usually charged is that on the safest class of investment. The British accountants under the leadership of C. S. Orwin include rent in the case of only tenant farmers but do not allow interest on investment, though they consider it a matter of vital importance to find out the rate of interest made by the farmer on his total agricultural capital. Interest on borrowed capital is taken to be a charge against profit and appears in the final profit and loss account and not apportioned to the different farm products. Under the Danish system, all expenses of production including the property tax but excluding rent and interest, are deducted from the total receipts and the balance taken to be the amount remaining to provide interest on total agricultural capital.

It follows from the above discussion that the tendency in recent economic thought and accounting practice is to include rent as an element of cost. It is suggested by a few that the question of inclusion or otherwise of rent and interest on real estate should depend on the object underlying the cost of production studies. If the object is to judge the comparative efficiency of farms, they would exclude these two elements. If the object is one of price-fixation and State assistance to farmers, they would include rent and interest in the cost of production. Such a distinction between objects is no doubt essential. But at some period of calculation even from the individual farmer's point of view, rent should figure as an element of cost for the reasons explained above. It is therefore reasonable to treat it as cost, irrespective of the purposes, though the latter may be distinctly mentioned.

In the determination of rent (and interest), where the land is leased and the capital borrowed, the procedure is easy. In the case of owner farmers, the

Americans adopt 'the alternative use value' as the basis for determining rent and interest. Here the assumption that there is free alternative use for landed capital is not always correct in an old country like India. The land and its improvements form the major part of farm investment. Leaving areas where estate system prevails there may not be many tenants and opportunity rents. Land has always had a sentimental, social and speculative rent value and the actual exchange value is always higher than the value in use for agricultural production only. The rents, wherever they could be ascertained, are normally below the interest calculated or expected on the value of land. The problem is one of separating interest from rent. If interest is charged on such high exchange value of land, it will include not only interest on the economic value of the landed capital but also an amount representing a charge for the speculative, social and sentimental value of the land. In a country where the largest part of the ownership of the land, labour and capital belongs to the operator, farming offers perhaps better opportunities for cheap production of new and replacement of old capital in the form of bunds, drains, fences and the natural growth of new livestock capital. The farmer is therefore relieved of a large part of the cost of acquisition of considerable part of his capital goods. For these reasons it is suggested that the return on his total investment should be found out without charging any interest in the cost statements. Exception has however to be made for borrowed capital for which interest must be deducted from the gross profits.

The above procedure while obviously reasonable in the conditions mentioned may not be applicable in cases where a large investment of owned capital has been made. It would be necessary to separate the element of interest after charging rent and include it in cost as a separate item both in respect of owned and borrowed capital used in farms.

There are also certain special problems connected with the determination of rent. Farm real property is a composite factor, consisting of land, its permanent equipment, farm house, farm buildings and sometimes also farm cottages in other countries as U.K. and the U.S.A. How should the cost charge be allocated among these constituent elements of farm property? The general principle followed in respect of farm-house in the U.K. is to treat it as an 'official residence' and attribute to it a rent charge normally paid to houses with such accommodation and amenities based on the assessments made for local taxation. The rental value of the farm-house is considered as the consumer's income and deducted from the rent to be charged to productive processes. In India in cases where there are farm houses, this procedure may be adopted. In the majority of cases, the farm house may be only mud-dwellings and it is not necessary to separate these for purposes of determining rent. Even in the U.K. the problem of segregating the proportion due to land and buildings respectively is avoided. There is no justification either, as the cost on buildings is inseparable for two reasons: (i) it is irrevocable, (ii) it must be always incurred jointly with land rent charges since it is not possible to

rent a farm without the buildings. In the case of new erected buildings, if the rent is raised as a result, the practice is to charge depreciation and interest and allocate it directly to the enterprise. With the passage of time the charge for the new buildings rapidly become an inseparable element of the total farm rent. As a rule, therefore, capital costs of buildings lose their significance for current costing purposes with the passage of time, and relations which are said to exist between capital depreciation and rents or capital costs and capital values are irrelevant in general for costing purposes. But there may be instances where buildings are used for specific production purposes and in assessing the costs of individual enterprises the cost accountant, in such cases will have to fix a rent charge separately on some basis or other depending on the purpose of costing being undertaken. If the object is one of price policy or the expansion of production and if new buildings would be required the principle recommended is a charge based on depreciation and interest on capital replacement cost. If the object, on the other hand, is only to maintain production at the current level a building charge sufficient to cover costs of repairs and maintenance of buildings is deemed to be sufficient. Since the rent of some buildings cannot be allocated to any single enterprise, the spreading of such costs over all the farm enterprises by one method or another has to be accepted.

Rent in Crop Costs: In over-all cost accounting and in the single enterprise costing techniques the allocation of rent to a given crop is calculated on a per-acre basis over the whole farm, i.e. an average rent per acre of cultivated land is arrived at deducting the charge made for the farm house separately. Some cost accountants however reserve the right to adopt a differential rate of allocation according to the different categories of land. But there seems to be little value in such a calculation, as rent itself has not been charged originally on the differential rate based on categories of land but only on the farm as a complete unit.

Applying the above principle rent is usually allocated to various crop accounts on the basis of their area and the period for which the field remains occupied by them. For example if a field is fallow or green manured during *khari* and under wheat in *rabi*, full year's rent is charged to wheat account. In case a field is under a main crop in one season the question arises whether the rent should be allocated equally to both the crops or should the main crop share a larger portion of it. What should be the basis of apportioning rent to the main and minor crops and to crops grown in mixtures? Should the proportions be arbitrarily fixed or should they bear some relationship with either the gross or net income of these crops? Generally the apportionment is governed by the value of the main crop in the rotation. Thus, for example, in the sugarcane area of the Bombay Deccan, it is the value of the sugarcane crop which gives the land a higher rental value and it will not be therefore justifiable if a minor crop like *bajra* which follows sugarcane in the rotation is charged the same annual rent as for sugarcane. There are two ways by

which a fairly equitable apportionment of rent can be made in such cases. One way is to distribute the total rent for the whole rotational period amongst the different crops which enter into rotation in proportion to the value of their yields. If this method is adopted, the accountant will have to wait till he studies the cost accounts for the whole rotational period. The other method is to arrive at arbitrary valuation of crops which enter into the rotation and then apportion rent on the basis of those valuations. The first method is preferable in point of accuracy. Another problem in the apportionment arises in the case of lands which are double cropped and in this case also distribution of annual rent between the two or more crops in proportion to their value seems to be equitable. When land is rented on share system and the landlord supplies part of the working expenses, it is necessary to deduct from the value of the produce paid as rent, the working expenses paid by the landlord.

Interest: Regarding the rate of interest to be charged on the capital invested by the farmer there is a wide divergence of views. The Punjab Board of Inquiry has charged interest at the rate of 4% on the original value of bullocks while the Imperial (now Indian) Council of Agricultural Research permitted the different States to fix the rates prevailing in the local areas which varied from 8 to 9%. It would be preferable to fix a uniform rate taking into account the local conditions prevailing. The allocation of interest on investment other than that charged for the use of land is made in proportion to the capital sunk under each branch of the business.

MISCELLANEOUS PROBLEMS

There are certain items of costs which must be taken into account in the calculations but which elude either quantitative determination or proper allocation under the principles studied above. These elements of cost may be simply mentioned and the research worker may be permitted to use his discretion and judgment in including them in his calculation under any one of the broad classifications suggested. Similarly there are various other problems in calculation for which no uniform method can be suggested.

Payments in Kind: Payments made in kind at the harvest in the field are not often correctly recorded. The investigator must make his own estimate in such cases, after repeated enquiries.

Fodder Production: The cultivator, usually cuts the green fodder grown in the fields daily according to the needs of the cattle. He cannot therefore give the total quantity of production at a time. The investigator must calculate the quantity, taking into account the stock of cattle and their requirements.

Sale of Standing Crops: It is customary to sell the standing crops, particularly in the case of cash crops, as sugarcane or crops such as green fodder.

The total quantity of production of the crop has to be ascertained only from the buyers or estimated.

Mixed Bhusa : The *bhusa* is obtained from several crops such as wheat, barley and gram and it is mixed up and stocked together. While recording the quantity of *bhusa* fed to cattle, the investigator may not be able to identify the crop to which the *bhusa* relates.

Illegal Payments: The cultivators in India have to incur some expenditure by way of illegal gratification either for the supply of irrigation water or for obtaining some aid from government or other sources. If expenses of such a nature have been incurred, though illegal, they must be included under some heading as 'Bakshish' or "Gratuitous Expenses".

There are losses which occur at intervals. These arise mainly from (a) insect pests (b) seasonal failures of monsoon or rains i. drought conditions ii. early rains iii. floods, (c) destruction by animals, (d) labour shortage, (e) theft and (f) loss in storage. In the final balance sheet it is necessary that some allowance is made for all these factors if they have been caused on a significant scale.

BALANCE SHEET OF AGRICULTURE

A survey of the farm expenses should obviously lead to a consideration of the Returns and the preparation of a consolidated Profit and Loss Account and Balance Sheet, for each farm as a business unit, for each household and from these for each administrative zone and the country. The importance of such accounting can be indicated without going into the details of the ways of preparing a balance sheet. That is by itself a separate subject. The balance sheet of agriculture is a tool for social accounting. It contributes to the measurement of the status and changes in the agricultural sector of the economy. It contributes to an understanding of the inter-relationship of the agricultural and non-agricultural activities of the economy. It covers in part the farm portion of the household sector of the economy.*

* Agricultural Economics Research—Vol. 11, No. 3, P. 94.

CHAPTER X

THE COST CONCEPT

In summing up, the discussion on the elements that comprise the cost structure and the methodological problems should now enable us to formulate a concept of cost consistent with economic theory yet measurable and significant to the peculiar conditions of our agricultural economy. The divergent views on the cost concept are mainly due to the two distinct approaches made. Either they are purely economic or they are purely from the statistical and accountancy point of view, i.e. either the concept is economically correct but not measurable or it is measurable but not consistent with economic theory. A comparison between the conditions in industry and agriculture will bring out the difficulty in formulating a single concept of cost. The measurement of cost in an industrially developed economy involves very little imputation as most of the factors of production as also raw materials etc. have to be procured from the market, and the individual unit cannot decide or alter the valuation of these isolated factors. In agricultural production the costs of the different factors are not automatically determined and known. It is difficult to provide even a satisfactory method of imputing costs to these factors of production. The observations of some American economists on this point are quite relevant to be noted:

"The above discussion, like most economic theory, has assumed primarily with reference to production for market, by employing factors of production having a market valuation and by entrepreneurs motivated primarily by the objective of maximum net profit; agricultural competition continues to be influenced by certain peculiarities which do not conform closely to the pecuniary assumptions intrinsic in conventional theories. As noted already, the family as a whole and not the individual, is frequently the unit of competition in labour's valuation of itself. Much of this family labour fails to respond to the inducement of commercial wage rates because of the obvious economic, social and psychological advantages of continuing family connection. In areas where agriculture is not predominantly commercial there is frequently the added influence of the lack of outside alternatives."

This explains the reasons for the existence of sub-marginal farms and un-economic units of production.

In agriculture, the function of production is either for subsistence or simply for commodity production. Subsistence production here means pro-

duction for direct consumption by the producer. Commodity production is production with a view to consume after an exchange. The exchange also is not between profit making entrepreneurs but between self-employed producers themselves. In the case of subsistence or simple commodity production the different factors are almost completely integrated, i.e., the factor payments like wages, profits, rent, etc. have no significance separately. There is practically no sale on a large scale and the farm itself supplies all the raw materials. These two forms of production together constitute the household enterprise production, i.e. an enterprise combining production and consumption within the same unit in contrast to *business units* which control only production and *household units* which control only consumption. The nature of the farm enterprise as outlined above provides two alternatives: either to accept the usual cost concept of a market economy and devise appropriate measures of calculating costs of cultivation on the line of business firms or formulate a clear cost concept in the background of the prevailing conditions in the agricultural economy. This can be easily said than done. The distinction between real versus accounting costs has already been dealt with. The academic definition of cost as value sacrificed is purely a subjective approach that cannot guide us to any objective measure of cost. In that case it implies only an exchange equivalent of any commodity.

The important point in the measurement of cost is the purpose for which we are devising a method. There are historical or actual costs, adequate income costs or necessary costs (which have to be realised in order that the labour of production may be maintained). Further the institutional set-up of the farm itself affects the calculation. Considering the set-up of a farm enterprise as corresponding to a planned aggregative economy it is suggested that cost should be simply defined as reproduction of conditions of the initial level of production, i.e. consumption of the household and depreciation charges for wear and tear i.e. the normal replacement needs of the economy. In such an economy there is no cost and profit except in the sense of a consumption and investment decision. Profit can only be defined as new investment of a period. It is claimed that such a definition of cost, taking together the farm and the household and suggesting a procedure of measuring it while avoiding highly subjective or refined and imputed costs, confirms to the primary object of the calculation of studying the conditions for maintaining agricultural production at the initial level, the conditions for its expansion and its decay. Such an emphasis no doubt clearly brings forth the significance of an integrated economy like that of a farm in which any one element can and does affect directly other elements in that economy. A farm will be producing at cost only when the net change in the total economy is zero, without considering whether the change is due to the household consumption or due to production operation. By this definition cost is measured as the gross value of the product minus the net investment, both valued at the different purchase, construction or sale price as the case may be of the household. Investment in this case will include both increase or decrease in capital equipment,

buildings, etc., as also durable consumer goods, the household may add or lose. The net increases in the assets of all types is considered as the profit the rest being his cost. The chief objection to this definition is that it considers the household consumption of all units as cost, and leaves it to be arbitrary from farm to farm. The advantage is that the controversial imputation problems are avoided. It is a unified cost of running a household enterprise including the farm. For purposes of comparison it is suggested that instead of applying the principle of opportunity cost and working out a normal or market cost, the household enterprises should be classified into suitable size groups according to the value of output at a point of time.* They may be further grouped as those with positive investment and those with negative investment and those with 'O' investment. The average of costs for the group with 'O' investment may be considered as the normal cost.

This simplified or unified cost-concept does not cover the requirements of cost accountancy nor does it satisfy the object of comparing cost data from enterprise to enterprise in a farm and from farm to farm. Though the conception of a farm as a household enterprise and defining cost accordingly is economically sound, it limits the possibilities of arriving at cost analysis for the various purposes detailed previously.

It is clear that cost of production in agriculture defies a simple definition due to the alternative objectives aimed at and the basis adopted by the farm economists and farm accountants. From a different angle from that discussed in the previous paragraphs and a more significant and important one these objectives can be reduced into two—one that of production objective and the other that of welfare objective in agricultural policy. Both of them relate to two quite different problems. On the production side concern is with the allocation of resources. Here the test is allocative efficiency. On the welfare side concern is with income problems which are related primarily to disparities among families in the amounts of resources owned. Judgment on the distribution of income among the farm people and its utilisation can be made only on the basis of welfare considerations. A clear understanding of the basis and nature of the functional dichotomy separating resources and income problems is of utmost importance in differentiating and limiting the scope of the cost concept in agriculture.

The two important elements in cost which lead to a variety of cost concepts are the labour of the farmer and his family and investment in land and equipment. These two elements appear in the dual role of costs and returns and vary with differences in the conditions of the farmer, market conditions and public interest in agricultural production. Costs like prices are per unit magnitude. They therefore cannot have any significance to the personal income distribution objective which depend upon the volume of output per

Vide. Á. Ghosh and R. Mukherjee—Paper read at the 12th Conf. of I.S.A.E. 1951.

person or per family. But this personal income aspect affects the above two elements of cost which are included in the cost structure.

We find again that most of the confusion and controversy arising over the methods in calculating cost of cultivation are due to the lack of understanding of the necessary distinction between the social cost and private cost. Requests for cost estimates often come from persons or groups interested in choosing them as bases for price negotiations or to support an argument for altering the existing income distribution. For such a purpose the elements of cost would naturally be different from that for the purpose of reflecting fully the allocative efficiency of the resources in farm enterprise. The second cause leading to the confusion is that of the fashion of economists, perhaps inadvertently, to present average costs per unit in monetary terms only. This method of presentation inevitably imputes unrealistic objectivity to the subjectively evaluated cost estimates. Our purpose should be in presenting a simple method to re-examine these existing ideas about social versus private cost and money versus physical inputs and outputs and also about the nature of costs in farming. This would involve important advances in research by a re-formulation of the elements of costs according to the specific approach. This is beyond our scope at this stage. In any case the concept of cost should be such that it can be identified and measured in physical resource terms, though ultimately expressed in monetary units. The obvious conclusion is that what constitutes a cost depends largely on the purpose for which the cost assessment is being undertaken and the length of the period under consideration. It is futile to search for a simple and single definition. The analysis of farm costs is a task which involves the use and application of economic theory, statistical techniques, accounting procedures and the personal judgment of the analyst. In view of the complexity of the problems involved one should not be surprised that differences in opinion arise as to the methods of analysis and to the soundness of the results obtained. The safe course is always to first state the purpose and then relate the conception of cost to that specific purpose.

Before concluding, the necessity for Central direction and planning in conducting costing enquiries must be stressed. It is not sufficient merely to have isolated studies of groups of enterprises even on a uniform method. Apart from international comparisons, which may not be possible for all crops, even for the purpose of comparison within the country, the peculiarities and conditions in the different zones would require modifications in the costing technique. This can be done only under the guidance of a Central Bureau of Costing Research manned by experts in the field of cost accounting and agricultural economics. The German National Planning of Costing* was conceived in this spirit and though we may not enforce a similar compulsory scheme of costing the investigations and studies should be broad-based and

* Vide. Dr. H. W. Singer: Occasional Papers Published by National Institute of Economic and Social Research.

co-ordinated and the proposed central bureau should be entrusted with the task of ultimate analysis and working out of the results for national and international comparisons.

CONCLUSION

A fairly large field has been covered in attempting a condensation and synthesis of the various problems and difficulties encountered in the study of farm costs with particular emphasis on the methodological approach. It now remains only to examine how far or to what extent this research can be of use in the practical application of the methods suggested. The aim of the scientist is to discover and analyse facts as they are and postulate certain theorems or principles which can be valid under given set of conditions and time. It would be too ambitious to visualise immediate beneficial results by the adoption of these methods in the profession of farming either by way of improved efficiency or reduction of costs. It must be recognised that the pragmatic aims of research are, after all, to assist through the development of principles, data and improved technique, those more or less directly concerned with farm management to direct their actions more intelligently. The value of such research experiments lies only in preparing the way for a better organized and scientific system of farming in due course of time along with the fundamental changes that may be necessary and may take place as a result of Governmental Policy and Action Programmes.

In addition, broader social considerations, as for example, of the effect of the cost-structure on the incomes and standard of living, and the tenancy conditions of the farmer, also envisage the utility of research in this field. Nor need we emphasise the practical importance of developing for farm cost calculations a consistent body of theory. Only when 'facts' and 'year to year' or 'period to period' running analysis are cast against the background of sound principles and theory, will they reach their rightful degree of validity and usefulness. Furthermore, forecasting of estimation is impossible otherwise. If this work of research can stimulate the interest of students in building up a body of theory for costing in Indian Agriculture it will have done its purpose. Best practical results will probably be secured if gradually a wider circle of farmers adopt or take to farm accountancy and the field investigators and agricultural economists, on their part, perform their function of obtaining the needed data about the farm and the farmer, and leave to the specialised central research institutions or offices the function of analysis and interpretation of results and other aspects of policy and procedure which research may develop.



APPENDIX

DEFINITION OF TERMS

According to Prof. Laur's suggestions the following terminology has been used in compiling international statistics concerning the results of farm accountancy; [for details see International Institute of Agriculture, Farm Accountancy, Collection of Statistics for 1936-37 and the preceding years—Laur, Prof. Dr. E.: Terminology and bases for an international agricultural statistics founded upon farm accounting, Brugg].

- a) *Net return* is the interest actually earned on the total capital invested on the farm. It is compared by subtracting farm expenses from the gross return.
- b) *Gross return* means the total increase in value obtained in one year on a farm through transformation, exchange and revaluation. It, therefore, includes: cash reports and accounts from the sale of farm produce, the value of contributions in kind from the farm (including rental value of farm dwellings) to the household, non-agricultural undertakings and hired labour; the value of the produce of the farm transformed into permanent improvements or repairs on the farm itself (e.g. wood for buildings or implements, in so far as forests have been considered as belonging to the farm), increase of supplies and of the live and dead stock.
- c) *Farm expenses* are understood to cover the total amount of sacrifices of every kind made in order to obtain the gross return, with the exception of a charge for interest on the total capital invested. By adding the interest charge on the total capital invested, to farm expenses, the cost of production is obtained. By subtracting labour costs (employees' wages, fair wage claim for the unpaid labour of the operator and his family) and taxes from farm expenses, operating expenses are obtained. Farm expenses include, therefore, outlay for hired labour (cash wages, board, contribution in kind from the farm, insurance, etc.) a fair wage claim for unpaid labour of the operator and his family on the farm; other cash payments for current expenses, other contributions in kind from the farmer to cover farm expenses; decreases of supplies and of the live and dead stock, and depreciation charges.
- d) *Family farm earnings* are the portion of the gross return which the farmer actually receives as remuneration for the use of his own capital and for the work done by himself and his family. Family farm earnings can be found by deducting from the net return the interest paid on debts and re-adding the fair wage claim for work done by the farmer and his family.
- e) *The social income* from the farm consists of the net total increase of value obtained from the operation of the farm. It, therefore, includes, besides net return, a fair wage claim for the unpaid labour of the operator and his family, wages in cash and in kind to workers and employees and farm taxes. In other words by dividing net return into income on net wealth and—if there are payments to be made for rents or interest charges on debts—outside capital, the social income consists of the family farm earnings, wages and salaries, payment to landlord and creditors, and dues and taxes to the State; the communes, etc., included in the farm expenses. It is therefore possible to compute the social income directly by subtracting operating expenses from the gross return.

Several experts in rural economy are opposed to the use of the term 'social income'; They assert that it may give rise to misunderstandings and confusion. Prof. Th. Brinkmann (Brinkmann Th. and Hagmann H.: Auswertung der

Buchführungsergebnisse Rheinischer Landwirtschaftsbetriebe. Wirtschaftsjahr, 1935-36 (and for the previous years). Veröffentlichungen der Landesbauernschaft Rheinland, Bonn) has therefore introduced the term "farm income" which is, in his opinion, the most suitable standard for measuring the efficiency of the farm, especially, because it takes into account also the labour structure of the family farm. The farm income represents the difference between the total return (which corresponds to the gross return as defined above) and the operating expenses (farm expenses less cost of total labour).

In order to conform to the conditions prevailing in Italian agriculture, Prof. G. Tassinari (G. Tassinari: *La Distribuzione del reddito dell'agricoltura Italiana*, Piacenza 1931) first computes the net product (*prodotto netto*) which is the difference between the gross product (*prodotto lordo*) and expenses in so far as these do not include the payment of the person whose collaboration makes it possible to obtain the agricultural output. He then calculates the distribution of the net product among the various categories (landowners, conductors, technical managers, workers, etc.).

As regards their content, the terms adopted by Brinkmann and Tassinari agree with the term 'social income'.—(*International Review of Agriculture*—January, 1941).

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