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**Economic Aspects
of Mechanization
on Medium-sized
Farms**



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NOTES ON THE ECONOMICS OF MECHANIZATION

THE economics of mechanization may be divided into three sections—land saving; labour saving; general economy.

I. *Land saving*

Land saving arises primarily from the transfer of the source of power from pastures and grain crops to mineral and water sources—coal, oil, and electricity.

Some transfers from human or animal power for secondary operations are ancient—e.g. wind- and water-mills in grinding corn. Others occurred in the nineteenth and early twentieth centuries—e.g. threshing and cultivations by steam-power. Most attention is directed to changes since *c.* 1913 in the U.S.A. and since *c.* 1920 in Europe and other regions, and the application of power to primary processes.

Effective land saving also arises from the relative efficiency of mechanical processes; e.g. higher yields of crops in quantity or quality by reason of timeliness, speed, or general efficiency of operations—in cultivations, seeding, harvesting.

Consequently, land saving has to be measured by (*a*) increase in area for sale crops, (*b*) increase in productivity over the whole area.

As regards farm organization and management, land saving must be considered in relation to (*a*) size of farm, (*b*) type or character of soil, (*c*) types of enterprise on particular farms. There has been some adaptation of size and type of power-units to each of these conditions. Mechanical appliances have been adapted to some specific requirements in each case. More consideration of adaptations, or innovations, may be desirable.

II. *Labour saving*

It is generally expected that the application of mechanical processes in agriculture will reduce the amount of manual labour required for given processes and given amounts of final products. Almost universally these expectations have been realized.

But simple labour saving is often masked, or hidden, by secondary results, such as increase in the scale or variety of enterprises; increase in total productivity of the farms.

Labour saving must be considered in relation to *casual* or *seasonal* labour and to *regular* labour. The application of mechanical appliances, such as harvesting machinery of many kinds, before the advent of the tractor, saved large amounts of seasonal labour, and made farm organization of labour easier. Use of mechanical power has caused further reduction of seasonal requirements.

Economy of saving *regular* labour depends on adjustment of farm needs, farm opportunities and enterprise, (a) either adjustment—reduction—of staff or (b) increase in productivity of the farm to use the labour which otherwise would have become redundant.

But under some circumstances, reduction of labour requirements by mechanization may be justified by reduction of weekly or yearly time of work, and increases of leisure, for farm people. This may require local or detailed consideration. There are, however, two aspects—reduction in *time* required, and reduction in the form or amount of *energy* required. There are various risks to health or physical condition of farm people which may be reduced or avoided by simple and inexpensive or elaborate and more costly processes of mechanization.

Labour saving may need consideration with reference to (a) individual farm, (b) local, (c) national conditions. In each, the final economy of saving usually depends upon finding alternative productive use of the labour saved (or justifiable provision and use of greater leisure). Where national policy retards practical processes of farm mechanization, in order to retain labour on the land, the condition will usually be disadvantageous to the agricultural community. It is doubtful whether any such policy can attain eventual success, but in the short run it may be pursued with undesirable influences on agricultural progress and thus on the position of both agriculturists and the nation.

In the notes above it has been assumed that mechanization generally occurs where agricultural systems are fairly fully staffed. But this is not always so. There are conditions in which the supply of labour is not sufficient to provide the combination of land, labour, and capital which will lead to the full use of all the resources. In these conditions use of appropriate mechanical power will lead to higher output and usually to reduction of costs per unit of product.

Combined land and labour saving

Realization of economies in land or labour, or in the combination, is frequently delayed by various conditions in the transition from

human or animal power to mechanical power. In the early transition period there is commonly some use of previous implements or machines, with or without adaptations; and there is a hybrid situation, with only part mechanization. The full economies are not realized until the transition is complete and the power units are used with implements or machines specifically designed to be drawn or driven by power.

III. *Factors of general economy*

All processes of mechanization affect the self-sufficiency of the farm; make the farm more dependent upon external agencies. This was the case with the development of harvesting machinery and dairy machinery in the nineteenth and early twentieth centuries. But this condition is much extended and intensified when mechanical power-units are used on farms.

This condition of increase in purchases outside the farm exposes it in higher degree to the fluctuations in industrial and commercial activities and to fluctuations in prices whether due to this or other causes. In periods of depression in some regions (e.g. western Canada) this has been a source of acute economic trouble.

Mechanization sets up needs of higher capitalization of farms. It also changes the processes and character of capital saving and accumulation. Whereas the animal power-units were commonly bred and reared on farms, and saving was of material character and to some extent 'automatic', capital saving for mechanization must be of monetary character. Increase of investment in work animals was often slow and continuous, but purchases of mechanical power-units is spasmodic. The fact that purchasing power may be obtained through credit sources does not materially change these positions.

Mechanization also changes positions in respect of depreciation of farm capital. In the case of bovine work stock, there is commonly some realization value in the culled or discarded work animals. This is also the case with horses, where they are used for human consumption. Mechanical power-units which begin to depreciate may be transferred from one farm to another—from the more enterprising or highly capitalized to the less enterprising or less highly capitalized farmers; or from larger to smaller farms. But their ultimate value is as 'scrap metal'.

Here two conditions have to be borne in mind: (a) mechanical deterioration or physical depreciation, (b) obsolescence by reason of

improvements or innovations in power-units or appliances. Effects of these may be spread by transfer from farm to farm (as above). But farms which make little use of specific appliances, particularly small farms, whose equipment suffers only slow deterioration, may suffer considerably in capital values by reason of obsolescence.

Mechanization changes the proportion of expenses or costs on farms. For a *given production* it usually reduces the proportions of land or real property costs, while it adds specific costs of fuel, repairs, and maintenance of the power and machinery. With increasing output per unit of land, it reduces the proportion and the amount of land or real property costs per unit of product; it reduces the proportion and usually the absolute amount of labour costs per unit of product; it probably reduces the general capital costs per unit of product; it adds its own specific costs. In general, it reduces total costs per unit of product; or its value per unit, when both quantity and quality of product are taken into account.

Co-operation in the supply and use of mechanical power and appliances may mitigate capital costs of supply and costs of operation, particularly for small farmers. Such co-operation has not been either very common or successful in Great Britain. There is, however, evidence of more frequent use and greater success in some other countries. Private business contracting for mechanical operations has been more frequent in Great Britain. This has both advantages and disadvantages, but recent evidence indicates a widespread desire amongst the smaller farmers to operate their own sets of power and appliances. Private business contracting may have its own place in specialist operations and services such as spraying, and spreading lime, &c.

General

Mechanization has to be considered from the point of view of private economy (individual farms), and from that of public or national economy. In each case, it needs and deserves consideration from the point of view of both technical and economic progress of agriculture. In some agricultural communities there may be much sentiment and some prejudice regarding mechanization in general, or some aspects of it. The subject is one which requires and deserves the closest possible rational consideration based on quantitative data on such items as (a) capital costs, (b) costs of operation, (c) savings achieved, (d) influence on quantity and quality of output.