

AGRICULTURAL PRODUCTIVITY AND SURPLUS PRODUCTION IN TANZANIA

Implications of Villagization, Fertilizers and Mixed Farming.

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INTRODUCTION

This paper is an attempt to analyse a basic contradiction in agricultural development, the tendency for the productivity of labour to fall on the one hand and the urge to achieve a higher rate of surplus production on the other.

In Tanzania, over the last decade, there has been a trend of stagnating production in the peasant sector. It is suggested that this trend can be understood in terms of a long-term tendency for the average productivity of labour to decline as the pattern of land-use is intensified. According to Boserup's thesis the intensification of land-use normally leads to higher output per cultivated unit of land (productivity of land) and the gradual decline in the productivity of labour is off-set by working hours. For large parts of Tanzania, however, it can also be shown that the productivity of land has tended towards stagnation and even decline as a result of land degradation.

The decline in productivity of both labour and land reduces the capacity of the peasant sector to produce a surplus which provides the necessary basis of capital accumulation for investment in industrial and other development projects by the state. A discussion is provided of surplus extraction seen as operating within the context of the terms of trade movements, in order to arrive at an understanding of the constraints on capital accumulation. Forms of surplus production are conceptualized and discussed in relation to labour productivity, and the development strategies of villagization, the fertilizer package and mixed farming are discussed in terms of their potential for raising the productivity of labour and land and hence for increasing surplus production.

It should be stressed from the outset that this paper is not an empirical study. It is rather an attempt to provide a tentative theoretical outline for discussing issues of agricultural strategies of relevance to the present problems of developing peasant farming in Tanzania.¹

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PART I

THE CONDITIONS OF AGRICULTURAL GROWTH

In Tanzania, as in a large number of other Third World countries, the growth in agricultural production has not kept pace with the growth of population in the last decade or so. This trend can be explained in terms of a gradual historical process of land-use intensification caused by population growth. As land gets more and more scarce it becomes necessary to switch from extensive forms of land-use characterised by a large per capita acreage to more intensive systems with a reduced per capita acreage. According to Boserup (1965), the most wellknown proponent of this thesis, the sequence of intensification is accompanied by a tendency for the average productivity of labour (average output per unit of labour time) to decline but with increased and stabilized productivity of land (output per unit of land).

The most extensive system, long-term forest fallow is characterised by relatively high labour productivity and a large area under long fallow. As the population density increases the fallow period is shortened and the fertility of land is no longer restored to the same extent. As the system of land-use is intensified towards permanent annual or double cropping - with irrigation as the most intensive system - there is a growing need to maintain or restore fertility through intensive weeding and the application of manure, mulch etc.. With the sequence of change, the techniques of cultivation are changed and intensified as well.

Even if the productivity of land is raised through the methods of manuring etc., the labour input associated with these techniques will usually have increased to an extent where the productivity of labour has declined.² This trend, understood as a long-term gradual process, seems to represent the general process of agricultural evolution of peasant farming systems.

However, in order to account for this process of intensification under concrete conditions of existence and in order to explain those cases where intensification does not raise the productivity of land, but instead causes a process of land degradation, it is essential to consider the impact of environment on land-use. The amount and reliability of rainfall and the topography and quality of the land will ultimately determine the system of land-use that can be practiced in an area. Semi-arid areas are only capable of sustaining extensive forms of pastoralism with low population carrying capacities whereas areas of high rainfall may sustain intensive cropping systems which will carry high population densities.

Within these broad boundary conditions, intensification may take place but not necessarily in a smooth fashion or to an indefinite extent as assumed by Boserup.

For Tanzanian farming systems three broad historical trends of land-use intensification can be distinguished according to environmental conditions and levels of intensity and productivity:

1. In high potential areas (highlands) intensification has achieved extremely high levels made possible through adoption of high-value cash crops (coffee and tea) and often associated with high-yielding but low-nutritious food crops (bananas). While the output per unit of land has reached high levels, labour connected with methods of soil fertility restoration are very intensive and long hours must be worked in order to compensate for the relatively low productivity of labour. Evidence suggests that these areas are entering a stage where absolute carrying capacities are being reached and where even yields seem to have stagnated.³ The limits to further intensification have spurred on high rates of migration into more marginal lands, generally of lower fertility and rainfall.

For well-watered medium potential areas a similar process of intensification has been associated with stagnation at a lower level⁴ - except for Ukara which features the most intensive system and where "....." the returns per hour of work are particularly low" (Ruthenberg p. 334).

2. Expansion of crop production into marginal land tends to be associated with more labour and land extensive techniques which under uniform agronomic conditions are more labour productive than intensive systems of land-use. However, the movement towards more marginal conditions in expansion areas are associated with a loss of yield, the differential product, and hence often with lower productivity of labour as well.

On the other hand, if the environmental difference between an old settlement area and an expansion frontier is not marked, the adoption of a more land extensive system will usually be accompanied by higher labour productivity. This factor explains the historical tendency towards population dispersal as a move to counteract the falling rate of labour productivity in densely settled areas.

3. In low potential areas, intensification of land-use has often not been associated with methods of soil conservation so that land degradation has become a serious problem in some areas. Both the productivity of land and labour has declined.⁵

Apart from the problem of soil degeneration associated with growing permanency of cropping, land degradation in medium and low potential areas is often a result of overstocking. The movement of both people and livestock from higher potential towards more marginal areas exerts a double pressure on land which has a lower carrying capacity. In some of these areas the population density has increased at a very high rate. The lower yields per unit of land necessitates the cultivation of a larger per capita acreage. Hence, the expansion of cultivated land takes place at a rapid pace and pastures are proportionately decimated. And yet livestock keeping constitutes a necessary and complementary activity of the households in terms of its role as a source of cash and protein and as a hedge against crop failures.

Overstocking results in a slower rate of herd reproduction, to the extent where the population grows faster than the herds. This implies a declining animal/man ratio, i.e. a decline in the number of animals per capita, which is at the same time connected with a decline in the productivity of herding labour since fewer animals per herder gives a lower output of milk and off-take per herder. Given the economic constraints this process imposes on the household economy the peasants are, understandably enough, trying to maintain their herds sometimes with grave ecological consequences.

The outline presented above is intended to show that intensification of land-use does not automatically lead to higher yields per unit of land but may in fact amount to the opposite. Whether land degradation or successful intensification takes place, there is a general tendency for the productivity of labour to fall. In Tanzania, the abundance of virgin land or frontier areas suitable for cultivation have over a long time span been able to absorb a growing population, which may to some extent explain the persistence of traditional extensive farming methods in most areas and the ability of the peasant sector to produce a surplus of food and cash crops. Recently, however, there have been signs of stagnating agricultural production. In so far as this stagnation is due to the conditions of the falling rate of labour productivity, this tendency could seriously impair the capacity of surplus production of the peasantry.

Hence, the task will be to analyse various strategies available for raising surplus production. These are discussed in the last two parts of the paper, while a definition of surplus, modes of surplus extraction and forms of surplus production are dealt with in the following section.

PART II

FORMS OF SURPLUS PRODUCTION AND SURPLUS EXTRACTION

The Agricultural Cycle of Material Reproduction.

The process of agricultural production and consumption is characterized by continuity. Every succeeding agricultural cycle depends on the former for productive inputs like seeds, tools and labour and for consumption requirements like food. In crop production the cycle is usually annual depending on the nature of crops grown. In cattle production, the annual cycle is influenced by a 7-8 year cycle which is a function of herd reproduction.

In any one agricultural cycle, the household (production unit) has to forward a fund of consumption necessary for feeding and maintaining its labour force until the next harvest. Moreover it has to forward a replacement fund necessary for maintaining the means of production at the same level of productivity. The former is called the fund of personal consumption, the latter fund of replacement is called the fund of productive consumption. The necessary quantity and quality of the former depends to some extent on the nature of work performed as well as on customary levels of consumption whereas the latter is a function of the level of technological development. Both these stocks are termed the necessary consumption fund which needs to be advanced in order to provide the consumption necessary for production. The necessary consumption fund constitutes the costs of material production.

Surplus and the form of Surplus Extraction.

The surplus product is defined as total output less the fund of necessary consumption or less the costs of production. The surplus product can be represented in two forms, potential or materialised surplus. Potential surplus is unused labour while materialized surplus is the realization of that potential.

Surplus appropriation or surplus extraction from peasant agriculture basically assumes two closely interrelated forms.

The first form, devalorization,⁶ operates in consequence of the integration of peasant production with the world market. The cost price of an agricultural product, say cotton, is determined by the averaged costs of production all round within that branch on a world scale. High productivity in large-scale mechanized capitalist enterprises producing cotton (for example in USA) reduces the cost of production of cotton in those enterprises and hence the aggregate effect of high productivity enterprises tends to lower the producer price on a world-scale.

For the Sukuma peasant the labour time engaged in producing a unit of cotton will be considerably higher than in the more productive capitalist enterprises given his low technological level. The value of his product in terms of the amount of labour time it embodies is therefore higher than the value of capitalist produced goods, but he actually receives a lower market price or producer price due to the nature of price determination on a world-scale.

With respect to food crops produced for domestic consumption the producer prices are less directly influenced by world market prices. The inevitability of the black market - caused by fluctuations of supply due to drought or low prices - means that crop prices may rise beyond import or export parity. On the other hand government controlled prices may be fixed above or below export or import parity, the low price, however, having been the normal state of affairs until 1974. Yet the agricultural crisis of 1974/5 showed the difficulty of domestic price control and food prices were adjusted to be closer in line with the world market prices. Lately, the World Bank has been pushing the government to adjust prices to world market levels.

The second form of surplus extraction, which for lack of a better term we shall call indirect taxation, operates at the domestic or national level as a result of government controlled prices. It is most apparent for export crops and consists of a levy appropriated by the state for its recurrent and development expenditure. The effect of this levy is to lower the producer price. Moreover the formation of investment funds by parastatals handling transporting and processing crops constitutes such a levy. The costs of handling, transport and processing of crops depends on the efficiency (productivity) of operations of these parastatals, and excessive costs are charged partly to the producers, partly to the consumers. If consumer food prices are in line with import parity, we could say that excessive costs are charged to the producers. If they are above import parity, costs are charged to the consumers as well.

In Tanzania where the state has taken upon itself to control and develop most sectors of the economy, surplus extraction constitutes the necessary basis of capital accumulation for industrial and development investment.

However, the rate of capital accumulation by the state is limited, circumscribed as it were by agricultural productivity and by the terms of trade between export crops and import goods like fuel, capital equipment etc.. If the terms of trade move against export crops (f.o.b. price of

export crops is lowered relative to the price of import goods), and if at the same time the government is not prepared or can not lower peasant producer prices, its margin of surplus extraction is reduced. The state then has no other option but to go for expansion of the aggregate agricultural output, i. e. to produce and export more crops in order to maintain the existing level of imports and investments. Virtually all underdeveloped countries are faced with the same predicament and the combined result of expanding the exported output is to increase the world market supply and thus to have the terms of trade moving further against export crops.

Surplus Extraction: Terms of Trade and the Peasant Response.

How does surplus extraction influence operations at the level of the peasant household?

The crucial thing to note in advance is that peasants are commodity producers. One part of their total product, the commodity or exchange component, is produced for sale or exchange in the market in order to enable the household to purchase necessary elements of productive or personal consumption which the household is unable to produce itself. Such elements are tools, utensils, vet. drugs, seeds, fertilizers and clothes, kerosene, salt, soap, food-stuffs, hospital and school fees etc.

If the terms of trade between peasant produced commodities (crops or cattle) and peasant purchased commodities (for necessary productive or personal consumption) turn against the peasant household either because of stagnating or falling producer prices or because of rising consumer prices, the peasant is faced with the following options:

- 1) Increasing the output of cash crops but maintaining his output of subsistence. This can be done either by extending the area under cash crops or by raising the productivity of land.
- 2) Increasing the output of cash crops, but at the expense of subsistence food crop production due to a shift in labour expenditure and land resources in favour of cash crop production. Raising the off-take of cattle usually assumes this form as well, because a beast sold is a deduction from the consumption fund.
- 3) Maintaining the level of output of both crops with the result of reducing the amount of consumer goods purchased in the market.
- 4) Reducing the output of cash crops or withdrawing completely and switching to a different crop.

In the case of export crops where the peasant usually faces a monopoly buyer (crop authorities), where the various regions tend to have only one marketing body handling only one specialized crop (tobacco in Tabora, cotton in Sukumaland, coffee in Kilimanjaro) and where the peasant might be indebted or dependent on credit from that monopoly, the possibility of withdrawal or switching to another crop is to some extent restricted. If, on the other hand, the peasant sells part of his food crop or of his stock of cattle, his scope for withdrawal is much broader. It is in this sphere where the likelihood of black marketing arises. Plans to raise the production on state farms and ranches of precisely those products which lend themselves to black marketing (e.g. wheat, rice, cattle and maize) may constitute a measure which will reduce the negative effects of black marketing.

Taking a look at the third option neither the peasant nor the state can be interested in a development of the terms of trade which forces the peasant to reduce his purchases thereby weakening his dependence on the market and pushing him back towards subsistence production. For the peasant this trend would represent a backlash and for the state the value of marketed output from which it draws its revenue is reduced.

Recent trends in the growth rates of subsistence and monetary (marketed food and export) production seems to suggest that a combined response of option 3 and 4 has been the case.

Table 1

Average Annual Growth Rates of Agricultural Production (per cent)

	1964-69	1969-73	1973-75	1964-75
Subsistence Production	2.9	4.0	4.0	3.4
Monetary Production	3.8	2.6	- 1.3	2.1
Total Production	3.3	2.9	1.5	2.8

Source: IBDR 1977, Annex VI, p. 9.

(The 4 per cent growth rate of subsistence production between 1969-75 might be somewhat inflated due to the tendency of overestimating subsistence production at district level).

This trend of decline can be compared with the overall decline in the farmers' terms of trade expressed as the total drop in their real income between 1964-73 amounting to 27.6 per cent for export crops and 13.6 per cent for food crops (ILO, 1978 p. 258).

The substantial improvement in producer prices between 1974 and 1977 notwithstanding, the overall decline in terms of trade between 1964 and 1977 was 24.4 per cent representing an annual decline of 2.1 per cent.⁷

When comparing trends of production with trends in the terms of trade there is a certain correlation between declining terms of trade and production trends for monetary and subsistence crops respectively.

Had there been no productivity constraints it is however not at all certain that total production would have declined to the extent it has since peasants would normally try to maintain their bare minimum level of purchased consumer goods and means of production provided it is possible to expand production. In the following discussion of option two, such a response is borne out by historical evidence for earlier periods. The above discussion does, however, suggest that existing systems of farming have increasingly run against constraints associated with raising productivity or extending the cultivated acreage.

In areas of land shortage the first option of extending the acreage under cash crops is limited and the second option could thus be adhered to by extending the acreage of cash crops at the expense of the acreage under subsistence food crops, followed by a parallel change in the proportion of labour expenditure on the two crops respectively. Historically this has in fact been a rather common response by the peasantry. A way of coping with the gradual reduction of subsistence food crop acreages has been to switch from low yielding and relatively labour intensive crops of millet via maize to high yielding, labour extensive crops like cassava, sweet potatoes or banana. Although in this case both the productivity of land and labour is raised successively, the nutritional value per Kilo of dry matter crop has fallen. Strictly speaking it is therefore not a case of raised productivity of labour. This trend has been most clearly observed in export crop producing areas like Sukumaland and the Usambaras.⁸

There is of course a fifth option to the problem of deteriorating terms of trade, namely wage labour. This option will not be discussed here.

This leaves us with the first option of raising the total marketed agricultural output per capita which is a course the state, by nature of the limitations imposed by the terms of trade in the world market and by the conditions of domestic accumulation, is forced to push as its development policies.

The Production of a Relative Surplus Product.⁹

The first form of surplus production - the production of a relative surplus product or relative surplus production - represents the directly opposite tendency of the rate of falling productivity of labour. It means raising the average productivity of labour as a continuous process and it is brought about by the introduction and continuous improvement of capital ~~inputs~~ which will raise the overall output per man hour. The result of this is that the labour time necessary for producing a given level of subsistence and purchased requirements is reduced relatively to the labour time engaged in surplus production. At least part of the increased surplus produced will have to be reinvested in improved technology and higher productivity in order to keep the process going. This process resembles the specific form of industrialised capitalist production where conditions of competition and a fixed length of the working day exerts pressure to raise the productivity of labour. In a peasant economy the working day is not fixed and here the pressure to raise the productivity of labour is governed by different circumstances, namely the tendency of the falling rate of labour productivity.

The obvious problem of initiating this form of production relates to the initial capital costs, the size of which depend on the choice of technique. Moreover, the strategy is intrinsically linked with a strategy of industrial production which must supply the agricultural sector both with its means of production (capital) and with mass consumer goods. In Tanzania at this particular point in time the rate of profit in such industries may in fact be lower than in say luxury goods industries (beer, cigarettes) so that a choice is made to go for the highest rate of profit by investing in the production of luxuries before the production of capital inputs for the agricultural sector to take-off on any scale.

Regarding the relationship between industry and agriculture it should be noted that the agricultural revolution which took place in Europe just prior to and parallel with the industrial revolution is a special case in as far as the raised productivity per agricultural labourer was partly a result of proletarianization which cleared the rural population off the land and increased the acreage available per farmer. Given the low level of industrialisation and industrial labour absorption in Third World countries, they can not hope for such a course of development in the near future, and it is a mistake to assume that Third World countries are now going through a phase which the industrialised countries went through earlier on.¹⁰ Rather the present conditions prescribe a necessity of maintaining the peasant on the land, of reproducing the peasants as a peasantry and of avoiding the flux to towns.

The Production of an Absolute Surplus Product.

The second form of surplus production, absolute surplus production, does not involve a change of production techniques. It simply means that the labour time spent on producing a surplus is extended absolutely in relation to the necessary labour time. Thus, if the terms of trade turn against the peasant he will have to work longer hours to produce a larger marketed output to be sold in exchange for the same quantity of consumer goods. In that situation (option two) where commodity production is increased at the expense of subsistence production we also get a case of absolute surplus production. Here, necessary labour time is reduced absolutely to surplus labour time but without extending the overall amount of labour time. Taking the first situation of extending the overall amount of labour time, there are two levels of intensity of lengthening the working day, or more appropriate, lengthening the working year given our annual cycle of reproduction.

Suppose there is no land shortage. In this case, the peasant can extend his acreage by simultaneously maintaining his level of extensive techniques and thus his average productivity of labour. His extended labour time is a direct function of extending his acreage.

On the other hand, if the population density increases and the cultivation factor (acreage per capita) decreases, the resulting intensification causes the rate of average productivity of labour to fall. The outcome is that the peasant will have to work longer hours not only to produce his subsistence crop but also to produce the monetary crop.

We could call this process of declining productivity and deteriorating terms of trade the productivity/commodity squeeze.¹¹ The peasant is gradually incapacitated of his ability to produce a surplus.

The response to this process will therefore be to work longer hours, but here labour peaks may constitute a barrier. In fact, what tends to happen with the transition from an extensive to a more intensive system of production is that the total labour time is increased, but at the same time spread more evenly over the year.¹² This is what we mean when we talk about the lengthening of the working year.

If we look at this process of underdevelopment over a long time span, the implications would seem to be that the total output produced per worker has been declining given the existing land and labour constraints. Secondly, evidence suggests that the expansion of cash crop production has in fact taken place at the expense of food crop production.¹³ The latter process has to some extent offset the former. Whereas a certain level of consumption

of consumer and producer goods is thus maintained the quantity and especially quality of food consumption has been on the decline. Hence the increasing prominence of the science of nutrition in development and the outcries of alarm from FAO about the inability of Third World countries to feed themselves if the present state of production continues.

The Increase of Aggregate Commodity Production.

The State appropriates its surplus through commodity production for the market. Leaving aside the fact that Tanzania has had to rely more and more on foreign aid for her recurrent and especially development expenditure, how has it been possible for the state to appropriate a larger surplus through a growing aggregate marketed output produced by the agricultural sector when the total marketed plus subsistence output produced per peasant has tended to stagnate or even decline?

Several factors are involved. First of all, areas of marginalized peasantries to be found chiefly in the southern and western part of the country have so far not experienced critical land shortages. Their historical marginalization as former labour reserves conditioned a low level of agricultural commercialization and a tendency for the growth of the population and the cultivated area to stagnate. During the sixties and seventies, these areas have increasingly been drawn into the mainstream of commodity production (cashews in Lindi/Mtwara, tobacco in Songea, Mbeya, Iringa and Tabora, maize (NMP) in Songea, cotton in Kigoma, wheat and seed beans in Monduli and Hanang). Secondly, the contribution made by mechanized large-scale parastatal and private farms to the growth in marketed output produced is undoubtedly important and may account for the fact that large-scale capitalist farming has been allowed to continue operating on an extended scale in crucial surplus producing regions like Iringa, Arusha and Kilimanjaro.

Thirdly, the role of fertilizer in raising output - a factor completely left out of the discussion so far - has to be taken into consideration although the extent of raised output from the use of fertilizer is difficult to assess. We shall return to this point below.

Fourthly, and this is a very important point, there is a spatial density factor to what we shall call the production of the aggregate marketed output. As the population grows and as the population density increases and the cultivation factor decreases, an increasing number of units of production that need to reproduce themselves through commodity production are established within a given area. Although the size of marketed output produced

per agricultural worker or per unit of production (household) might have declined in the process, the aggregate output of surplus appropriated from so many more households might have increased beyond the stages of previous aggregate outputs.

As long as the conditions of existence of peasant production can allow this tendency to continue, and provided that the rate of growth of the aggregate marketed output is high enough as far as the state is concerned, the state could not, objectively viewed, be bothered about the tendency of the falling rate of labour productivity. But as should have become clear, there are limits to this process and the Tanzanian Government seems to be increasingly concerned about the low level of productivity in agriculture. The development strategies adopted to alleviate this situation are the topic of the following section.

PART III

STRATEGIES TO INCREASE THE RATE OF SURPLUS EXTRACTION

In its recent quest for maintaining or accelerating the rate of surplus extraction the state seems to have adopted two strategies of which the first one of necessity presupposes the second.

First of all, there is the strategy to draw or integrate the entire peasantry, each and every household, into the mainstream of commodity production by increasing the rate of absolute surplus production.

Secondly, and to some extent simultaneously, there is a strategy to create the conditions for and to instigate production of a relative surplus product.

Both of those strategies are conveniently embraced by the strategy of villagization.

Villagization.

During the colonial period, and earlier on as well, there has been a tendency for households to disperse over the countryside. The reason for this, as already indicated above, is migration and dispersal as a counter-move to conditions of growing population density which causes the rate of the average productivity of labour to fall. Dispersal is a means to increase the cultivation factor and to raise or maintain the average productivity of labour.

The policy of villagization concentrates the population as a counter-move to dispersal and is not a recent strategy in Tanzania. It can be traced back to the sleeping disease concentrations of the British and has since then

assumed various forms and labels like settlement schemes, Ujamaa and Planned Villages. During the 1950s and the first half of the 1960s, the stated intention was to establish the provision of inputs, extension services and close supervision of improved methods of production. The schemes did at best show very limited success if any at all.¹⁴

As far as the Ujamaa Villages are concerned their establishment, especially during the early seventies seemed to revolve more and more around the provision of social services. Apart from improved standards of living emanating from the provision of social services their impact is expected to free labour from water fetching and to improve the working or productive capacity of the labour force. Another important aspect of villagization is to provide the basis for concerted efforts in self-help projects in order to improve economic and social infrastructural facilities.

The Production of an Absolute Surplus Product.

Our main concern here is however to try and grasp the implications of the recent concentration of some 13 million peasants in some 8,000 compact villages for the falling rate of labour productivity and for the imperative of raising the rate of surplus production, be it absolute or relative.

The strategy to establish conditions for the production of an absolute surplus product is reflected in the very nature of the land reform which followed upon the settlement drive and in the formation of block farms and the revival of by-laws for the proper cultivation of minimum acreages. Although the partial land reform did involve redistribution and equalization of land holdings in some areas,¹⁵ the very large land holdings were often not affected and its main thrust seems to have been ensuring minimum acreages for the vast majority of households. While some villages were set up on virgin land and while some households got access to more land, so did villagization in other areas create artificial land shortages by reducing the total household acreage of fallow, pasture and cropped fields. In the former case villagization represents a move to realize a potentially existing surplus of unused labour and land and is thus a clear example of establishing the conditions for absolute surplus production. In the latter case, villagization would be followed by a transition from an extensive to a more intensive system of land-use with the shorter or longer term result of lowering the rate of the productivity of labour unless productivity increasing inputs are provided. Even in the former case where the set minimum acreage represents an increase of acreage per household or worker over previous

levels it cannot be inferred that the rate of labour productivity will increase, because all the land has to be cultivated every year and cannot, therefore, be allowed to revert into fallow for the purpose of natural regeneration of soil fertility.

If production in the planned villages were to be carried out with traditional methods, the established conditions of a more intensive permanent land-use system would in the long run result in a decline of labour productivity which would have to be counteracted by extending labour time. This extension does not concern surplus production but represent a case of productivity squeeze.

On the other hand, minimum acreages and block farms is a measure to ensure proper cultivation, in some cases to extend the permanent cultivation factor and to rationalize the process of production in order to ensure increased surplus production. If this increase is not a result of raised labour productivity as a continuous process but simply a result of lengthening labour time we have absolute surplus production.

Villagization provides the first step towards central planning and regulation of food and cash crop production, towards preventing withdrawal from the market, and towards restricting black marketing, and should therefore contribute to stabilizing the official market for crops and easing the task of central socialist planning. But villagization intensifies the contradiction which results from declining productivity and increased surplus production. The necessity of raising productivity in agriculture, a task which the government has strongly embarked upon, will be discussed below.

A final advantage, which is very important but does not directly concern the issue of productivity, is that the concentration of households in village clusters greatly eases the problem of controlling, collecting and transporting the marketed surplus in contrast to the previous obstacle to commercialized production and transport from remotely dispersed households.

Villagization, Kulaks and Surplus Appropriation.

Tanzania has opted for a socialist policy where the state has taken control of most sectors of the economy and is trying to regulate production both in industries through nationalizations and in the traditional agricultural sector through villagization. The decisions as to which crops should be grown on block farms and with which inputs and methods are planned from national down to district, divisional and ward level. Government paid officials (extension officers, village managers and now also village chairmen) are stationed at the village level to plan, supervise and implement these decisions.

Another aspect of Tanzania's socialist policies is, as far as possible, to arrest the process of social and economic differentiation, to prevent class formation and the exploitation of man by man. However, the process of differentiation and formation of a Kulak class exploiting the poor peasants through wage labour took root already during the colonial period and accelerated unchecked up till the Arusha Declaration, partly as a result of the so called progressive farmer policies.

Bearing in mind our previous mentioning of the existence of a black market particularly for food crops it is not surprising that Kulak formation spurred by local accumulation of agrarian capital took place particularly in the major food producing areas (cf Ismani (maize), Karatu (wheat), Monduli (beans), Hanang (wheat and beans). The specific conditions under which production took place in those areas allowed the Kulaks or capitalist farmers to appropriate large surpluses for themselves through mechanized farming and through largely controlling and operating the black market.

Villagization, at least in Ismani and to a much lesser extent in Arusha Region has tended to limit the role of Kulaks in food production for the home market. Many of them have switched to the production of export crops (tobacco in Iringa, seed beans in Arusha) or to commercial activities (transport, bars etc.) where state involvement is still relatively weak.

The combined effect of this recent development seems to be that while the state is able to extract its levy from Kulak or capitalist export crop production it has at the same time secured for itself the possibility of extracting more surplus from the food crop producing areas by controlling black marketing.

The Production of a Relative Surplus Product.

The production of a relative surplus product depends on the ability to raise the average productivity of labour, to increase output per labourer. If this takes place as a continuous process the result is that the labour time necessary for producing a given amount of subsistence and purchased commodities is reduced relative to the labour time engaged in surplus production.

Assuming that the peasant decides to maintain his given level of personal and productive consumption at given terms of trade he can now do with less work. But since the precondition for raising the productivity of labour is the investment of capital we will assume that he can only replace his capital input initially by maintaining or perhaps even lengthening the hours and intensity of work throughout the year. Once the process gets going the

labour time spent on subsistence production is shortened relatively to the time spent on cash crop production and while the total output of subsistence is maintained, the total output of cash crops is increased. A relatively smaller proportion of his gross income from cash crop sales goes into purchasing items of personal consumption while a relatively larger proportion is available as a surplus for the purchase of capital inputs.

Normally, the initial capital outlays may be so high that the peasant cannot afford them. Hence the importance of credit schemes to get this process going. A certain rate or percentage of the surplus produced would have to be reinvested in expanded agricultural production. Given the objective conditions of the possibility for peasant withdrawal, the state would probably have to assume this role of distributing and investing the surplus in productive activities in order to prevent its personal consumption by the peasants.¹⁶ Alternatively, the village provides an organization for retaining part of the surplus, for instance through a crop levy paid by NMC and the crop authorities to the village. This surplus could constitute a fund reserved exclusively for productive investment and would have to be democratically controlled to avoid embezzlement.

The Fertilizer Package

The introduction of the seed-fertilizer package can be considered an attempt to bring about the production of a relative surplus product.

With the introduction of improved seeds suitable to local conditions, with the use of the right type of fertilizer to the right type of soil and supposing rainfall is adequate, yields per acre can be raised say two or three fold. Even if the amount of labour spent on proper spacing, on fertilizing, on extra weeding and on extra harvesting is higher per acre, we can expect the output per labour unit to have increased. Even if the costs of the package are deducted, we assume that the peasant after having sold his crop is left with an extra margin of cash with which to buy more fertilizer than the previous year.

At the onset of the following cycle he then applies more fertilizers, perhaps with lesser spacing (higher plant density) and again he receives an extra margin etc. etc. .

The example given here constitutes a process of increasing the average productivity of labour. The increased output and sales of crops means that the levy of the state, the surplus it extracts, increases proportionately with the increase of output of cash crops given fixed terms of trade. In order for this process to develop as fast as possible, it is necessary to fertilize both

the cash crop and the subsistence food crop to allow the cash crop acreage to expand at the expense of the subsistence acreage without jeopardizing the total output of subsistence. Hence, to the increased output per unit of labour time is added the output from acreage expansion. It is obvious that the rate of expansion of the aggregate surplus produced under such conditions is considerably higher than would have been absolute surplus production.

However, there are basically three sets of limitation to relative surplus production by way of fertilizer as a continuous process.

Limitations Imposed by the Terms of Trade.

The first set of limitations are imposed by the tendency for the terms of trade in the world market to move against cash crops as the supply of these crops starts shooting up. The reduced margin of the f.o.b. price of export crops could in that case be charged either to the producer, or to the state's tax levy, the rate of which would consequently have to be reduced. But reduced prices have the effect of lowering the rate of capital accumulation both of the state and of the peasant whose ability to purchase a larger amount of fertilizers every succeeding year is curtailed.

The other aspect of the terms of trade problematic, the rising cost of fertilizers due to rising oil prices, basically boils down to the same negative effects for the peasant whose ability to purchase fertilizers is again curtailed.

The example presented above is borne out by the stark realities of the terms of trade of fertilizer in Tanzania. It so happens that the ex-factory price of fertilizer produced in Tanga is twice as high as the c.i.f. price of imported substitutes,¹⁷ not to mention the fact that the price of fertilizers rose four times between 1973 and 1976. The state therefore had to subsidize fertilizers by 75 per cent, reduced to 50 per cent in 1976 which is just at par with import costs. Since not all peasants in Tanzania presently use fertilizers, the subsidy benefits only a small section of the farmers whereas all farmers growing cash crops effectively finance the subsidy by receiving lower prices.¹⁸ Secondly, fertilizers are supplied on credit and if the credit is not recovered, the loss is charged to the producer prices as well.¹⁹

Technical Limitations to Fertilizer Application.

In contrast to what was assumed above, crop yields per acre do not continue to increase indefinitely and proportionately with increased application of fertilizers. A point will be reached where every succeeding unit of fertilizer applied will result in a gradual but progressive decline of output per unit of fertilizer applied (declining marginal productivity).

Eventually a point will be reached where the total yield per acre cannot increase further and actually starts to decline with further amounts of fertilizer applied.²⁰

Although the use of fertilizers under favourable circumstances may result in a substantial upwards jump of productivity of labour its use can not on its own induce a process of continuously increasing the productivity of labour. The package of seeds, fertilizers and pesticides apart, other factors would have to be added.

Environmental Limitations.

The third set of limitations which perhaps more than anything else have been responsible for the lack of success of fertilizer applications fall under the heading of environmental conditions.

First of all the diversity of the chemical composition of soils not only within the country as a whole, but even within one village or block farm poses a serious obstacle, since the type and amount of fertilizer used must correspond with the composition of the soil in order to create a good crop response. Hence the importance of the Tanga based National Soil Survey and the necessity of moving away from blanket recommendations for the use of fertilizer.

Secondly, the climatic conditions of erratic rainfall and semi-aridity over large parts of Tanzania, do not easily lend themselves to the use of fertilizer. If there is not enough rainfall, fertilization tends to have adverse effects for crop yields by burning the crop. For the same reason it is important to adhere to proper timing of fertilizing, both in relation to precipitation and in relation to the growth stage of the plants in order to achieve positive response.

Thirdly, there has reportedly been a tendency for weeds to respond much more vigorously to fertilizers than the intended crops.²¹

Fertilizers and Labour Peaks.

The environmental and technical implications of using fertilizer has a bearing on the intensity of labour which is increased in several respects.

First of all, the recommended method of fertilizing, using first a match box of nitrogen pellets, then a match box of phosphate, equally distributed for every plant or plant cluster over a distance of 10 meters in a row (the case of maize in the N.M.P.) involves a lot of extra work.²²

Secondly, the labour of weeding will often have to be intensified.

Thirdly, if the crop has responded well, more labour will have to be spent on harvesting, transport and perhaps processing.

The extra work involved in the last activity is obviously much more acceptable to the peasants than the work involved in fertilizing and weeding since these two activities tend to fall within already existing labour peaks. On top of this the peasants have been advised, and sometimes forced, to plant pure stands instead of adhering to the traditional mixed cropping patterns, which is altogether ridiculous in the case of the common crop-mix of maize and beans, since beans add nitrogen and shade to the soil. If the peasant was to follow such recommendations he would in fact have to open an extra field for beans with all the extra work that involves.²³

Seen from this purely technical and environmental perspective it is not surprising to find that some peasants decide to sell the fertilizer, to use it for beer brewing as a "catalyzer", to throw it away (the most common response) or to refuse accepting fertilizers, which, being a pre-condition for cultivating a plot in the block farm in many areas, amounts to refusal of cultivating in the block farm. The latter response is, however, subject to a fine or a jail sentence in those areas where colonial bylaws stipulating the cultivation of minimum acreages with proper methods - some of which specify the pure-stand approach - have been revived.

Conclusion.

Going back to our discussion of villagization it is clear that the land reform created the conditions for provision of chemical inputs, for supervision and for regulating the process of production of peasant agriculture by the state. Whether intentional or non-intentional, villagization suits the fertilizer package. Whether the package is going to establish the conditions for the production of a relative surplus product is however more doubtful. We may conclude that even if the introduction of fertilizers may in some cases contribute to an initial rise of the productivity of labour, this is not the case if the extra margin of overall labour expenditure is increased proportionately with or beyond the increased margin of yields. The latter case together with the continued use of fertilizers beyond the point of zero marginal productivity appear to constitute absolute surplus production. The use of the fertilizer package on its own does not bring about a trend where the productivity of labour increases as a continuous process.

As far as the state is concerned, the initial increase in the rate of surplus extraction made possible by the package might well stagnate in the long run. In addition the dependency on foreign exchange for producing fertilizers and the future trends of the terms of trade might turn out to be a burden which in all likelihood would have to be shouldered by the peasantry.

What has been said above on fertilizers should not be understood to mean that fertilizers have no role to play or have not played any role. No doubt fertilizers have contributed to raising the aggregate output of crops, not to mention the production of crops like tobacco where fertilizers are indispensable. However, it has been observed that fertilizers are most successfully made use of by the more well-off peasants and Kulaks, partly for financial reasons, partly for their ability to hire wage labour. In that respect, the effects of the fertilizer approach might well defeat the objectives of socialism and villagization, i.e. the equalisation of household incomes on a broad front. However, since the country is only in its infant stage when it comes to using fertilizers appropriately in correspondence with local conditions, and since not all peasants use fertilizers at present the possibility of a substantial increase of overall output in the future cannot be denied.

In countries like India, the Phillipines, Thailand and Mexico, the Green Revolution has particularly contributed to substantial increases of output on land belonging to the rich strata. The negative consequences of the Green Revolution reported from these countries such as growing differentiation, proletarianisation, economic dependency etc. are factors which have to be taken into account in the Tanzanian context as well.²⁴

PART IV

MIXED FARMING AS A STRATEGY OF RELATIVE SURPLUS PRODUCTION

Mixed farming is defined here in terms of the existence of technical integration between crop and animal production. The form of technical integration may consist of feeding livestock with crop residues or hay, applying manure for crop growing, using oxen for traction and tilling, growing fodder crops or including a grass ley for grazing within the cultivated acreage on a rotational basis. Mixed farming is often confused with agro-pastoralism, characterized by absence of crop-animal integration at the technical level but by economic complementarity of crop production and livestock keeping within the system of material reproduction of the household.

Policy and Development Efforts.

Oxenization and the use of manure does constitute one of the official strategies for developing agriculture in Tanzania. Research, testing units and ox-training centers have been set up to develop oxenization. The call for oxenization and use of manure has been made with variable intensity for many years.²⁵

And yet, the Government has hardly been serious about oxenization. If one was to make a comparison of the amount of funds spent on the production, distribution and wasting of fertilizers on the one hand and on the promotion of oxenisation on the other hand the disparity would no doubt be glaring. The extension efforts devoted to introducing appropriate ox-drawn equipment to peasants are hardly worth mentioning despite many years of experimental development of such equipment.

The impression received from interviews with a number of district government officials is that they do not consider oxenization as "modern" agricultural husbandry and give priority to tractors. But given the existing hoe-technology and the diseconomies of tractors on small-scale farms with lack of skills and service facilities, ox technology combined with a gradual development of mixed farming could provide the alternative basis for relative surplus production.

As done in the previous section on fertilizers we shall set out by giving an outline of the conditions necessary for raising the productivity of labour on a long-term basis, to be followed by a discussion of the limitations and constraints posed by such a development of mixed farming.

Mixed Farming and Relative Surplus Production.

The first step of oxenization, the use of ox-drawn equipment for tilling the soil provides a means to raise the productivity of labour in so far as the use of ox power is a way of extending the acreage cultivated per agricultural labourer and hence increasing the output per labourer. Whereas the acreage cultivated per labourer with a hoe would normally not exceed 2 acres, two persons with a team of oxen should be able to plough at 8-10 acres.²⁶ However, since there is an absolute limit to the extension of the acreage that can be ploughed (and weeded) by a team of oxen, oxenization on its own does not imply raising the productivity of labour as a continuous process. Ox cultivation is basically an extensive form of land-use which to be advantageous over hoe cultivation depends not only on extending the acreage farmed per household but also on the availability of grazing land for the oxen.

Given the limits of the acreage that can be cultivated it would thus be necessary to raise the productivity of land as a further step towards raising the productivity of labour. The application of manure provides such a possibility, but as we have already pointed out above the application of manure, with all the extra labour this involves, would tend to result in lowering the productivity of labour. In the event, the main bottleneck of manuring, is that transportation to the field would have to be solved by using ox carts.

For the productivity of land to be raised in any substantial way, the amount of manure applied has to be sufficient. Apart from the oxen, it would thus be necessary for households to keep an extra number of animals, preferably milk cows. Additional milk yields would contribute to improving the nutritional condition and thus the working capacity of the labour force.

Apart from the number of animals, the production of manure is more-over a function of the amount of fodder fed to cattle. As more land is put under the plough and as the amount of grazing land is reduced it will become necessary to feed cattle. Cattle feed can be obtained first of all from crop residues, such as the stalks from maize, beans and millet as well as picking fresh stalks and foliage from suitable plants, such as sweet potatoes. Another possibility is to reserve part of the pastures for hay during the wet season when grass is usually in abundant supply. Even in areas like Shinyanga known for overgrazing, natural grazing by cattle can not keep pace with grass growth during the wet season and some of the grass grow tall and fibrous and loses a lot of its nutritive value.²⁷ It would thus be more productive to increase stocking densities during wet seasons by reducing the land for grazing to an extent where the cattle are able to keep down the sward to a height where the grass grows at its fastest rate. On the remaining grass land set off as a reserve, grass should be cut shortly before flowering and should be dried and kept as hay for the end of the dry season when oxen need to gain strength for the cultivating season.

To keep hay reserves is probably only possible in areas where grazing land is still available to a sufficient extent. Eventually it will be necessary to grow fodder crops. The extension of the cultivated acreage made possible through oxenization provides the possibilities for growing fodder crops without actually reducing the acreage in food and cash crops to the level existing at the time of hoe cultivation. Furthermore, ley farming - preferably with legumes adding nitrogen to the soil - allows the land to rest and regain or improve its fertility. After some years in grass, the land could revert to cultivation of food or cash crops.

The inclusion of ley-farming or fodder production within the cultivated acreage thus allows for forms of crop rotation to be undertaken which would further improve output from the land. At the same time the feeding condition of the oxen is improved and the possibility then exists of extending the acreage cultivated. More importantly, intensive feeding of the cattle would increase the production of manure to be used for raising the productivity of land additionally.

During the initial phases of transformation, particularly during those involving the provision or production of fodder for the cattle, it is not at all certain that the productivity of labour will be raised. Mechanization of tilling and transport activities (field to house and vice versa) would have to offset the additional labour time spent on fodder production for the productivity of labour to be raised.

Once the process of feeding and manuring is kept going at an increasing rate the productivity of land will be raised as a continuous process. Higher yields of both fodder and food crops will provide more feed, more manure, better yields etc.. Hence the combined effects of extending the cultivated acreage and raising the productivity of land as a continuous process could in fact lead to a continuous process of raising the productivity of labour.

Compared with the fertilizer package there are additional benefits connected with mixed farming:

1. First of all the application of manure to the land raises the moisture retention capacity of the soil and reduces the effects of erratic rainfall.

2. If part of the fodder crop is made up by serena millet, sweet or irish potatoes these crops provide a supplement to traditional food crops in times of shortages or famine.

3. Milk yields of stall-or bomafed cows would be raised and the cultivation of fodder crops makes it feasible to introduce higher grade cattle as a measure to improve the productivity of animals.²⁸

4. The off-spring from the dairy herd not to be used as replacement on the farm can be sold as a source of cash income.

The crucial elements of mixed farming outlined above, i.e. the technical integration of crop and animal production and inclusion of cattle within the farmed acreage constituted the very technical basis upon which the Agricultural Revolution in Northern Continental Europe took place at the time of the Industrial Revolution. The productivity of labour was substantially increased viewed as a long-term process, based on fodder production, manuring and improved forms of crop rotation where ley-farming and leguminous crops constituted crucial elements of the pattern of rotation. It should be noted, however, that one of the most important prerequisites for this development was the progressive proletarianisation of a large section of the peasantry which made it possible to extend the acreage cultivated per agricultural worker. Moreover, this development was based on a radical

transformation of the pattern of land-use, involving a tendency of dispersal of farm homesteads as well as amalgamation of scattered plots rather than concentration of the farming population.

LIMITATIONS TO MIXED FARMING.

Terms of Trade and Economic Constraints Connected with Supply of Inputs.

In contrast to fertilizer production the production of ox equipment is not constrained by world market terms of trade. Ox equipment can be produced with local materials and with local skills. However, the purchase of an ox plough and a team of oxen represents a very high outlay of capital which few households could afford for a start.

The problem can most easily be overcome in those large parts of Tanzania where one or another form of cattle keeping already exists. Untrained oxen could be exchanged for trained ones and the outlays of capital be reduced to the cost of training oxen plus the equipment. Moreover, the annual replacement cost of ox equipment seems to be relatively low, compared to fertilizer which have to be procured at full and - experience shows - rising costs every succeeding year.

In order to ease the introduction of ox technology the government should set up credit schemes.²⁹ Depending on the capacity utilization of equipment it should be possible for two or three households to cooperate in the purchase and use of equipment. This would apply particularly to high capacity equipment like harrows, planters and ox carts. Alternatively, since ox mechanization would most likely have to be undertaken stepwise, the purchase of planters and carts could be staggered according to need.

Environmental and Technical Limitations.

Needless to say, it is difficult to use ox equipment in mountainous areas with steep slopes. And most of the mountain areas are already so densely populated that extensive ox farming is completely out of the question. A large part of Tanzania's cultivated or arable land does however provide favourable conditions for ox cultivation as far as topography is concerned. But one of the most commonly reported obstacles to ox cultivation is the existence of a heavy sod, hard-pan soils, and in some areas, heavy clay soils which are difficult to plough with a team of oxen. It seems, however, that this problem is related partly to the use of the mould board plough, partly to the weakness of oxen. With the proper development and design of

equipment and with proper feeding of the oxen it should be possible to overcome this problem. For example, chisel or tine implements reduce the power acreage ratio, and their mode of tilling reduces evaporation and erosion by leaving the weeds on the soil surface.

A factor related to the problem of power, which so far seems to have received little attention, is the type and design of the harness used. The yoke might not provide the most efficient means of transmitting ox power and more research and testing efforts should be diverted to developing proper harnesses which would allow large teams of oxen to pull heavy instruments for breaking up virgin land.

Labour Peaks.

If we consider the problem of limits to labour intensification there is no doubt that the overall amount of labour time will, at least initially, be increased with the transition to mixed farming. But in contrast to the fertilizer approach, mixed farming is a way of reducing labour peaks and equalizing seasonal labour rather than creating bottlenecks.

It is quite obvious that unless weeding and, to a lesser extent, planting, is not mechanized the extension of the cultivated acreage by means of ox-ploughing will create a bottleneck for weeding such a large area with a hoe.

The labour involved in transporting and spreading manure on the land would take place in the slack season, well in advance of the rainy season. If the oxen are well fed and the equipment used is properly designed it might also be possible to start ploughing the land in advance of the rainy season.³⁰ Scythes will probably have to be introduced for cutting hay and fodder crops like lucerne and grass. The most intensive feeding of cattle would be done during the slack dry season.

Another important impact to be expected from the introduction of ox technology is that women will be relieved of the hard work of hoe digging, weeding and carrying crops (and manure) since it is a male activity to operate the ox team.

Manuring.

When the input of fertilizer on land is increased by successive equal amounts, then the extra crop yield (marginal product) per unit of fertilizer used will eventually decline. Intimately a point is reached where the total output cannot increase and actually starts to decline with further input of fertilizer. This case of the law of diminishing returns is reached at a fairly

early stage with the use of fertilizer in contrast to manuring where the marginal and absolute productivity limit only enters as a factor at a much later stage.³¹ And whereas fertilizer use has often had negative effects on tropical soils, manuring improves the soil.

But under favourable conditions, relatively small amounts of fertilizer may raise the yield two or three fold. There is a dearth of information on the amounts of manure needed to create a certain crop response. A small input of manure might not give a very high response.

In mixed farming the limiting factor seems therefore to be the availability of sufficient manure which in turn depends on the number of cattle kept in relation to the farmed acreage as well as the ability to grow and provide sufficient amounts of fodder for the cattle. This takes us to the most crucial element of mixed farming: the pattern of land-use.

Land-Use.

In developing a system of self-sustained mixed farming dependent upon high inputs of manure, there must be a fairly well-balanced relationship between the size of the natural "external" pasture land (excluded from the cultivation-rotation), the fodder crop acreage, the number of cattle kept and the food-cash crop acreage.

The necessary size of food and cash crop acreages would depend on the sustained productivity of the land which in turn depend on the amount of manure applied. It might therefore in the long run be more productive to extend the acreage in fodder crops at the expense of the food-cash crop acreage, because the extra amount of manure produced might contribute to a larger aggregate output of food and cash crops from a smaller acreage than what was achieved with less manure on a larger crop acreage.

Alternatively, the provision of cattle feed in the form of industrial waste (mollasses, milling waste etc) to the farmers could be fairly easily arranged with the lorries carrying produce from villages to towns but presently returning empty to the village.

But before this intensive stage is reached it is necessary to secure natural pastures for the cattle as well as the possibility of extending the cultivated acreage to allow for the initial stage of fodder production.

Conclusion: Villagization and Mixed Farming.

It seems that the form of land-use pattern implemented as a consequence of the villagization campaign during 1974-76 has seriously hampered the possibility of developing mixed farming. The concentration of

the population in compact villages has had and will increasingly have the effect of intensifying the use of land. The land within an accessible range of walking distance from the settlement center is now farmed on an annual basis. Moreover, the separation of block farms for cash crop production from food crop land has laid the basis for a system of monocropping.

Previous methods of restoring soil fertility such as fallow systems and more or less systematic forms of crop rotation can no longer be maintained.

In other areas, grazing land near or within the village has been reduced to the extent where cattle has had to be moved far away from the settled areas resulting in separation between crop and animal production. A different version of this separation has been observed in Singida, where the homesteads - near which cattle are kept because of the dangers of theft - have been moved close to roads without any consideration for the suitability of farm land. The peasants thus had to continue cultivating their already developed old farm land, but the long distances now made it impossible to transport manure from the homestead to the fields.³²

The multitude and wide diversity of agricultural and grazing systems over the country obviously makes it difficult to come up with generalizations. Nevertheless the general picture seems to be one where villagization has artificially reduced the total amount of cultivated, fallow and grazing land available per capita although the permanently cropped acreage has been extended. The specific pattern of land-use established by the villagization campaign has therefore had the impact of severely limiting the number of cattle that can be kept for manure production. The possibility of gradually extending the acreage by way of oxenization and mixed farming has become much more difficult.³³

SUMMARY AND CONCLUSIONS.

Gradual population growth and intensification of land-use systems seems to have reached a stage where agricultural production is stagnating. This trend can be understood in terms of a process where growing labour intensification and land pressure causes the productivity of labour and of land to decline.

Villagization, rather than relieving the pressure on land, has tended to intensify land-use and with it the dangers of soil erosion and overgrazing. Despite the great diversity of agronomic conditions in the country, the state adopted a blanket approach towards implementing villagization. The minimum size of the villages stipulated in the Village and Ujamaa Act seems to have

been pinned on the economies of providing social services and during its implementation, considerations of road access, and bureaucratic design and control seemed to override consideration for the land-use requirements of agricultural and livestock production.

The government has thus locked itself in a position where extensive and rapid provision of inputs for raising agricultural output is imperative if the villages - many of which are too large for their resource base - are to remain viable units.

The pattern of land-use imposed on villages appears to suit the fertilizer package and mechanization with tractors. We have pointed to a number of limitations associated with the fertilizer strategy in terms of its effects on the ability of peasants to produce a surplus:-

The application of fertilizer tends to aggravate already existing constraints of labour peak seasons.

Given the labour intensive techniques associated with the use of fertilizer there is no guarantee that fertilizer will contribute to raising the productivity of labour as a continuous process. A decline in marginal and average returns may set in at an early stage.

The diversity of agronomic conditions make it impossible at least in the near future to design and adapt packages to local conditions. The blanket recommendations used so far have had rather limited if not negative effects in many areas of the country and in particular where rainfall is critical and unreliable.

The real cost of fertilizers is prohibitive and subsidise have been charged to producer prices. The cost of fertilizer, even when provided on a subsidized credit basis has proved to be a heavy burden to shoulder for the peasants and credit payment is a serious problem both for the peasant and for the credit agencies.

The terms of trade associated with the production and/or import of fertilizer have been extremely negative in recent years and there is little chance of a reversal of that trend. As a result, the conditions of capital accumulation have been severely limited and the high foreign exchange component of fertilizer tends to strengthen economic dependency rather than creating the conditions for self-reliant and nationally controlled growth.

The production and distribution of fertilizer is of necessity centrally organized and controlled. Even though the distribution of fertilizers

has tended to center mainly on cash crops in certain target regions the distribution has proved a serious bottleneck fraught with problems of late distribution, high costs, inefficiency and waste.

The use of fertilizer could prove beneficial as a short term strategy for raising crop yields, especially in areas where high rainfall and high-value crops makes it economical. The fertilizer strategy does not, however, allow for an integrated approach to rural transformation. Its linkages both to the agricultural subsectors (e.g. livestock) and to other sectors (rural industries) are virtually non-existent.

For the fertilizer strategy to have any long-term benefits, it will have to be supplemented with improved methods of production. Although the lay-out of village block farms happens to suit mechanized tractor cultivation almost all previous attempts at tractor mechanization organized on a village basis have proved to be disastrous failures. Yields on tractor ploughed land have often been lower than the yields obtained from hoe or ox tilling,³⁴ probably because intensive tilling with disc ploughs damages tropical soils through pulverization and increased exposure to evaporation and erosion. Secondly tractor mechanization is associated with extremely high cultivation costs which can only be met if the capacity of tractors is utilized very efficiently. Given past experiences and the lack of a repair and servicing infrastructure it is safe to conclude that tractor mechanization in villages would be a sheer waste of foreign exchange, as it has been in the past when tractors were much more cheap.

Oxenization associated with intensification of mixed farming represents a comprehensive, **integrated** and self-reliant approach to solving the present state of stagnation for a considerable section of the peasant sector. The long-term benefits of this strategy can be listed as follows:

Improvement of the soil fertility and moisture retention capacity, development of rotational practices.

Improved nutrition.

Self sustained growth of productivity without reliance on externally controlled foreign exchange inputs.

Development of location specific instruments based on local materials and skills.

Development of rural based industries for manufacturing, repairing and servicing equipment.

Removal of labour constraints and relief of women's work load.

Improved local transport of crops, water etc.

Methane gas as a source of fuel and energy.

The government has so far concentrated little effort on developing oxenization. The population concentration and intensification of land-use brought about by the villagization campaign appears to have further reduced the prospects of developing oxenization and mixed farming. Nevertheless, sufficient land resources do exist, especially in those large parts of the country where agro-pastoralism and extensive forms of mixed farming are practiced. The future task would then be one of creating the conditions for more intensified integration of crop and animal production which is to say that especially cattle must be reintegrated into the land-use pattern of the villages. In some areas this is probably only possible by reducing the size of villages.

The development of oxenization and mixed farming has to be based on internalized intensification of the existing multitude and diversity of local land-use systems. To be successful it will have to rely on local knowledge of agronomic conditions and on neighbour and village based cooperation for efficient development and utilization of ox technology, and for reorganizing the land-use pattern. If a restructuring of the agrarian economy is to take place it will have to be based on democratic mobilization of the peasantry, not on the previous approach of one-way communication from the top characterized by bureaucratic blanket recommendations, often inappropriate and sometimes backed by force. The productivity/commodity squeeze, expressed as the contradiction between falling productivity on the one hand and terms of trade moving against the peasants on the other is reflected in increased impoverishment and exploitation. This contradiction is not solved but only postponed by establishing the conditions for absolute surplus production where the peasants have to work harder under the supervision and control of a growing number of government paid officials in the villages.

Absolute surplus production as represented by the isolated block farm/fertilizer approach does not involve a long-term transformation of the technological and agronomic base of the economy in so far as this approach is mainly concerned with labour intensification for raising the productivity of land,³⁵ not with the productivity of labour. Although absolute surplus production may allow for a short term increase of the aggregate surplus produced it does not create the conditions for expanded capital accumulation as an inherent process of reproduction.

Relative surplus production, on the other hand, involves raising the productivity of labour as a continuous process. Once established it allows for a faster rate of capital accumulation both internally within the peasant economy and by the state. It is suggested here that an integrated, scientific and democratic approach to oxenization and mixed farming may provide the first step towards establishing the capacity for expanded capital accumulation in peasant agriculture independently of externalized economic dependency.

FOOTNOTES:

1. I am indebted to S. Rugumisa and H. Bernstein for having developed some of the theoretical themes and concepts put forward in this paper. Views expressed and mistakes made rest entirely on the author.
2. Upton (1973, pp. 101-102) relates this phenomenon to the law of diminishing returns operating in agricultural production.
3. Ruthenberg (1968, pp. 334-5), summarizing case studies on Bukoba, Kilimanjaro and Usambara. Also Datto (1973, p. 49) on Uluguru Mountains and Schultz (1971, pp. 179-185) on Kainam in Mbulu Highlands.
4. Examples are Iringa (Benson, 1978 pp. 92-98); Sukumaland (von Rotenhan, 1968); Mbulu Highlands (Schultz, 1971, pp. 190-208).
5. The United Republic of Tanzania (1977): The Threat of Desertification in Central Tanzania.
6. This section is based on M. Wuyts (1979): Unequal Exchange and the Peasantry (draft note, Dar es Salaam).
7. ILO 1978, p. 257. The price indices on which terms of trade calculations were based include the crops of coffee, cashewnuts, tobacco, maize, rice and wheat as compared against the national consumer price index relating to non-food items. It appears not to take account neither of rising costs of farm inputs nor higher rural shop prices. In reality the farmers' terms of trade might therefore be considerably more negative.
8. Ruthenberg (ed.) 1968, p. 334.
9. The concepts of relative and absolute surplus production used forthwith are borrowed from J. Friedman (1972), and are not strictly synonymous with the concepts of relative and absolute surplus value production which operate under conditions of wage labour. The concepts are used here because they relate directly to the concept of average productivity of labour regarded as crucial in understanding the conditions of agricultural growth.

10. P. Bairoch, 1975, pp. 39-41.
11. Boserup (1965)
12. Bernstein (1977)
13. Ruthenberg (1968). This development seems to have been the case during the colonial period and the first decade after Independence. As can be gauged from table 1 the trend seems to have been reversed during the 1970s, although the increase of the subsistence trend can be questioned in terms of the reliability of data.
14. For detailed accounts of the policy and projects concerned, see Cliffe & Cunningham (1973); Raikes (1978).
15. e.g. Ismani in Iringa.
16. Unfortunately, the record of the state bureaucracy has so far not been promising when it comes to efficiently investing its available surplus in a productive fashion. To give an example, embezzlement of funds for beer consumption is unproductive consumption, in contrast to embezzlement of funds for productive investment as done by civil servants in Kenya on a grand scale.
17. IBDR, 1977, Annex VI p. 29.
18. ILO, 1978, p. xix.
19. Funds for fertilizers not recovered amounted to 17 million shillings in 1975 and 18 million shillings in 1976 (FAO/K. Zschernitz, 1977/78).
20. B. Nindi, (1978, pp. 278-290) provides a well informed discussion of the limitations of fertilizer use in Iringa, both in terms of its financial and technical aspects. His excellent account of the intensification of farming systems in Ismani (pp. 92-97) is instructive. After the establishment of villages based on a system of permanent land use, fertilizer inputs failed to raise yields and may in fact have accounted for a further decline in yields.
Another example of this tendency is provided by some of the cotton growing areas in Mwanza, where the indiscriminate use of fertilizers, urged by extension advice has caused acidization of the soil and declining cotton yields. A similar lack of crop response to recommended fertilizer levels has been reported from tobacco growing areas in Tabora where experienced peasants deliberately reduce the amount recommended for tobacco. (Pers. com. with J. Boesen).
21. F. ex. at the largest state farm in Tanzania, Basotu Plantations Ltd., fertilizer trials resulted in a lot of weeds but no wheat. Production is now carried out without the use of fertilizer. Many large-scale farmers in Arusha are similarly opposed to fertilizers, both for environmental and economic reasons.
22. Having once had the personal experience of fertilizing on credit following meticulously the recommendations of the National Maize Project, I would assess the extra labour involved as equivalent to the work of two plantings.

23. I know of several villages under the NMP in Hanang District where this happened although it was most common to completely refuse cultivation in the block farm. The land was then given to capitalist farmers on a share cropping basis who grew wheat instead.
24. For a detailed analysis of this process in Ethiopia, see M. Stahl (1974): *Ethiopia: Political Contradictions in Agricultural Development*.
For the generally modest effects of the Green Revolution for raising agricultural productivity, see P. Bairoch op. cit. (pp. 45-48).
25. cf Second Five-Year Plan and Siasa ni Kilimo, Iringa 1972. In his Farmers' Day speech in Mbeya on July 7th 1978, the President reiterated the necessity of oxenization and manuring and in fact posed this strategy as an alternative to using fertilizers, because of the latter strategy involving high costs, transport problems and dependence on foreign exchange.
26. Raikes (1971, p. 470) gives a figure of about 10-15 acres for Karatu, Mbulu District.
27. Sullivan et. al (1978).
28. Such a development has taken place in Central Province of Kenya and has contributed substantially to raising farmer's incomes and to developing the dairy industry.
29. So far no credit has been available for ox technology.
30. Raikes (1971) has suggested that to kill weed growth and seeding it might actually be an idea to plough (with a chisel plough) shortly after harvest, when oxen are still well fed and strong.
31. In China for example, the single most important factor responsible for the extraordinarily high land yields is the highly intensive use of manure (animal dung, night soil, Green manure etc.).
32. Personal communication with M. Jellicoe.
33. It must be stressed that the outline of developing mixed farming, presented above, is very tentative due to the lack of data and research on the productivity aspect of ox technology and manure application under concrete conditions of peasant farming. This paper is merely an attempt to direct attention to some of the issues involved.
34. Nindi (1978), pp. 92-98; Raikes (1975).
35. Note that labour intensification is also the stated policy of the World Bank.

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