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Farm Management Research and Extension Advice: Possible Developments in Toro. *

by

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1. ECONOMIC STUDIES UNDERTAKEN BY THE DEPARTMENT OF AGRICULTURE

Background. The first detailed study into the economics of small-scale farming in Uganda was carried out in 1958-59 (1). In 1963 the Department of Agriculture started a more extensive programme, of which the work in Toro is a part. Half the farms covered in Toro were more-or-less peasant holdings and the other half consisted of tea farms. Within each group a pilot survey was conducted which led to a few case studies (2) (3), while the main surveys each covered thirty farms (4) (5).

These studies carried out in Uganda differed from those conducted in Kenya and Tanzania in being detailed management surveys, involving the frequent recording of only a few farms, rather than extensive surveys, covering a large sample of farms recorded at long intervals or on a single-visit basis. Surveys which only cover a few farms are open to the criticis that, to misquote, "they are fit for an academic thesis but of no earthly use". Various reasons have been given for conducting small-scale surveys (6), and the following are offered as being relevant to the Uganda studies.

(a) The surveys were conducted at the same time as, and to some extent in the same parishes as, the National Census of Agriculture and could, therefore, be fitted into a context which gave them a perspective.

(b) Farm surveys were virtually untried in Uganda and detailed studies were considered to be a better test-bed of methodology, due to the amount of detail one gets bogged down in (7).

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(1) "The Economics of Peasant Agriculture" E.H. Jones. Ministry of Agriculture, Entebbe. Mimeo 1967.
(2) "Case-studies of 9 tea-outgrowers in Toro"; Min. of Agric., Entebbe. Being printed.
(3) "Pilot Study of 12 Farms in Toro"; Min. of Agric., Entebbe. Being printed.
(4) "An Economic Survey of Farming in a Wet, long-grass Area of Toro"; Min. of Agric., Entebbe. Being printed.
(5) "The Economics of Out-grower Tea Production in Toro"; in draft.
(6) For example M.R. Haswell in "Economics of Agriculture in a Savannah Village"; David Edwards in "An Economic Study of Small Farming in Jamaica"; J. Heyer in his Ph.D. Thesis (London); Anne Martin in "The Farm Economist" Vol. 6, No. 3 defending a criticism of Miss Haswell's work by F.M. Clayton, Vol., No.
(7) The methodology employed in these surveys has been rather laboriously described in "Pilot Study of 12 Farms in Toro".

* The writer who is a member of the Uganda Department of Agriculture wishes to stress that the views expressed in this paper are his own and do not necessarily reflect official policy.

(c) Where it is proposed to superimpose a new crop (e.g. Tea) onto traditional farming it is important to understand the traditional farming pattern more than just superficially, especially if the giving of credit is involved.

(d) Detailed data is capable of being compared with similar data collected on D.F.I.S. and other Departmental stations.

(e) If extension work is going to become more than technical advice on how to increase yields per acre and embrace advice on farm management then it is essential that management data be available rather than superficial descriptive information.

(f) It is felt that detailed studies which give information on labour availability provide some relevant insight into the "social factors" so often used as the scapegoat when projects fail.

Objectives. The objectives of the schemes started by the Department were described as follows (Nov. 1962):- "To obtain financial and physical data on typical peasant farms. Information to be gleaned will include the costs of production of crops grown, the level of subsistence and cash income which peasant farmers produce, the distribution of demands on labour and capital and background information on factors of acting the ability and desire of farmers to change and/or expand their production of different crops. This information is urgently required as a basis for planning research, for the operation of such schemes as the Agricultural Subsidy Scheme and the Progressive Farmers' Loan Scheme and to provide standard data on the basis of which individual farmers may be rationally planned". In short, there was a lack of information relating to peasant farming and the object was to collect any data which might be relevant, without actually deciding beforerchand the precise form of analysis to be adopted. Basically it was recognised that extension work and calculations regarding loans could not be based solely on Research Station findings. What was, therefore, required of the analysis was information which might be compared with results and which was of direct use in extension work.

The difficulty of making comparisons with data from Department stations will be discussed later. If analysis is going to present information which is going to be of any use to extension workers, the following questions should be taken:-

1. What factor is limiting?
2. How do farmers' existing performances compare with those achieved on Departmental stations?
3. What resources are used in traditional (or "subsistance") farming?
4. What resources may be considered available after meeting the requirements of traditional farming?
5. What scope is there for increasing incomes by moving away from the traditional farming pattern towards grater specialization in traditional enterprise?
6. If surpluses of traditional products are produced, what are the market prospects for these products and how attractive an incentive do they provide?
7. If a cash enterprise is to be introduced into the traditional farming pattern, how much can be managed with the resources available (see 4)?
8. At what stage should one consider removing the restrictions imposed by the general policy of adding a new crop onto traditional farming? i.e. when can extension advice be allowed to consider a farmer as commercially-minded?
9. Do enterprise returns obtain under the existing level of managerial ability indicate that loans can be beneficially made for these enterprises?

Before an attempt is made, in section III, to answer at least some of these questions for Toro, it is probably helpful to consider what extension policy has been in the past and what changes are now in the offing.

II. EXTENSION POLICY

Established Policy. Departmental policy has not really changed since 1954, when it was laid down in the Report of the Agricultural Productivity Committee. This is summarised in the introduction to each Annual Report produced since then. The emphasis is on land consolidation, land conservation, improving yields per acre, integrating stock with crop enterprises and the development of cash crops. Over the years more emphasis has been put on the injection of capital in order to give the farmer "the tools to do the job" and to overcome bottlenecks.

More specifically, extension advice is summarised in the 1964 "Crop Production Programme", which lays down Departmental advice on how, "in order to maintain their standards of living as prices fall, not only must farmers improve the quality of their products but they must also increase the productivity of their land by increasing their yields."
..... "In order to increase the productivity of his holding the farmer must pay careful attention to
1. the timely opening up and preparation of the land;
2. early planting and proper spacing of all crops;
3. judicious manuring;
4. timely weeding, thinning and spraying of the crop;
5. proper harvesting and drying of crops; and
6. beforehand, the proper and timely selection of seed for planting."

The Programme discusses these technical aspects for each crop in turn. Although occasional reference is made to how various enterprises compete for labour at certain times of the year, the solution offered to overcome, for example, a weeding peak for finger-millet is to plant in rows. It is evident, therefore, that extension advice has urto now been concerned almost solely with conserving soil, increasing yields and improving quality.

Although drives have been made to promote the growing of particular crops, there has been little attempt to relate these to the traditional farming system. Furthermore, while it has been acknowledged that certain enterprises and recommended practices lead to labour stresses, there has been no measurement of these. Overall, therefore, the extension services have not involved themselves with management advice concerning the selection of crops and overall farm profitability, though this is now becoming the focus of their attention.

Increased Policy. During the Department has felt that management advice should be given in the extension service, even if only at those areas given at District Farm Institutes. A circular has been issued on "Farm Management" and meetings have been held in the Regions to discuss the matter. The circular discusses the alternatives to the present service, known as either intensification or extensification. It enumerates the information required to arrive at management decisions and concludes, "the topics mentioned above which have not been taught at all should now be included in your extension programmes. Much of the information required you already have or can get. .... We are particularly anxious to start with those farmers in the Community Saturation Project." In fact, much of the required information is very hard to get, if access to it is possible at all.

Therefore, although emphasis is now being placed in extension work on profits rather than purely technical considerations, this is more in theory than in practice, since field workers do not have the information required. This is where the data from D. F. I. testings farms and from field surveys come into the picture.

III. ANALYSIS OF FARM DATA FOR EXTENSION

Some of the data collected in Toro is presented here to see how far the questions posed on page 2 may be answered. Although this data was collected from only 77 farms and accordingly suspect, it must be remembered that the Department have so far relied on only one station in the area, the D.F.I., from which to obtain equivalent information, though this will eventually relate to more than one year.

(1) Limiting Factor.

Generally it might be assumed for most areas of Uganda that land and labour are normally limiting but that either capital or management is. Short-term and broad extension advice has to take factors as given, and due to the lack of capital as normally understood and the nebulous nature of management it is not generally feasible to work out returns to these two factors. Extension advice has, therefore, to be based either on maximizing yields to land or returns to labour. It is evident that so far all research and extension has been concerned with increasing returns per acre. Yet it is generally agreed that land is not limiting in Uganda, though local shortages are found. In Toro, certainly, land is in abundant supply, and until new legislation was brought in recently it could be obtained for a nominal price "embago".

It might, therefore, be assumed that labour is limiting even though it is also argued (section III-4) that surplus productive capacity of labour exists, a paradox that may be explained by the lack of demand sufficiently attractive to draw out this potential. As far as extension is concerned, the point is what do farmers consider their limiting factor? It is suggested that the answer is labour. This may explain to some extent the bewilderment farmers are reported to show on receiving advice which runs on the lines "Do this, do that, do the other and you will get a bigger yield per acre."

If labour is limiting the farmer is interested in the effect all the "Dos" have on returns to the effort involved.

The analysis done on the data collected in Toro have concentrated on labour, the assumed limiting factor as the farmer sees it. An analogy might be made with farming in Britain. The price of land and labour are both very high and may be considered limiting, though labour can be replaced by capital. Which factor should a farmer try to maximize his returns to? The farmer starting from the position of buying his farm would have no hesitation in saying that to him the restriction is cash and that he aims to maximize returns to every x pounds invested, whether in land, capital or working capital. To the British farmer all resources can be lumped together under the single head of cash invested.

The parallel for Toro may be drawn by saying that capital is non-existent except as it appears as "cleared land". Land as such is not limiting, though again cleared land is. As cleared land is the direct product of the labour applied to open it from bush, the factors land and capital can be valued in terms of the labour cost involved in opening land. This labour cost can be added to the labour directly applied to the growing of crops so that all factors can be measured in terms of the single factor labour, which is thus equivalent to the "cash invested" by the British farmer.

If extension is now to concern itself with management, it becomes necessary to be able to compare crop returns, or at least returns to alternative rotations. But the time factor seems to make a nonsense of comparisons of returns per acre, since a bean crop may be in the ground for 3 months, sweet-potatoes for 9 months, cassava 24 months; bananas 36 years and tea 40 years.

An advantage of the "total labour" factor analysis is that, since labour is applies in time and labour profiles can be calculated for each enterprise, crop returns to total labour can be usefully compared.

The remaining questions posed on page 2 will be approached with this attitude of mind.

(2). Farm Performances and those achieved on Departmental Stations

Since the surveyed farms lie within 10 miles of Kyembogo D.F.I., it is felt that the only valid data that can be compared with the peasant farm data collected are those recorded there. More specifically, the small-holding at the D. F.I. is meant to represent what a family can manage, so data from this c tings unit are used here.

Direct comparisons are hard, however, since the Kyembogo small-holding uses oxen whenever possible, and since these oxen are brought in from the D.F.I. and not maintained on the small-holding they appear as a hired unit which is not intergrated into the farm. Departmental policy is to encourage the use of oxen, but the Batoro have shown little interest in adopting their use, though the Nandi people who have settled on the Fort Portal to Kasese road have been demonstrating their use for nearly ten years.

TABLE 1. CULTIVATION RATES - KYEMBOGO D.F.I. OUTINGS FARM AND NEIGHBOURING PEASANT HOLDINGS. (Hours per acre)

Operation	Kyembogo Man-hours	Ox-hours	Kijura (a) Man-hours	Kahangi (b) Man-hours
Opening Bush*	1365	205	879	1209
Opening ley	1278	112	-	-
Inter-crop Cultivations	168	70	456	459

(a) Kijura data are derived from 11 farms analysed as case-studies.

(b) Kahangi data are derived from 30 randomly selected farms.

* "Bush" at Kyembogo was 3-year old elephant grass planted in 6-foot rows. Most natural bush is also elephant grass.

TABLE 2. LABOUR INPUTS AND GROSS RETURNS - KYEMBOGO D.F.I. COSTINGS FARM AND NEIGHBOURING PEASANT HOLDINGS.
(Figures per acre)

Crop	Kyambogo (a) Man-hrs.	Ox-hrs.	Shs.	Shs./Hr. (b)	Kijura Man-Hrs.	Shs.	Shs./Hr.	Kahangi Man-Hrs.	Shs.	Shs./Hr.
Arabica	3309	75	482	0.14	1118	381	0.34	-	-	-
Robusta	-	-	-	-	1153	410	0.36	-	-	-
Bananas	16 6	264	317	0.16	319	442	1.39	502	465	0.93
Beans	369	24	150	0.38	266	158	0.59	268	99	0.37
Irish Potatoes	1043	94	1017	0.89	-	-	-	-	-	-
Sweet-potatoes	319	33	36	0.10	528	316	0.60	-	-	-
Maize	365	44	291	0.71	-	-	-	-	-	-
Finger-millet	-	-	-	-	489	100	0.20	863	144	0.17

(a) While on peasant farms net returns to labour are approximately equal to gross returns less seed, on the Kyambogo costings farm net returns to labour would have to take into consideration not only seed but also capital(in the form of oxen and ox equipment) or a hire charge for ox work, and fertilizers, herbicides and pesticides used. Eg. on the coffee plot Shs. 340/- worth of herbicides were used per acre, and their application involved the use of capital in the form of spraying equipment.

(b) The hours used as the divisor are the sum of man-hours and ox-hours. This is clearly a misleading figure. Although there is some data on comparative work rates between oxen and hand labour(1) these do not seem to refer to Toro conditions.

In view of the notes appended to tables 1 and 2 conclusions cannot easily be drawn. The D.F.I. records are only complete for 1966, while the peasant farms were surveyed in 1964-65. They are simply presented here as an example fo how comparisons might be made. Nevertheless it is felt that these figures do help to draw attention to the need for more such comparisons, since extension work essentially involves saying "If you do such-and-such you will be better off", which implies that the advocate for Departmental advice in fact knows both sides of the picture. On the whole the figures might suggest that oxen are a doubtful asset under these conditions and that "high" farming is not particularly profitable.

This last conclusion is to some extent supported by the following statements which appear in the Kawanda Annual Report for 1962 and refer to the costings farm there:- "The labour force was hard pressed and additional labour had to be employed .... the stall unit made its only profit .... the poultry unit was not

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(1) For example, P. Okai, in "Some aspects of labour use in the agriculture of Lango District of Uganda", E.A.E.R. 25, compares ox work with the Lango-hoe, the former working at the 7 times the rate. In "Peasant Farm Survey in Bugisu" by D. J. Stainburn, Min. of Ag., Vol. Two, oxen appear to work about 10 to 17 times faster than hand-labour, but this analysis is not very useful since there is no record of the man-hours associated with the ox-hours and it appears that the ox-hours were mainly "ox-team" hours, though this is not made clear.

TABLE 3 HOURS WORKED ON KYEMBOGO D.F.I. AND BY FAMILY MEMBERS IN TRADITIONAL FARMING

Source of Data		Jan.	Feb.	Mar.	Apr	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
30 randomly selected farms 1964-65	(a) Family man-days available(i).	71	62	67	63	67	67	70	72	73	69	66	70	816
	(b) Hours worked on Crops by Family	192	180	181	176	181	181	224	202	190	193	218	182	2285
	(c) Hours worked per head (b ÷ a)	2.7	2.9	2.7	2.8	2.7	2.7	3.2	2.8	2.6	2.8	3.3	2.6	2.8
13 peasant family farms from above	(d) Family man-days available(ii)													1091
	(e) Total hours worked on crops	302	262	288	305	300	273	348	331	285	308	333	257	3592
	(f) Hours worked per family member available													3.13
Kyembogo DFI costings farm, 1965	(g) Hours worked on crops(iii)	985	734	1390	1454	1396	953	992	952	935	588	420	378	10997
	(h) Family numbers required(iv)	14.6	10.5	19.1	21.8	18.6	12.2	11.5	13.1	13.8	9.4	4.9	6.1	12.8
	(i) Ox-hours worked	169	121	228	199	40	91	32	216	124	11	86	67	1384

(i) During the period Sept. 1964 to Aug. 1965 there were 307 working days (i.e. excluding Sundays and other Holidays). Children under ten are not considered available for farm work, and deductions are made for those people over ten years old for days spent in off-farm earning employment and for days at school. The word "man-days" means "human-days" - i.e. there is no conversion to man equivalents.

(ii) On these 13 farms, family members did 95% of the work on crops.

(iii) On the D.F.I. costings farm a full-time worker does nothing else but look after the dairy unit, including the cutting and carting of grass to the stall unit. From total hours worked on the farm 9 hours per day have been subtracted to allow for this man, the rest of the work being applied to crops, many of which were eventually fed to the cows.

(iv) These figures are derived by dividing row (g) by row (c) and then again by the number of work-days per month.

profitable .... arable crops were on the verge of profitability .... the cost of maintaining and picking the coffee crop exceeded the value of the crop .... of the minor crops tried onions and Irish potatoes seem to be the only crops (1) likely to produce a profit .... losses on the cotton crop were, as usual, heavy." The reference to the labour force being extended brings us onto the question of labour availability, but before proceeding it is worth noting that labour data are generally unavailable from Departmental Research Stations. For example, Serere "endeavor to maintain a fair standard of weed control without any regard to labour input except for general restrictions due to financial stringency" (private communication).

Finally, it might be questioned whether research work, costings farms and demonstration units should employ resources not generally available to the ordinary farmer, except as trials of these resources. A "control" using only the resources locally available would be a useful addition to all Departmental stations.

(3) Resources in Traditional Farming.

In section III - (1) it was concluded that labour was the limiting factor upon which attention should be focused. In countries where the established pattern of farming is largely subsistence orientated most extension policy has taken the labour force as being the farm-family. The question is, how much work do these people do? Some Toro data are presented in table 3, together with the hours worked on the Kyembogo D.F.I. costings farm.

For the 30 randomly selected farms there were an average of only 816 working days available in the year - i.e. 2.66 family workers per household. This sample included 6 farms owned by widows, on which there were no men, and 1 farm belonging to a single man who lived by himself. Nine householders has regular outside employment, and in one other family a daughter and two sons had full-time jobs, so that there were only thirteen "peasant family farms". The average composition of these 13 farms is indicated by the following table of working days for which family members were available, and it also shows how much work was done.

Family member	No. of days available in the year	Average hours worked on crops per available day
Householder	296	2.96
Wife	307	3.80
Other men over 15	50	2.06
Other women over 15	283	3.06
Boys aged 10-15	76	0.78
Girls aged 10-15	80	3.23
Boys aged 5-9	-	-
Girls aged 5-9	-	1.88
TOTAL	1091	3.13

On these farms there was an average of 3.55 family workers per household, and they worked on crops for just over 3 hours each on average through the year.

(1) At Kyembogo D.F.I. they have had to give up the growing of Irish potatoes due to the difficulty of selling the produce of 1 acre!

Table 3 shows that at Kyembogo, even with the use of oxen and excluding work applied to the cows, about 12 family workers are necessary if they are going to work the customary 3 hours average per working day. Furthermore, while on peasant holdings variation about the average monthly labour inputs is of the order of 13% for peak and through months, on the D.F.I. costings farm the variations if 60%. This suggestes why farmers may be reluctant to practice what they are taught. For example, the D.F.I. peaks in March-May and August-September arise from the practice of early planting in rows. As the returns to labour indicated in tables 1 and 2 are no higher than those generally pertaining on local farms, and as most farmers lack the means of starting the single profitable enterprise, namely milk production from exotic dairy cattle, there appears little incentive to work harder on the lines being recommended. The possibility for this should be discussed.

(4) <u>The Surplus Productive Capacity of Labour</u>.

The general policy pursued by the Agricultural Department has been to graft a "cash" crop onto subsistence farming. In areas like Toro where there is no land shortage, the assumption implicit in this policy is that surplus productive capacity of labour exists. This may be attributed initially to a lack of demand for any surplus production from subsistence farming; i.e. in the absence of a market and in a situation in which subsistence needs are relatively easily met a form of disguised unemployment is considered to exist. This surplus capacity, it is then considered, may be exploited i.e. by exposing the farmers to market opportunities.

Yet in the Annual Report of the Department of Agriculture for 1960 it was stated that "Despite the efforts of the Department over the last 40 years the general level of farming is still at the subsistence level and .... we can no longer afford to dissipate our forces .... in an attempt to help those who will not help themselves."

The data collected in Toro generally supports the opening phrase. Thus the two surveys of non-tea-growers indicate that "available" family members (people are considered unavailable if under 10 years old, while at school and while in off-farm earning employment) are engaged in work activities, both farm and non-farm, for about 5 hours a day, and in non-work activities for about 11 hours a day. Both these surveys were conducted in areas where there were market opportunities for food surpluses either in Fort Portal or from employees on tea estates, yet over 80% of labour was devoted to meeting subsistence needs, and beer, which may be considered as 60% of sales by value. It would appear, therefore, that the market open to these people is not sufficiently attractive to incite them to more effort (see section III-6).

Tea is considered to be a profitable crop and, without having asked farmers what returns they anticipated from this crop, a comparison of family labour inputs on tea-growers' farms and on traditional farms might indicate whether, and to what extent, the assumed surplus capacity of labour is responsive to a theoretically attractive market. For this purpose it is necessary to compare "peasant" families, of which there were 13 who were traditional farmers and 9 who were tea-growers. In table 3 the available people on the 13 traditional farms are seen to have worked an average of 3.13 hours on crops per working day, while on the tea farms they worked an average of 3.85 hours, an increase of 23%. These figures only relate to work on crops, since work with stock, mainly herding, is not physically demanding, even if time consuming and boring, and is to a large extent done by small children who are incapable of much productive effort on crops. Nearly half this increase may be attributed to the householders, who worked 4.10 hours on average compared with 2.96 on traditional farms.

It may be tentatively concluded from this small sample that farmers are responsive to market incentives, but that the returns from established food crops are not sufficiently attractive to encourage their production for the market, a conclusion which justifies closer scrutiny.

(5) & (6) Traditional Enterprises, Market Prospects and Incentives.

The farm management aspects of production, to which extension staff are now turning their attention, are basically concerned with re-allocating resources between enterprises, taking the methods production as given. To plan a farm involves programming, and this has not yet been done to the data collected in Toro. However, as far as a discussion of the market and incentives are concerned it is sufficient to look at averagereturns so that the relative attractions of enterprises can be noted from the outset. (Thus Mrs. Heyer's linear programmes applied to Machakos data excluded three crops entirely in all final solutions.) Certainly extension advice would only be based on the programming of a "model farm" for any locality, so that general recommendations on the choice of enterprises, rather than detailed advice on resource allocation between enterprises, can justifiably be based on average returns. These returns have to be expressed in terms of the limiting factor, and here returns to "total labour" are considered. However, table 4 is included to show comparative crop returns using three other bases as well, as these show how ides on the relative attractiveness of different crops are generally arrived at.

Table 4. GROSS RETURNS AT LOCAL MARKET PRICES COMPARED FOR 11 FARMS AT KIJURA.

	(a) Shs. per acre Assuming a single crop	(b) Shs. per acre for 12-month period	(c) Shs. per acre of direct labour	(d) Shs/hour of total labour
Arabica	477 (3)	477 (5)	0.40 (5)	0.39 (4)
Robusta	588 (2)	588 (3)	0.78 (3)	0.67 (2)
Bananas	630 (1)	630 (2)	1.18 (1)	1.10 (1)
Beans	283 (5)	566 (4)	1.06 (2)	0.53 (3)
Finger-millet	200 (6)	400 (6)	0.40 (5)	0.25 (6)
Sweet-potatoes	446 (4)	714 (1)	0.68 (4)	0.34 (5)
Cassava	120 (7)	72 (7)	0.22 (7)	0.10 (7)

(a) "Assuming a single crop" means that a year's production from a perennial crop is compared with a season's production of a short term crop and two year's production of cassava.
(b) Comparisons for a 12-month period assume double cropping of short-term crops, 1.6 crops of sweet potatoes and 0.6 of a crop of cassava.
(c) Directly applied labour covers the period from the start of planting to the end of harvesting in the case of short-term crops and all operations devoted to mature perennial crops.
(d) For perennial crops there has been an annual allocation of opening and establishment costs added to directly applied labour, the mature life of bananas being taken as 20 years and of coffee 30 years. For annual and biennial crops a 4-year cropping period is assumed and each crop is charged with its portion of opening costs according to the theoretical number of crops that could have been grown (eg. 8 bean crops, therefore 1/8 opening costs is charged to a single crop). A charge is also made for inter-crop cultivations. In neither case is a charge made for seed or planting material. If a 3-year cropping period were taken the allocation of opening costs would be a third higher.

It is believed that the last column of figures in this table gives the truest picture of relative crop profits as the farmer sees it. However, a deficiency here is that while, for example, beans might appear

comparatively profitable at local market prices, short-term crops cannot be mono-cropped, so that beans cannot be considered in isolation but only in the context of a rotation. A comparison of some crops rotations is made in table 5.

TABLE 5. RETURNS TO TOTAL LABOUR (30 FARMS IN KAHARGI).

	Shs/hr at wholesale prices (a)	Shs/hr at local market prices
Bananas (b)	-	0.75
Millet, beans, millet, beans, sweet-potatoes and beans 2x	0.26	0.34
Millet, beans, ground-nuts, beans, sweet-potatoes and beans, cassava and beans, cassava and beans, cassava	0.19	0.27
Millet, beans, millet, beans, ground-nuts, beans, sweet-potatoes & beans 2x	0.25	0.33
Sweet-potatoes, beans, millet, beans, sweet-potatoes & beans 3x	0.33	0.38
Sweet-potatoes & beans, millet, beans, ground-nuts, sweet-potatoes & beans 2x.	0.31	0.37

(a) Mixed beans, ground-nuts and finger-millet are valued at the average prices paid by licenced produce buyers, but sweet-potatoes and cassava still at local market prices.
(b) Annual interest-free charges are made for the work of opening bush for and the establishing of bananas assuming no inter-planting in the first year and a mature life of 20 years. These charges are added to directly applied labour.

An unexplained feature of Toro is that prices recorded at local markets are about double those paid by licenced produce-buyers... Of the crops listed in tables 4 and 5 only mixed beans, ground-nuts and finger-millet are storeable products which enter into the national market, and the production of more than the local market can take of these involves the producer both in greater marketing problems and halved returns. Excessive production of bananas, sweet-potatoes and cassava would presumably also result in a very great fall in the prices obtained for these products in local markets. An alternative method of calculating relative crop profits to that used in column (d) of table 4 is to assume a mono-cropping sequence and apply the method used in table 5.

This gives the following results (cents per hour):-

	Assuming 3-year cropping sequence		Assuming 4-year cropping sequence	
	At local market prices	At wholesale prices	At local market prices	At wholesale prices
Mixed-beans	18	9	19	9.5
Finger-millet	21	10.5	22	11
Sweet-potatoes	43	-	43	-

This explains why the more profitable rotations in table 5 are those with a higher proportion of sweet-potatoes.

TABLE 6 - COMPARATIVE LABOUR INPUTS ON 13 TRADITIONAL (HOURS).

	Jan.	Feb.
(a) Hours worked per farm - 13 "Traditional" farms.	302	262
(b) Hours worked in the traditional sector - 9 Tea farms	277	163
)(a) divided by no of full-time family workers (3.55)	85	74
)(b) " " " " " " (2.95)	94	55
)(c) adjusted by x0.8909 to correct ratio of family members to family workers	75	66
)(d) adjusted by adding hours worked on food crops inter-planted in young tea	101	68
)(a) divided by no. of family members (6.46)	47	41
)(b) " " " " " " (4.78)	58	34
)(c) adjusted for work on crops inter-plarted in tea	62	42

FARMS AND IN THE TRADITIONAL SECTOR ON 9 PEASANT TEA FARMS

Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
288	305	300	273	348	331	285	308	333	257	3592
149	115	122	222	247	253	260	183	219	212	2423
81	86	84	77	98	93	80	87	94	72	1011
51	39	41	75	84	86	88	62	74	72	821
72	77	75	69	87	83	71	78	84	64	902
55	50	54	78	86	92	97	71	79	74	905
45	47	46	42	54	51	44	48	52	40	557
31	24	26	47	52	53	54	38	46	44	507
34	37	33	48	53	57	60	44	49	46	559

The situation, therefore, appears to be that the crops which any dividual farmer can dispose of outside the narrow confines of the local market give a very low return to labour at local market prices and even more so at commercial prices, while the bulky and more profitable crops can only be produced for the local market, and any great increase in their production would lead to a swamping ofthis market and a very sharp fall in price. As far as prospects for commercial farming are concerned, it is necessary to compare the above returns with the current wages paid by African farmers, which are about 30 cents per hour (Shs. 1/50 for a 5-hour day.)

The marketing system is often blamed for the failure of people to grow more for sale. In 1961 Miss Martin[1] was asked to make a factual study of the marketing of agricultural produce, other than the major export crops, in order "to throw some light on the question as to whether or not the organization of buying and selling minor cash crops in Uganda is such as to inhibit their profitable production". She states in her report; "Apart from such highly congested districts as Kigezi and parts of Bugisu and Bukedi, labour, rather than land is the immediate limiting factor to increased production. To understand more of the economy of the individual farm, therefore, it is essential to have more figures on relative labour costs for different products, under the normal conditions of peasnat farming, than we have now. .... This question of knowledge of labour costs is of the most direct relevance to any marketing survey since, until we know the real costs of production, we cannot form a sensible decision as to whether or not inadequacies in the marketing system are a serious inhibition to greater output." Later she states that "the farmer will now react, in the main, to economic incentive only, and respond to the efforts of advisory officers only as he clearly envisages economic advantages from doing so; while, should technical advance occur in the future .... there is no guarantee whatsoever that demand for the farmers' produce will rise accordingly." The low level of returns to labour in traditional farming in Toro seems to indicate that hsi si what prevents greater participation in the market for traditional products, while the data of tables 1 and 2 imply that the same is probably true for returns to practices recommended by the Agricultural Department. The staple foods of a poor, unspecialized agricultural community are generally inferior goods, and consequently it does not augur well for future prosperity to produce them.

Table 4 shows that the overhead labour costs of digging bush and between crops greatly reduces the profits derived from crops grown in the shifting cultivation sequence. In the wet, long-grass areas of Toro, therefore, a profitable cash crop should be saught amongst perennials. Tea will be considered as one such crop.

(7) The scale of Enterprise which can be Superimposed onto Traditional Farming.

In section III-4 it was suggested that family members on peasant tea farms worked 33% more than their counterparts on traditional farms, whose main source of cash was from the sale of beer. It might be taken, therefore, that this represents the surplus labour available for work on the introduced cash crop. However, it makes no allowance for possible differences in the ratio of dependents to workers in each house, nor does it take into account seasonal variations in surplus labour. Further, it cannot be expected that an introduced enterprise can literally be superimposed onto traditional farming without the latter being modified, and the adjustments farmers make warrent study,

Unfortunately analysis of data relating to tea farms is not yet completed, but tables 6 and 7 are added here as being of possible relevance to the problem under consideration.

Table 6 shows that 558 hours are worked on traditional crops per household member. Multiplying this figure by the ratio of household members to workers (eg. 1.62) gives the 900 hours each full-time worker has to work in the year to meet established obligations (which may be considered as an "average target income").

Although these two total figures are very similar on both tea holdings and ordinary farms, the seasonal profiles are not the same. On the tea farms appreciably more work was done in the traditional sector in September and January (respectively the months of planting and harvesting finger-millet), while less was done in March to May, the months devoted in traditional farming to the preparation of the seed-bed for and the planting of beans. On tea farms this period was devoted to preparing land for the plantign of tea, and the bean crop was inter-planted in the tea. Many people have considered the interplanted beans to be an addition to normal sales which may partially pay for labour devoted to the establishment of tea, but on peasant holding this is questionable in view of the above.

Table 7 indicated why little tea is planted in the second rains (which it was at one time considered should be encouraged) and also that 0.6 of an acre is as much as a family can manage in the first year (given a ratio of 1.6 family members to each of 2.95 full-time family workers). Further analysis should show how much, if any, additional tea can be added subsequently, and it should be possible to make calculatins for various family sizes and various ratios of family members to family workers.

Before completion of the analysis it is not possible to say what the final total acreage will be for the "average" family, but it is probably under an acre. The question then arises as to whether or not this should be taken as the ultimate target or whether it should be accepted that either the traditional sector should be allowed to wither away or hired labour interduced, or both!

(8) From Peasant to Commercial Farmer - When?

If certain problems of analysis can be overcome so that tea returns can be allocated to plots of different ages, it is possible that some attempt to answer this question could be made.

This would involve an analysis of tea returns over time related to wage rates and returns to traditional enterprises. From this it should be possible to locate a point at which increasing returns, from older tea, yield an income which could either more than make up for the loss in income that would result from transfering family resources from the traditional sector to the planting of more tea, or finance further plantings of tea using hired labour. The recognition of such a point should enable extension advice in appropriate cases to break away from the "family-labour-providing-subsistence-plus" approach and so exploit the scarcest resource - managerial ability.

Half the tea farms records were not peasants but earned money from outside employment, shops or bars and were investing their savings in tea. Some of these people definitely had considerable managerial ability. Analysis of their holdings could provide some comparative data to indicate what returns might be expected if peasants acquired the additional resources available to these men. This is where credit considerations come in.

(9) Enterprise Returns and Credit.

The comparative analysis of returns in traditional farming and at Kyembogo D.F.I. (section III-2) suggests that although the latter has the "tools to do the job" returns are not really any higher. This appears to be due both to the inadequacy of the tools and to rapidly diminishing returns. The unattractive level of these returns is not due to poor managerial ability nor lack of capital of the type available but weak demand. It is, therefore, doubtful if credit should be extended for the growing of staple food crops.

It is known that tea is a profitable crop when properly managed, so the final analysis of the data relating to outgrower tea farms should try to discern whether resources which can be supplied on credit are needed and justified or whether the general level of managerial ability deems such credit unwarrented.

IV. SUMMARY AND CONCLUSIONS

"If the result of a treatment was of small a magnitude that a correctly designed experimental layout was required to detect it, the treatment would have no appeal to the average peasant." (1)

This seems a truism which should always be born in mind in extension work. In the light of it, and granted the great variation found in tropical peasant agriculture, even average figures derived from small-scale studies should detect the large differences which are all that are necessary if the information is going to be useful for making the comparisons implicit in extension work = "Do such-and-such and you will be better off". The analyses of such surveys in Toro suggest that the methods being demonstrated and preached to farmers do not fulfill the requirement that their adoption will made farmers "much better off". It is quite wrong to think that farmers are not prepared to "help themselves". The reason for the misunderstanding is largely due to the emphasis put on increasing returns to land, while under Toro conditions labour is the limiting factor.

The analysis of returns to "total labour", considered in a somewhat Marxist way, as representing the factors land, labour and capital, has suggested that these are at present unattractive. This explains why the surplus productive capacity of labour, which is shown to exist, has not been stimulated into production merely by exposure to the market, in spite of the abundance of land. However, the introduction of tea does seem to have encouraged people to work longer hours, so that it may be claimed that farmers are responsive to incentives. (If the proposals of the Uganda Tea Growers Corporation go through as they stand now, the price of green leaf will fall by 7-9 cents per lb., from a base of 32 cents per lb. to 23 cents and from a prospect, after study loans have been repaid, of 40 cents to 33 cents. It would be interesting to study the effect this has on family labour inputs, in, say, two year's time).

Extension workers are now concerning themselves rightly with management problems, but this does not mean that technical issues should be forgotten. Rather, technical research should now be determined by the demand for information relevant to mangement. It is, therefore, necessary that research work should be carried out at, it is suggested, three levels; firstly using the resources available to the ordinary farmer, secondly using divisible capital with prospects of quick returns (fertilizers, herbicides and pesticides) and thirdly incorporating large-scale farming methods (i.e. using large, indivisible capital items).

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(1) W. H. Beckett and S. D. Anyabo, "Agricultural Surveys with Particular Reference to Tropical Forest Conditions", in Tropical Agriculture, Vol. 33, No. 2.

Comparative results between these three levels and further farm studies will indicate where credit facilities are needed.

The market for the common crops grown is small and prospects are unlikely to improve. This assumes that there is no export market for inferior goods better than the existing internal one (for, even if donations under PL 480 were stopped, would the previous recipients of these gifts be able to pay a higher price than the present urban population of East Africa, since this would be necessary if farmers were to be stimulated to produce more?) Taking the projected urban and rural population changes envisaged in Uganda's Second Five Year Plan as correct, the increase in the urban market in the next 15 years can be met by an increase in farm production of only 3.7% over the same period. Given the surplus productive capacity existing this can be met without any increase in productivity. Thus it might be fair to assume that the terms of trade will move against staple foods, and an example of Gunnar Myrdal's dualism is likely to develop from this "Backwash" effect.

It, therefore, seems contrary to all one's instincts, that the subsistence sector in Toro should be left to its own devices. Attention should be concentrated on other crops, which should have a high income elasticity of demand, a high value of bulk ratio and preferably be exportable, if farmers are to prosper. Under the conditions found in Toro such crops must be sought amongst the perennials. Tea promises to fulfill these needs, bananas and their products seem to offer limited hope, and probably grass fed to exotic dairy cattle holds out better prospects than any other.

TABLE 7 - FAMILY HOURS AVAILABLE FOR WORK ON TEA AFTER MEETING THE DEMANDS OF THE TRADITIONAL SECTOR, AND THE AREA OF TEA IN ITS FIRST YEAR WHICH THIS LABOUR CAN MANAGE.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Hours available for work on tea.	35	87	139	184	130	50	20	66	77	140	86	25	82	61	143
Acreage of tea planted from bush dug by hand which family can manage in 12t rains	0.51	0.67	0.78	0.57	0.75	0.70	0.27	0.57	0.70	1.31	1.13	0.25	0.88	0.79	1.50
Acreage of Tea planted from bush opened by tractor which family can manage in 1st rains	0.30	1.05	1.56	1.12	1.00	0.79	0.32	0.50	0.76	1.21	0.80	0.25	0.77	0.32	0.68
Acreage of Tea planted after another crop which family can manage in the 1st rains	8.75	2.23	0.85	0.73	0.96	1.05	1.54	0.74	1.48	1.21	1.79	0.59	1.35	1.33	1.23
Acreage of Tea planted from bush dug by hand which family can manage in the 2nd rains							1.05	0.07	0.31	0.23	0.39	0.52	0.15	1.28	0.61	1.29
Acreage of Tea planted after another crop which family can manage in the 2nd rains								0.56	1.10	0.29	0.43	0.43	0.75	1.28	0.59	0.62

NOTE:- These figures relate to 9 farms on which there were on average 4.78 family members and 2.95 full-time workers whose average labour inputs averaged 3.35 hours per work-day in the year though the seasonal inputs varied as follows:-

4.2 3.7 3.8 4.3 3.4 3.8 3.3 3.9 4.2 4.3 4.0 3.3 (average 3.85).