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TRINIDAD & TOBAGO AGRICULTURAL CENSUS -
preliminary review of methods and results

by

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INTRODUCTION

This paper will necessarily be mostly descriptive, rather than analytical. Moreover, most of the Census results are not yet available and therefore, even theoretical measures of accuracy would not serve to assess the value of the results. Nevertheless, this description of the methods may provide some guidance to others, whether users or gatherers of statistical data - guidance on the value of this and other censuses as one of the tools for policy making and for agricultural development.

I sometimes feel we may provide better guidance on 'how not to do a census'.

I intend to outline briefly:-

- a) The historical background to this Census;
- b) The methods used, indicating some of the reasons for choosing these;
- c) The coverage and content of the data;
- d) The aims of the Census and to what extent these have been met.

Perhaps the most useful points to be borne in mind for discussion are: the priorities to be assigned in collecting agricultural statistics; and the need for and uses to which data may be put.

HISTORICAL BACKGROUND

The Agricultural Census of Trinidad & Tobago 1963 was the first full Census of Agriculture to be taken in Trinidad and Tobago since 1946. In that year an Agricultural census was taken in conjunction with the Population Census. In 1956, however, a survey of land utilisation and production was undertaken, which was on a scale that warrants calling it a "partial Census".

Before 1946, no census of Agriculture had been taken. Such data as existed was obtained from special enquiries, from annual reports of the Department of Agriculture, or from reports of the local government administration. Little or no information was gathered on peasant Agriculture, apparently this was thought insignificant.

The Agricultural Census of 1946 was on a regional basis. As it was taken in conjunction with the Population Census, the coverage of private farms would have been complete; at least, there were no theoretical problems of coverage. The scope of the data required was restricted, however, e.g. little information on production was collected. More important the material and the methods did not lend themselves to too much analysis.

If this seem over critical, let me balance this by pointing out that few countries at that time had undertaken agricultural censuses and even in 1950 only 106 countries and territories participated in the World Agricultural Census Programme formulated by FAO. Indeed the use of statistical analyses in policy guidance is still underdeveloped in most countries.

The next major effort to obtain basic agricultural statistics in Trinidad and Tobago was in 1956, when the Annual Land Enquiry was first undertaken together with a sample survey of Agriculture. The Report, entitled "Land Utilisation and Agricultural Production, 1956" was published by the Central Statistical Office in May 1958. It gives the major results of these two enquiries and some indication of the methodology of these surveys.

The recommendation to undertake the sample survey stemmed from a regional committee of the British Caribbean Agricultural Advisory Council under the auspices of the Development and Welfare Organisation. One of the major recommendations of this committee was that quinquennial agricultural censuses be undertaken, the first of which was to be taken in 1956. This proposal was subsequently modified to recommend the taking of sample surveys with two objectives:

- a) to carry out preliminary work for a full scale agricultural census in 1961 and
- b) to obtain some current estimates on Agriculture.

Independently of this proposal, an interdepartmental Agricultural Statistics Committee in Trinidad had already advised the (then) Government Statistician of Trinidad to undertake an annual survey of estates 100 acres and over, to obtain information on:

- a) total acreage of the estate;
- b) acreages under crops and grass;
- c) number of persons working on the estate and such other information as needed.

This enquiry was to be gradually extended to smaller estates.

Eventually, the two projects were combined and in 1956 the first Annual Land Enquiry was undertaken by the Central Statistical Office, together with a sample survey. The latter was accordingly restricted to occupiers of less than 100 acres. Mr. G. E. Hodnett, Statistician, at the Regional Research Centre assisted the Director of Statistical Service in planning and carrying out the sample survey. The A.L.R. was repeated in 1957 and 1959.

Following on from the 1956 Survey, it had been hoped that Trinidad and Tobago would participate in the W.I. Federal Agricultural Census of 1961. The other obligations of the Central Statistical Office, particularly on the 1960 Population Census for which Trinidad was the East Caribbean headquarters, precluded our participation at that time and the Trinidad and Tobago Agricultural Census was therefore undertaken independently. Thus, the preliminary planning for this Census did not begin until 1961 when a special unit was established in the Central Statistical Office.

THE AGRICULTURAL CENSUS 1963

The main object of the Agricultural Census 1963 was to obtain the greatest possible amount of basic benchmark data on the agricultural sector of the economy. Data from previous surveys was insufficient as well as very out-of-date. More particularly, these surveys were limited in the amount of cross classification that could be obtained, particularly in the fields in which new approaches to economic planning most urgently required information i.e. on the small farms, on local food crops, etc.

Thus while some attention had to be paid to continuity with past data, the need for information in these new areas was paramount. The availability of electronic data processing equipment meant that plans could be made for more elaborate analysis of the data obtained.

In order to decide precisely what information should be sought, an Advisory Committee was established and consultations were held with all the relevant Government departments and other interested bodies. In most cases, this advice was in general terms and it remained our responsibility to define for the purpose of measurement.

To determine what definitions should be used, recourse was had to a number of sources in addition to the advice of our agricultural officers. The most important sources were:

- a) The FAO World Agricultural Census Programme, 1960.
- b) The W.I. Agricultural Census, 1961.
- c) The Survey of Land Use and Production of Trinidad and Tobago, 1956.

The final decisions were necessarily determined by local conditions and requirements.

Speaking as a statistician to agricultural economists, I may point out that the hardest part of my job often seems to be to establish just what statistics are wanted. The more data we collect, the more you want. It is for the economist to define the economic problems and formulate his requests for statistical data with which to inform the problems.

THE DESIGN OF THE CENSUS

It was realised early in the Census planning that the use of sampling techniques would be more economical and more efficient. Data available from the 1946 and 1956 surveys indicated that there was a marked inverse ratio between the number and acreages of holdings. This is demonstrated by the attached Tables I and II.

TABLE I. Percentage of Numbers and Acreages of Farms 1 acre and over in 1946⁽¹⁾ in each size group.

Size Group (acres)	1946			
	Number (1)	% (2)	Acres (3)	% (4)
Total	30,511	100	414,937	100
1 - under 5	18,120)	80	38,109)	19
5 - " 10	6,242)		39,898)	
10 - " 20	3,719)		49,041)	
20 - " 50	1,602)	18	46,048)	29
50 - " 100	372)		25,277)	
100 - " 1000	394)		105,673)	
1000 and Over	44)	2	110,891)	52
Not stated	18)		-)	

(1)

Source: Agricultural Census Report 1946, Part B - Table 64.

TABLE II. Percentage of Numbers and Acreages of Farms 1 acre and over in 1956(2) in each size group.

Size Group (acres)	1956			
	Number (1)	% (2)	Acres (3)	% (4)
Total	34,428	100	478,718*	100
1 - under 5	19,200)		40,000)	
5 - " 10	8,100)	79	50,200)	19
10 - " 50	6,400)		110,900)	
50 - " 100	400)	20	27,800)	29
100 - " 1000	282)		88,131)	
1000 and Over	46)	1	161,687)	52

(2)

Source: Land Utilisation and Production 1956, Section 1 - Table 5B & Section 2 - Table 2.

* Excluding Government Occupiers with 571,218 acres, of which 547,208 in Forest.

Whereas one could not efficiently sample among the few large holdings (for which data was essential), to cover the very large number of small holdings without sampling would be costly and unmanageable. It was essential to obtain data for these however, for the reasons already indicated. Thus, it was realised that by enumerating just 20 per cent. of the holdings, some 80 per cent. of the land would be covered. The remaining 80 per cent. of the holdings could be sampled to cover the rest of the acreage. This pattern of enumerating an upper stratum completely and sampling the lower, is not dissimilar to the W.I. Agricultural Census of 1961, as you will no doubt hear later.

THE FRAME

It had been hoped initially that the Population Census would provide the frame for the Agricultural Census. Provision had been made in the Population Census to record every agricultural operator. This approach was rejected for a number of reasons, and an alternative frame had to be found. The first need was to establish a list of the Holders with 10 or more acres (the upper stratum). This list was built up from the Warden's Rolls which provides a complete register of private land ownership. It was necessary to ensure the coverage of 'institutional' land holdings e.g. Companies, which would be amongst the largest holdings.

Thereas the Warden's Rolls could give us this list, the household approach could not supply this as efficiently.

The many limitations of the Warden's Rolls soon became apparent, but as the problems were mainly associated with the smaller holdings, it was agreed nevertheless to use this frame for the upper stratum. It was already agreed that a different (household) frame would be used for the sample stratum. Actually the difficulties of up-dating the Warden's Roll Frame and of identification of the units caused a delay in the Census programme - but eventually it was found to be reasonably efficient. The List of Land Holders 10 acres and over constituted Phase I of the Census operations.

THE SAMPLE

The sample stratum, became, in effect, a sample of all holdings not included in the List A prepared from the Warden's Rolls of Holdings 10 acres and over. The main aim of the sample was nevertheless directed at covering the Holdings of under 10 acres.

The sample design, in Trinidad, was primarily an area sample. Approximately 50 per cent. of the Enumeration Districts of the Population Census were selected and all the Holders found within these E. Ds were enumerated (unless enumerated in the Phase I).

A further complexity was introduced. Many Holders do not live on their holdings and a large proportion have occupations other than Agriculture and/or live in urban areas. The sample E.Ds had to include urban areas, where re-listing all the households to find the farmers would have been uneconomic. It was therefore decided to make use of recent re-listings of these E.Ds carried out for the Continuous Sample Survey of Population. This Survey as with the Population Census, recorded holders of land and livestock keepers. Since these C.S.S.P. listings were weighted towards the urban areas, the use of their lists of holders effected a considerable economy in listing for our Census. The rest of the E.Ds. selected in our Agricultural Census sample balanced the overall sample to provide full representation of all areas. Checks on the listings were built-in to the enumeration programme and the estimates adjusted accordingly.

In the sample phase, it was decided that the collection of all the detailed data would be difficult. A

simplified basic questionnaire was therefore used for 2/3 of the sample holdings and the full schedule was used for only one-third. The detailed information obtained in this one-third sub-sample was used to provide estimates for the whole sample stratum by applying the ratios to the sample totals.

The reference period used in Trinidad was the crop year i.e. 12 months ending 30th September, 1963. The Hurricane in Tobago which occurred in September 1963 necessitated a revision of the programme for Tobago.

TOBAGO

In Tobago a different sample design had to be evolved because of the Hurricane in September, 1963. The C.S.S.P. listing could not be used as that survey was suspended until June, 1964. The operation of the Agricultural Census field work in Tobago was separated from that of Trinidad for the same reason. Further, it was not thought practical or meaningful to collect data for the 1963 crop year i.e. prior to the hurricane and data was therefore to be taken for the post-hurricane crop year, i.e. 12 months ending 30th September, 1964.

Following the Hurricane on 30th September, 1963, a registration of households was made, primarily for purposes of food rationing. From comparison with the Population Census 1960 and with allowance for growth, this registration was considered to be practically complete. It seemed probable that only the better-off agriculturalists might not need to register and that as these would be on the upper stratum list anyway, the Hurricane Emergency Registration List could serve as a frame for the Sample Stratum.

In making the registration, an indication of hurricane damage suffered was given on the form. This served as a basis for stratifying the households as follows:

H: an agricultural holding was indicated.

D: " " " " doubtful.

E: no evidence of a holding was shown.

(A further stratum EE was made for certain districts where the hurricane damage record seemed incomplete).

A pilot sample survey in one Parish showed that the stratification did improve the precision of the sampling. Accordingly, the sample fractions of $\frac{1}{2}$, $\frac{2}{5}$ and $\frac{1}{4}$ were used for the three main strata indicated above. (The further stratum EE was also sampled with a fraction of $\frac{1}{2}$).

Within the stratified Registration Lists the sample of households was selected at random and the enumerators lists made. The sample lists (called List B) and the upper stratum list (with 100 per cent. enumeration as in Trinidad) (called List A) were enumerated concurrently.

THE CENSUS OPERATIONS

Before moving on to consideration of the coverage and content of the Census data, it may be worth referring briefly to the problems of actually carrying out the Census. The volume of work needed to actually execute a Census, even on the scale of this one, becomes in itself a factor delimiting what can be done.

In all, three distinct pilot studies had to be undertaken, one for each phase; to test the effectiveness of the schedules, the enumerators instructions and the field procedures. The selection and training of enumerators was a task of some magnitude. Even by spreading the field work over several months it was necessary to select and train nearly 500 people to obtain the required number of enumerators and supervisors. The total number working at any time was about 300. The number used was of course larger because the enumerators were engaged on a part-time basis:-

- a) to draw in a higher level of person who would normally be employed during the day;
- b) because anyway, the best time to interview farmers at their homes was in the evenings rather than during the day.

The Census planning and preparations took over two years. The field work was conducted in three phases:

- a) Phase I - complete enumeration of Listed Holders with 10 acres and over in Trinidad. This was done between January to March 1964.
- b) Phase II - sample enumeration in Trinidad was conducted from September to November 1964.
- c) Tobago - all enumeration was conducted as one operation in the period January to March 1965.

As each phase was completed, the office staff of 15 commenced the checking, editing and coding processes required before the machine processing could be done. All the information was then put on punch cards in preparation for use in the Computer.

THE COVERAGE AND CONTENT OF THE DATA

The theoretical coverage of the Census is determined by the definitions used and by the Census design. The effectiveness with which the Census was completed is another matter which can be dealt with separately. Here I wish to outline the theoretical coverage and definitions used and to indicate what information was to be collected. Finally I shall indicate the way in which the raw data is being handled in analysis. In describing the design of the Census the coverage has already been indicated in general terms.

The specific definitions of the Holder and his Holding which are given below, show more precisely who was to be enumerated.

THE MAIN DEFINITIONS

The Holder was defined as:

"The Holder is the civil person or legal entity with the economic and technical initiative, responsible for running the holding directly or through a manager. The Holder is therefore normally the owner, or the tenant/lessee. Or he may be a rent-free tenant or squatter.

The Holder may be an individual, a Company, a partnership, a trustee, or it may be Government."

The Holding was defined as:

"The Holding is all the land (irrespective of size, title or tenure) under the control of a Holder, being run by him (or his representative) as a single business unit and in one county. A Holder may have more than one Holding, even within one county, if his lands are run as more than one business unit. Or he may have more than one Holding, although run as one business unit, because the lands are situated in different counties.

Where the lands cut across a County boundary and the Holder cannot reasonably give separate information on the parts in adjoining Counties, then ascribe the whole area, as one Holding, to the county where the major part lies".

In the sample manual, further explanation of what constitutes a Holding was given to indicate the lower limits or minimum size of a Holding to be enumerated. Thus:-

- a) a piece of land of one or more acres must constitute a Holding - whatever its use;
- b) a piece of land of less than one acre was only considered to be a Holding if:
 - i) at least 1/8 acre was cultivated (with crops or pasture),
 - ii) the Holder kept one or more heads of livestock and/or 12 or more heads of poultry of 2 weeks old and over. This was a "landless livestock Holding".

In addition, if certain special conditions were met, there was a Holding whether or not the condition of the amount of land was met, i.e. Specialist Pig and Poultry Keepers were enumerated without regard to the amount of land held, if they kept:

- a) 10 or more pigs of 4 months and older.
- b) 200 or more chickens of 2 weeks and older.

As a matter of procedure, the Holdings under 1 acre and 'landless' holdings were not enumerated on the detailed schedules, but were just listed and their major outlines recorded in the Listing Record. Nevertheless, in terms of what was regarded as a Holding the coverage was broad.

The major reason for using the definition of Holder given above, was that this was the most specific identification that could be achieved, particularly as we were concerned with broad land use, beyond agricultural land. To use the 'operator' type of definition would have limited the coverage to units of land on which some Agriculture was practised. Further, the identification of 'operators' would have been more difficult given the type of frame used for the upper stratum. It could have led to duplication and omission. Aiming at the ultimate controller of the land restricted this confusion. This very basic question of definition can be further discussed; eventually the choice made must be determined by practical consideration as much as by the aims of the Census. Actually, in our Census, data was collected on the occupation of the Holder and on the use of a manager so that it would still be possible to derive a classification based on the "operator".

THE INFORMATION SOUGHT

The main outlines of the data collected fall into 12 sections or groups as follows. The Questionnaire gives more precise details. The statistician's concern with the problems of measurement is not discussed here, all that is done is to describe the outlines for your information.

1. The Holder and his Holding (acreage):

This included a number of characteristics of the holding such as tenure and fragmentation as well as the acreage.

2. Land Use:

The broad land use of the holding was recorded showing croplands (tree crops, non-tree crops and fallow) grasslands, forest and lastro, and non-cultivable land (built-on, swamp and other).

3. Tree Crops:

Acreages and tree numbers for 3 age groups of each main crop, and a record of subsidiary crops was taken.

4. Non-Tree Crops:

The acreage under cultivation at census date and the acreage reaped in the crop year were recorded. The vexed question of mixed crops was handled in two ways. Where one crop predominated the whole area was ascribed to that crop, but where no crop dominated, then the mixture was recorded as such and coded appropriately as say, mixed provisions.

5. Production and Sales of Crops:

For each crop, the quantity reaped over the crop year, the quantity sold and the value of those sales was recorded. The sum of the value of produce sold was also used as a holding characteristic.

6. Livestock Numbers:

The number of each type of livestock and poultry on the holding at census date was recorded. In addition, livestock belonging to the holder, but not kept on any holding were added. The question of double-counting was carefully controlled.

7(a) Livestock Sales:

The number and value of animals and poultry sold was recorded for the crop year. This data was perhaps not complete in that no balance sheet was made with acquisitions or disposals.

7(b) Livestock Products:

For the major livestock products (milk, eggs) the production in the period immediately before enumeration was recorded. It was not thought practical to obtain annual production, but just what formula to use to estimate this from the data collected is not yet established. An attempt to get annual value of sales of these products was made however.

8. Employment and Wages:

The numbers engaged on the Holding in the period prior to enumeration was recorded in detail. Again this data may only be used as an indicator, until more information on seasonality is obtained. For this and the livestock products, we mainly followed the F.A.O. recommendations, but further data must be obtained before census data can be fully used. In addition, wages paid out for the crop year were obtained.

9. Irrigation:

In addition to checking whether or not any irrigation was used, some details on systems and water sources were recorded. No attempt was made to tie this directly to crop acreage.

10. Fertiliser:

A simple record was made of what type of fertiliser was used (if any) i.e. manure, chemical or both - but no quantities were recorded.

11. Machinery:

An inventory was made of each type of machinery and whether it was owned or hired. This was to indicate usage.

This then is an outline of the data obtained. In the Final Report on the Census all details will be given and all the forms used will be attached.

THE TECHNIQUE OF ANALYSIS

It would seem useful to say something of the technique being used to analyse the information. As has been indicated above, it is hoped to produce quite detailed cross-classification. The method being used is to have all the data in each of the sections outlined above, coded by each of the following classifications so that the information can be analysed by any of the characteristics. These characteristics are:

1. Location of Holding (Ward and County),
2. Holder's Main Occupation (mainly on holding or not).
3. Holder's Age group.
4. If Manager employer and Manager's age.
5. Status of Holder - i.e. individual, joint, company etc.
6. Holding Tenure - Owned, Rented, Mixed, etc.
7. Holding Size Group - (acreage of Holding).
8. Agricultural Size Group - (acreage under crops and pasture).
9. Employment Size Group - (number employed).
10. Production Size Group - (gross value of sales).
11. Machinery Used - (whether or not any machinery used, other than hand-tools or draft animals).
12. Irrigation Used - (whether or not irrigation used).
13. Fertiliser Used - (whether or not any type of fertiliser was used).

Thus, for example, the acreage of crops can be shown not only by location or by holding size, but by any other of these characteristics. It would be possible therefore to explore for example the relationship between the numbers employed and the cultivation of a particular type of crop. Do tree crops tend to use less labour than say sugarcane?

This system is possible because of availability of the computer. Of course, it is necessary none the less to ensure that the basic data is established first, and only afterwards can we hope to make use of the almost infinite possibilities for further analysis.

MEETING THE AIMS OF THE CENSUS

As already indicated the main aim of the Census was to provide basic bench-mark data with which to review the agricultural sector and from which growth and change can be measured in the future. This aim will, I think, have been realised with the publication of the main report later this year. We are aware however, that time is passing and in some respects there is already a need to update the information. A new programme is now being planned to establish a continuing series of surveys for this purpose and which will also measure change. It is now realised that the nature of the sampling may create some technical problems for future surveys, but this will not prevent the work continuing.

It is hoped that further research on the census data will throw light on many other aspects of the existing state of Agriculture, as well as providing current estimates on production, etc.

It is only now that some of the remaining gaps in the agricultural statistics of Trinidad and Tobago data become apparent and only as the census data is published, do we get requests for specific data which cannot always be provided. In some cases these requests are for information which cannot be expected from a census operation - man hours, costs of production, farm income, capital formation and the like. As I have mentioned, we are now formulating plans for a new programme of agricultural statistics in which we hope to provide more and better information. It is up to the economists to formulate their needs, and I hope we may discuss this aspect of agricultural statistics here.