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Integration of agricultural statistics in perspective: the case of Brazil

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INTRODUCTION

Integration of agricultural statistics in the statistical system was the central topic of the IV ICAS. With possibly the most valuable contribution on the topic at the congress Graham Eele considered that the importance of agriculture for development was neglected and underestimated, and had been given limited separate treatment in the statistical systems (BELKINDAS e EELE, 2007). This is one of the crucial questions of the document the Global Strategy for Improving Agricultural and Rural Statistics², a reference text for the core object of this Satellite Meeting (GLOBAL ..., 2009).

The document under discussion gives more emphasis to (lack of) operating integration and problems, such as duplicating efforts, conflicting statistics and non-standard concepts. It mentions as a possible causal factor only the division of powers and/or lack of coordination between statistical activities of the National Statistics Organization and Ministry of Agriculture. (GLOBAL ..., 2009, p. 43).

On one hand, it is worth considering that even in the same institution, as in the case of Brazil, agricultural statistics also lack integration and are isolated. This is normally attributed to the so-called specificities of agriculture. Yet, if the specificities explain something about the separate treatment, they absolutely justify it. Apparently, deeper and historic explanations are appropriate more in relation to the direction and structuring of statistical demand on agriculture than the characteristics of the sector or methodological or operating technicalities as a result of their characteristics.

In the case of agricultural activities, it seems that specificities superimposed the similarities. And statistical practices were to be addressed in a particular and separate manner. Ironically, perhaps because it is a traditionally emphasized activity and topic and because it easily permits multi-entry either as an object of economic statistics or as an object of social statistics, it eventually became quite confined to a more limited approach directly relating to traditional concerns of the sector's management. The statistical framework seems to have settled and adapted to the limited production information required by the central demands of the Ministry of Agriculture, with emphasis on priority for the questions of

¹ Note prepared for ISI Satellite Meeting on Agricultural Statistics, Maputo – Mozambique, August 2009 – Session 5: Integration of Sampling Frames (Pop/Ag Census)

² Referred throughout this paper only as “Strategy”.

agricultural markets and food supply (and more recently, on safety), in a direction that clamors to be overcome³.

At this particular point, attention is called to the fact that agriculture seldom (if at all) figures in the recommendations and colloquies organized around what is conventionally called business surveys. On the other hand, the agricultural economic activity, including family farming, is only superficial and imperfectly collected, in the household survey schemes, between the employer and self-employed producers, in view of the proposed objectives: to generate statistics on the labor market, according to international recommendations, not completely comprising the measurement and characterization of production.

Certainly agriculture requires its own special schemes of investigation. But the scope and objectives of its investigation should be integrated, linked and jointly coordinated with that of the other segments being studied, among the surveys of economic or of social or environmental interest.

To achieve this objective implies (a) understanding how and why we are today in a poorly integrated situation; (b) considering how agriculture is organized in the country; (c) aligning scope of its investigation with the other objects of the statistical system, and (d) furthering an integrated statistical infrastructure with operating synergy.

It is therefore necessary to focus efforts on integrating the required statistical frameworks, methods and statistical operations. IBGE (the Brazilian Institute of Geography and Statistics) is moving in that direction. Some aspects of interest on this matter will be discussed; the first part of the article is dedicated to thematic integration and the second to practical integration. Emphasis is given to projects and actions that are being implemented by IBGE and tend to lead to more integrated agricultural statistics.

PART 1 – Thematic integration

It cannot be said that there is no integration of agricultural surveys and agricultural statistics in the statistical system in Brazil. However, the existing integration is strongly centered on (or limited to) the appropriation of aggregates in order to prepare national accounts. Some aspects of organization, priority and periodicity standardization of concepts in surveys also derive from the use of results in national accounts. They cannot however be considered as having a strong influence.

In fact, the key characteristics of our main agricultural surveys (Census and local agricultural production surveys) were established, in principle, last century before the concept of national accounts and much earlier than the beginning and dissemination of a structured methodology for the national system of accounts.

³ See OFFUTT 2003

In fact, with few exceptions, the accounts system was based on existing information, and adapted rather than contributed to structuring surveys and the current supply of agricultural statistics.

The key characteristics of our main current studies result from standardizing and organizing initiatives of local surveys at the time when IBGE was created. They came about by running annual statistical campaigns, using standard forms organized in different notebooks, such as: notebook A (structural aspects and registers) launched in 1937; notebook B (annual statistics), launched in 1938, and notebook D (quarterly estimates of agricultural production) launched in 1943.

Adopting this kind of survey was justified by the fact that the enumeration method, considering its high costs, could only be carried out over long periods of time. An alternative process was recommended:

“Through this process, without direct inquiries to the producer and perhaps, from a certain aspect, with more facility than itself, it will be perfectly possible to obtain from the commission of informants the necessary data, referring to the limited geographic scope of the district, whose territory is not only personally known to the commission members, but also each one of the existing holdings. Thus, with little mental effort they are in conditions to inform, not, of course, with absolutely accuracy, but by estimating in fully satisfactory conditions, the indices representing the activity...” (COSTA, 1960, p. 297)

It should be considered that in the period in which it was instituted, the early fundamentals of modern statistical science were just beginning. The publication of the book *The Design of Experiments* by Ronald Aylmer Fisher dates only from 1935 and in 1937 the first expressive use of random sampling was made in the survey to verify US unemployment conducted by Stephan Hansen. (SALSBURG, 2009)

In the Brazilian case, the fundamentals of the methods outlined so far still prevail over the main basic agricultural surveys⁴, which comprise the National Statistical System and inform the National System of Accounts.

In the National System of Accounts, the Agricultural Census provides the essential parameters for building the base-year. The process of estimating annual data extrapolates the current data by volume and price indices, obtained from the current surveys. Information on agricultural, forestry and livestock farming production is used to build the indices of production volume and intermediary consumption, and to form fixed capital. (SISTEMA... [2007?]).

⁴ It should be noted here that agriculture was a topic not only of the first investigation using IBGE probability methods, but also of various other initiatives, with emphasis on the Harvest Forecast Survey – PREVS. Nonetheless, either they had strict specific objectives or did not achieve coverage and continuity. (GUEDES et al. 2007)

The new series of national accounts – reference 2000, publicly announced by IBGE in March 2007, introduced a series of improvements. One of the most important aspects refers to the change between an SCN that is being estimated basically by extrapolating by price and volume indices for the new system. The new system is referenced by annual surveys of industry, commerce and services, and other sources by providing data at current prices. In this way, a benchmark was established that helps control the evolution of the SCN series, thereby preventing characteristic slants in the use of price and volume indices.

The implementation of the new series culminated in the review process of the system of the so-called business surveys, begun in 1996. It suspended the economic census and instituted the Central Corporate Register (CEMPRE) and new bases for structural survey in industry, civil construction, commerce and services, and for formatting an economic survey framework (GÓES, 1996).⁵

An equivalent is missing from agriculture, except with regard to the program of censuses. It should particularly adopt annual surveys that permit disclosure of changes in the technical relations, in variations of the sector's productivity and cost, performance and income, overcoming the strong premises of the current model. A direct investigation of the agricultural holding is undertaken to meet such data and integration requirements.

At this point, one of the specific aspects of the agricultural sector calls attention: the strong bias of family farming. Special attention is called to integrating the household and economic survey framework, particularly in labor and income surveys. A large part of the agricultural production depends on family units and the income of a large number of families is basically or largely due to their agricultural undertaking/holding.

IBGE performs a widespread household survey program, namely the annual National Household Sample Survey (PNAD) since 1967; and the Monthly Employment Survey (PME) and Family Budget Survey (POF) over longer periods. They help generate statistics relating to labor and income and various social aspects in their regular questionnaires and through supplements. These originally independent surveys will be included in the Integrated Household Survey Framework (SIPD)⁶, centered on a master sample⁷, whose planning, testing and implementation are underway.

The importance and need to list frameworks of agricultural production, family income and rural poverty repeatedly emphasized in the *Strategy*, has been present since the early discussions of SIPD, also with regard to the link between information on the production unit and family⁸. At the first SIPD Technical Forum in November 2006, emphasis was on the need to “investigate the portion of family income originating from the agricultural activity and technology used to undertake such activity”, while at the same time needing “to know what the family does in addition to agriculture”. And it was considered that

⁵ Economic Survey Framework without including agriculture.

⁶ See SISTEMA, 2007.

⁷ See FREITAS et al, 2007

⁸ On the same topic see OFFUTT 2003 and UNITED NATIONS 2007.

for “a good standard of income, it is necessary to investigate the holding in terms of production, method and its destination” (RELATÓRIO..., 2006).⁹

On one hand, it is easy to recognize the difficulty in adequately allocating the rural producer’s activity and income by means of general survey tools that give priority to measuring any type of occupation and income for the week or month, and the need to develop proper methodology and forms, and a sampling scheme especially directed at this target population¹⁰. On the other, it is necessary to assure coherence in enumerating farm households of the family agricultural holdings and, as *Strategy* indicates, to enable cause and effect assessments by associating aspects of the agricultural holding with social indicators investigated together with the producer families. Moreover, a series of similarities in methodological and operational aspects deriving from the overlapping sampling units and investigation itself imposes integration between agricultural surveys and household social survey.

Thus, direct investigation of the agricultural holding presupposes the assembly of a widespread integrated statistical infrastructure. On the other hand, this permits creating survey frameworks to give quality to a good part of the data requirements listed in the Global Strategy to Improve Agricultural Statistics, under discussion at this Satellite Meeting, and also in relation to emerging demands, namely those relating to environmental topics. (GLOBAL..., 2009 Chap. 2 and Appendix).

Considering, however, solely the key-indicators of an annual and periodical survey mentioned in *Strategy* (GLOBAL ..., 2009, p. 36, table B), it is found that traditional agricultural production-related items prevail therein, mostly covered by the current IBGE survey program and by regular surveys of other organizations¹¹. For this group, the necessary enhancement refers mainly to the quality of data. There are major gaps, for example, in aquiculture, inputs and destination and processing of some agricultural raw materials. An especially significant gain in terms of providing relevant information to the sector will be to implement the income and labor-related survey with the suggested details. The major challenge refers to annual georeferenced monitoring of the change in land use and land cover, as proposed, in a country with the occupation pattern and size of Brazil.

The integration around the National Statistical System is especially important and requires strong organization in at least three types of occurrence or circumstance: (a) on analyzing common aspects of different objects of investigation when attention must be given to the content of the investigations and guaranteed standardization of concepts; (b) on analyzing related matters or chain activities when it is necessary to establish mechanisms that guarantee coherence of the statistics produced, and (c) in event of a coincidence or

⁹ Interventions by Ricardo Paes e Barros (IPEA) and Wasmalia Bivar (DPE/IBGE), respectively.

¹⁰ See FERREIRA et al, 2000

¹¹ Fishing covered by the Ministry of Fishing and Aquiculture (MPA), by means of administrative registers and surveys carried out by a network of federal and state institutions, with emphasis on the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) and some prices from the Getulio Vargas Foundation (FGV).

overlap in the target population, sampling, investigation or informant units, when the coordination of registers, samples, surveys and operating procedures must be observed to optimize the use of resources, and weighting the content to the informant. In every case, integration increases the statistical production capacity and analytical potential of results.

Part 2 is especially dedicated to aspects of operating integration. It addresses the concept and structuring of statistical infrastructure, which is being implemented in IBGE and will attend agricultural surveys. It is mainly an approach correlated to the idea of “master sample frame for agriculture”, a important element in the *Strategy*. However, as will be seen below, it looks to evidence the integrated character that it must have in the general structure for national statistical operations.

PART 2 – Operating integration: register infrastructure

IBGE is undertaking a major transition in its infrastructure and survey instruments. It involves innovations that would be necessary just to keep the standard of statistical services provided by the institute. But they are also essential to meet the growing demand for statistical information, for the new media to access and use statistical data, and for current general conditions when undertaking statistical activities in the sphere of Brazilian public administration.

The principal innovations concern the statistical infrastructure and point to a more in-depth integration of its statistical operations, to further standardization and reformulation of the production processes.

Possibly the main project to mark this transition is the project of the National Address List for Statistical Purposes (CNEFE). CNEFE was based on digitization (by OCR), formatting and standardizing the addresses listed in the 2000 Demographic Census. These addresses were used to form pre-lists, updated by the operation of Censos 2007, in the surveyed formal urban enumeration areas. The operation that integrated the population count and Agriculture Census 2006 also allowed the simultaneous registration of the location and address of all rural households and agricultural holdings in the country. PDAs fitted with GPS were used to obtain geographic coordinates associated with units investigated in the rural areas.

In subsequent listing operations for current surveys, the same standard procedure is being adopted, resupplying the list and incorporating improvements¹².

In CNEFE entries, when a rural producer lives on the agricultural holding, both units (household and holding) are registered as two kinds of unit associated with the same address and coordinate.

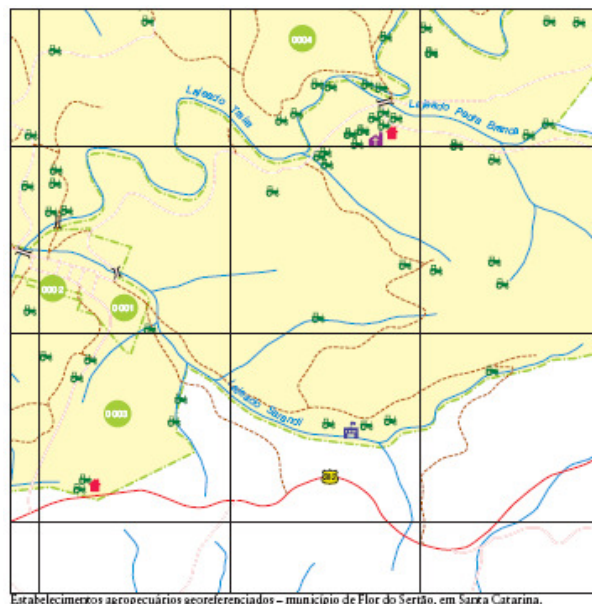
¹² Case of the Family Budget Survey (POF), 2008-2009.

Figure 1

The registration of the agricultural holding's address and coordinate is accompanied by supplementary information, such as the name of the holding and producer, which generally also consists of essential information for their identification and location in rural Brazil. The online form, which is being adopted in tests relating to operating planning of the Ongoing Census (figure 1) includes questions on attributes, main activity, main products and size of the holding (total area). It was considered that they would be the minimum elements required for a continuous comprehensive update to keep the lists focused on the agricultural survey.

A key feature is to maintain and increase the links with positioning elements and geographic information. To undertake the Demographic Census 2010, the address list is being associated with digital maps (see figure 2).

Figure 2



Estabelecimentos agropecuários georeferenciados - município de Flor do Sertão, em Santa Catarina.

Accordingly, this shows the institutionalization of general and standard frame updating procedures that are part of register bases and geographic data, meeting needs of different surveys and thematic areas, contributing to greater overall efficiency. This will be particularly important in the upkeep of the agricultural register created from the Census 2006 results.

Agricultural Registers and Frames

The Censos 2007¹³, which included the Agricultural Census 2006, provided the base grid of enumeration areas (EA) to build up a **Frame of Enumeration Areas with Agricultural Information**. The EA with agricultural activity, together with added information on the agricultural structure obtained with the Census, form an area frame for area sampling for the agricultural investigation.

As a sub-set of the EA grid used in the socio-demographic surveys, it is in its own constitution, an integrated frame. It therefore facilitates the coordination of integrated operations as they are being studied, for example, in combined scanning and listing operations for SIPD and agricultural surveys.

The Frame of Enumeration Areas with Agricultural Information consists of 85,147 enumeration areas. They were planned to have up to 150 agricultural holdings or 300 households in urban areas and 200 in rural areas and 500 km² of less of total surface area, respecting the legal administrative boundaries and status of the areas (urban and rural). They are areas (preferably) demarcated with physical boundaries, containing stable and easily identifiable reference points. The EA in the frame with agricultural activity contain on average 61 agricultural holdings. The 63,000 EA in a rural zone correspond to 98% of the country's surface area and 23,000 in urban areas or rural agglomerates. The EA comprise an average of 151 km² total surface area (15,000 ha) but the mean is 47 km² (< 5,000 ha).

The frame of EA covers in a thorough and mutually exclusive manner the universe of identifiable events in the territory. It therefore provides full coverage of the target population to be followed up by area sampling. However, it is known that it does not permit efficient sampling of major holdings or segments that occur less frequently and are scattered.

So, another step considered fundamental in running an agricultural survey framework by sampling holdings is to organize a list register. The registered data obtained from the Agricultural Census 2006 form the initial basis for building the **Register of Agricultural Holdings and Farmers (CEPA)** that completes the system of agricultural registers/frames.

With a view to approximation with the general procedures applied to the other activity sectors, as discussed in part 1 herein above, the concept and operation

¹³ See 2007 CENSUSES..., 2008.

of the new list is along the same lines and integrated in the Central Corporate Register (CEMPRE).

CEMPRE, run by IBGE since 1996, organizes information about the group of formally incorporated companies and their operating addresses. Formally incorporated companies are considered to be firms registered in the National Corporate Taxpayers' Roll (CNPJ).

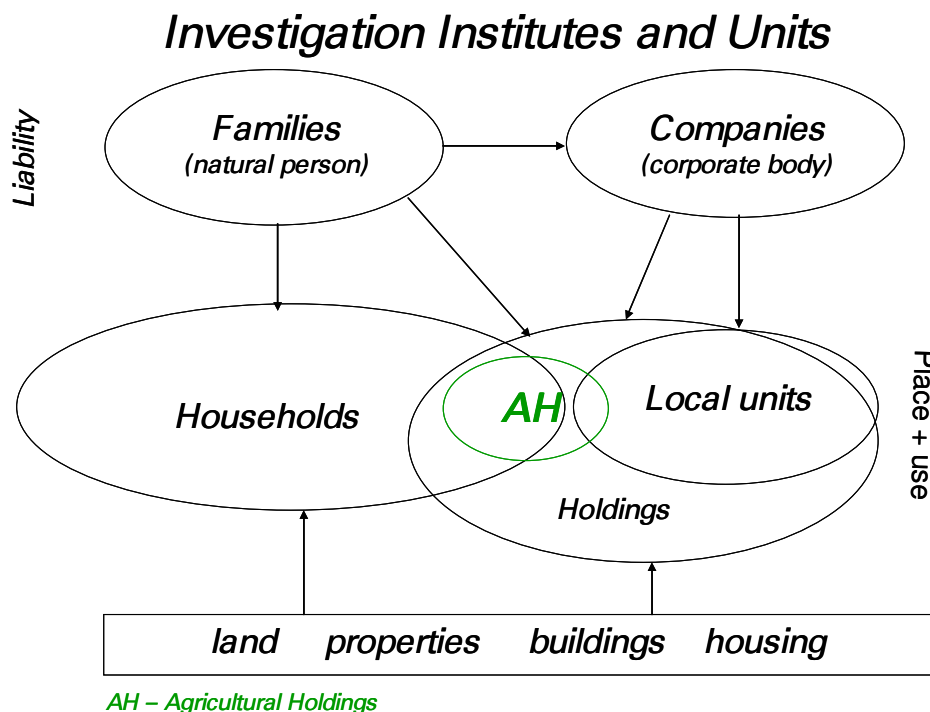
Thus, certain adaptations prove necessary with regard to the units not organized as a company but that are being implemented in compliance with the general principles that guide the formation of lists for purposes of investigating the economic activity.

The models of analysis and economic survey are based on at least two types of interrelated entities: the institutional unit and productive unit (figure 3). Obviously they form statistical units and therefore must be properly represented in the registered that give support to the statistics activity.

The institutional unit is an entity that is engaged in economic activities, incurs debts and obligations, owns assets and takes economic decisions on what to produce and how to finance its production and investment, being liable before the law for such decisions (UN, 2004).

The productive unit (or holding) is a certain building unit engaged in producing an asset or service (or goods and related services), associated with a single location and address. The holding forms a technical productive unit but is not legally autonomous and, per se, does not have freedom to take decisions but exists as a place to produce and acts as a statistical unit of reference to obtain production-related information. It is, thereby, also an investigation unit.

Figure 3



The institutional unit may be an individual or company. In the case of agriculture, lists for statistical purposes must be able to withstand both the occurrence of individual or corporate institutional units.

In the Brazilian case, the corporate institutional unit (UI-PJ) is the entity with a legal personality under private law, of a business nature (company), formally incorporated and identified in the CNPJ, by company name and the first eight digits of its tax registration number. The individual institutional unit (UI-PF), however, corresponds to the natural person, is identified by the name and can have a civil registration (birth or marriage registration) and also have as identity elements the number in the natural persons' general registration (RG), issued by state governments or the number of the individual taxpayers' roll (CPF), maintained by the federal revenue service.

In relation to the agricultural activity, the institutional unit is equivalent and identified with the figure and concept of rural producer, which has been used for operating the agricultural census. And in the sampling frame of agricultural holdings will correspond to the informing unit.

The holding is generally identified by its own name and address. Nowadays and especially for rural zones, the address has as a related complementary information a geographic coordinate. Concerning agricultural holdings, it is admissible to present more than one non-confining portion provided that, by proximity and productive organization, they are explored together, using the same personnel, equipment and other material resources, in addition to the direction of the work. In this case, a single principal address will be associated with the holding.

The universe of agricultural holdings in Brazil is quite diversified. There is a wide range of different situations, forms and types of organizations responsible for agricultural production:

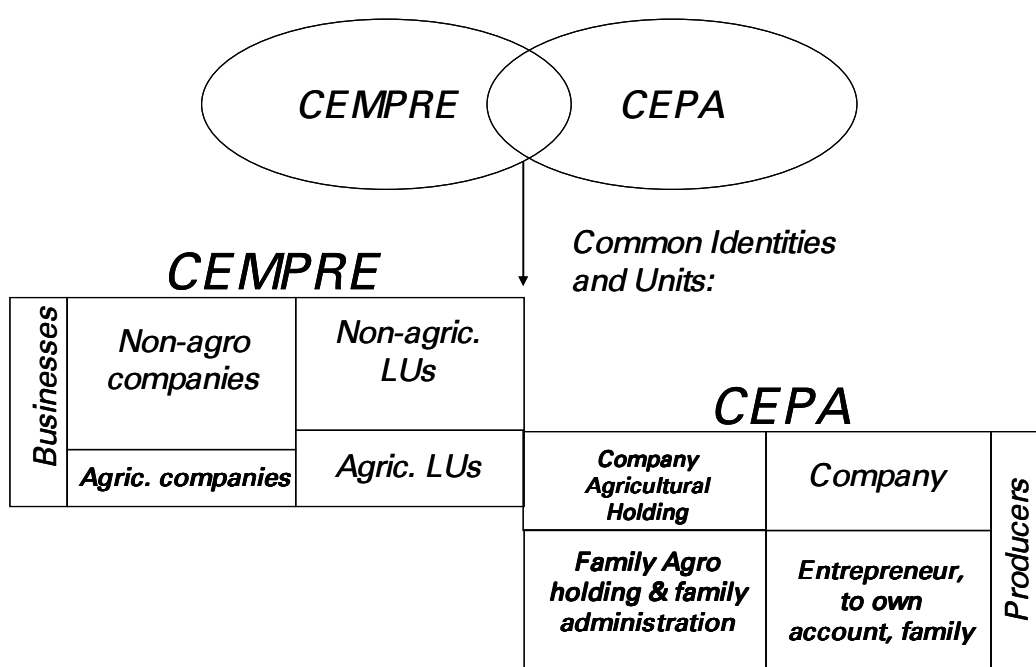
- A. Agricultural companies, formally incorporated, operating in one place alone;
- B. Local units of formally incorporated agricultural companies;
- C. An agricultural portion of local units of formally incorporated companies, such as, land of a sugarcane mill adjacent to industrial plants;
- D. Local agricultural units of formally incorporated companies, for example, forestry units of steel or pulp and paper mills, cattle ranches of cold storage plants, units of land belonging to a sugar mill or distilleries, etc., not adjacent to industrial plants;
- E. Own land or rural properties leased to formally incorporated companies, not registered as local units;
- F. Agricultural businesses not formally incorporated, operating in their own confining area (that is, farms and ranches) with agricultural production, on behalf of an individual producer, as well as land leased or occupied and explored by an individual entrepreneur;
- G. Family agricultural holding (not business), in a confining area of land owned, leased and/or occupied.

H. Holdings for collective agricultural exploration, including, for example, indigenous villages and rural settlements organized as such¹⁴;

Figure 4 shows a diagram of the integration and of relations and overlapping of common units between CEMPRE and CEPA. Situations A, B, C, D and E correspond to overlapping cases. In situations A and B an agricultural company is producer. Situations C and D correspond to non-agricultural businesses. In situation E the producer is a company but the holding does not appear in CEMPRE.

Figure 4

Integration of list frames - CEMPRE & CEPA



The diagram is not on scale. CEPA, constituted in its initial load by the registered units in the Agricultural Census 2006, accounts for 5.2 million registered holdings. CEMPRE statistics for the year 2006 show registration of 5.7 million businesses and 6.1 million local units. They include 49,585 agricultural businesses and 64,069 local units of agricultural activity (ESTADÍSTICAS..., 2008).

CEMPRE'S main update source is the Annual List of Employee Information and Wages (RAIS), an administrative register run by the Ministry of Labor, completed annually by force of law. This will also be an important update source for CEPA. RAIS not only guarantees data relating to businesses and local units

¹⁴ Considering that CEPA is focused on sampling surveys, holdings with very particular and/or relatively very rare characteristics were not included, and excluding teaching institutions, experimental stations, landless holdings, hotel farms and the like, in addition to country homes, estates, market gardens and animal husbandry, which are also normally not registered units in the Agricultural Census 2006.

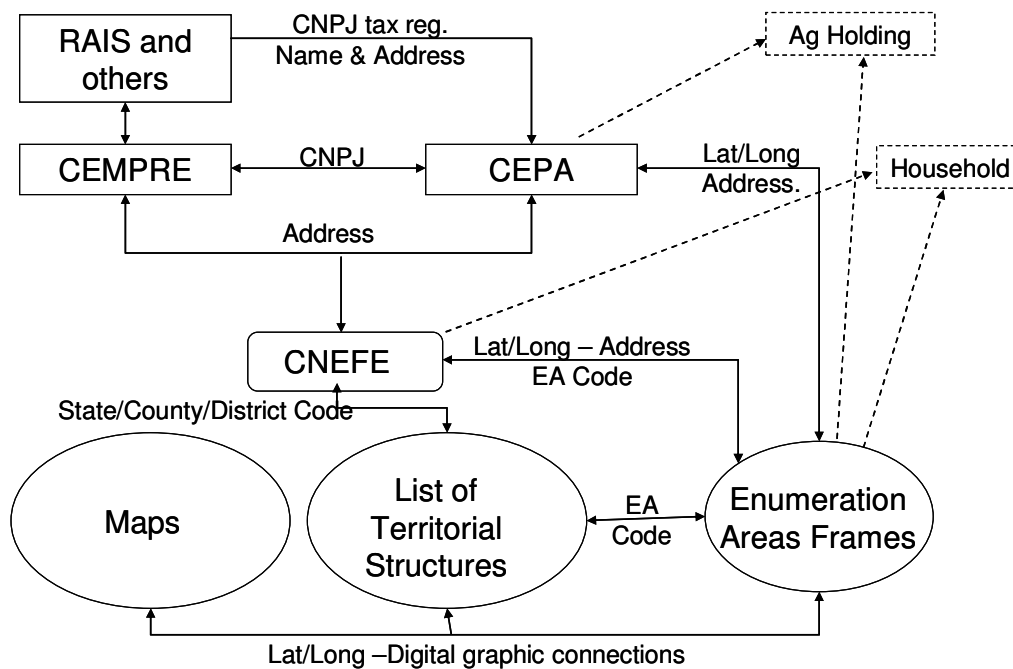
but also is completed by individual employers. RAIS 2008 reveals the existence of 82,000 local units of agricultural activity and 288,000 other agricultural businesses with employees, totaling more than 369,000 agricultural production units.

The group, which includes business holdings and, in principle, the main natural person holdings that are employers, forms a sub-population of larger productive units, which will be prioritized the maintenance effort of CEPA. To this priority is added the search for update sources for units undertaking important specialized activities but relatively few in number and scattered over the territory, such as, for example, breeding laying birds. This strategy is related to the survey model under study discussed below.

Lastly, figure 5 seeks to summarize the links, interdependence and integration of the various lists mentioned above. An infrastructure of statistical registers listing a basic and specialized cartography, geographic positioning, toponomy, administrative and geographic divisions, enumeration areas, rural and urban structures, streets and addresses, buildings (their uses and occupation) and the economic and household units.

Figure 5

Integration of registers



Survey model: a dual frame application

This section describes some basic elements of the survey frame model by sampling agricultural holdings, to be implemented, regarding its relationship with register infrastructure. For a clearer understanding, it will be interesting to discuss some characteristics of the target population.

The diagram in figure 3 also seeks to represent the main forms of occurrence of the agricultural holdings, bearing in mind the interrelations from the institutional viewpoint, type and location. In the case of companies with only one location there is an identity between Company \equiv Local Unit \equiv Holding. Multi-located companies, by definition, operate in more than one Local Unit, and may also have and administrate holdings not registered as an operating Local Unit, formally linked to a company. In most cases the holding is run by an individual producer – a family producer – who lives on the one and only holding he owns. In this more common case, there is identity between Household \equiv Holding. These would characterize the typical or ideal agricultural household. Yet, there are also numerous cases where the producer, even a family producer, has more than one holding or does not live on his one and only holding. In other words, even when not considering the holdings of companies, there is no one-to-one relation between household and holding nor necessarily an identity regarding the location of households and holdings linked by the producer. In fact, the operation of the Agricultural Census 2006 registered complementary register information of the non-dwelling producer's home address for more than 1.2 million agricultural holdings, many of which informing residence in urban areas and/or different counties. Note that this is almost one quarter of the registered holdings.

It is easily perceived that under Brazilian conditions it is not possible to reduce all forms of occurrence of agricultural holdings in the two categories of the investigation unit – business units and agricultural households, as the *Strategy* suggests.

The question turns to the discussion of most appropriate concepts from the analytical and investigative viewpoint. In the extensive review of the literature presented by the Wye Group Handbook (UNITED NATIONS, 2007 chap. IX) some of the most common criteria for identifying the farm household are (a) occupation on own account by the reference person in agriculture (narrow concept); (b) occupation on own account in agriculture of at least one family member (broad concept) and; (c) predominance of income from agriculture – in any case, irrespective of residence or not on the holding. This is a household classification that, in all cases, results in a different enumeration from that of the holdings and in the cases (a) and (c) does not lead to covering all holdings. Based on PNAD 2001 data, Kageama (2003) already mentioned that 78% of the rural households were farms and 61% of all agricultural households were located in rural areas. This characteristic is more important when family farming is investigated using the area sample.

The family farm unit as used in the Agricultural Resource Management Survey (ARMS) survey of USDA/ERS¹⁵, is perhaps a more general notion of applicability, which simplifies the sampling and estimating processes without detriment to the interest in listing production and consumption units.

In short, despite recent major advances, considering the standards of administrative registered in Brazil, there is no possibility of doing without a an area frame sample in the survey of the agricultural sector. On the other hand, it is necessary to overcome its limitations for a more efficient sampling of the larger and specialized units. Thus, the option is to use a dual frame.

However, the strategy that IBGE is exploring and that will be the object of pre-tests in August 2009 and January 2010 is to split the target population in two sub-populations: one less numerous sub-population, which concentrates the business and specialized agriculture, sampled from list frame; and the other quite numerous sub-population, centered on family farming, taken as an area sample.

The division in sub-populations shall also lead to the differentiation of approach and producer-based questionnaire, looking to overcome the limitations of the single standard procedures and instruments used in censuses operations, being somewhat similar to the Italian RICA/REA procedure¹⁶.

It is estimated that this model also permits (a) prioritizing the list upkeep work in groups for which more complete sources are available; (b) concentrating the efforts of detailed listing only in selected enumerations areas; (c) obtaining measures of quality of coverage and of the list frame; and (d) preventing duplication of efforts in applying a dual frame.

On the other hand, for estimating purposes, the model presumes (a) a strict register of location of the population sampled by list; (b) correct identification and sizing of the listed units in the enumeration area sampled that are part of the list-sampled population and, accordingly, proficiency in record linkage.

Final comments

The strategy for improving quality and widening scope of the agricultural statistics has emphasis on structuring the investigation of the agricultural holding, by probability sampling. The main immediate investment is in structuring an efficient and robust register frame enabled by the Agricultural Census 2006, which integrates an area frame and list frame.

The register frame is designed to be integrated with other registers and with the overall statistical infrastructure of IBGE. The concept opens doors for a greater integration of the survey and agricultural statistics to other segments and fields of statistical information. Nevertheless, the performance either of the desired

¹⁵ See UNITED NATIONS, 2007 chap XIV.1.1

¹⁶ See UNITED NATIONS, 2007 chap. XIV.2.2

enhancements or greater operating and thematic integration depends on the development of various methodological aspects and on a major effort of specialized capacity building. Below are some strategic questions/requirements that are still to be solved.

The building of the economic surveys is constructed with the business as an investigation and calculation unit. In the case of agriculture the alternative of the establishment (agricultural holding) as a unit is superior. In Brazil, agricultural production of non-agricultural businesses is relevant. What is missing is to establish how to combine these two approaches.

So far it is not clear the best way to address and combine the investigation with family farming as a consumer unit (household) and production unit (holding), in the search for better equality estimates and link between economic and social aspects.

Besides essential institutional links and bringing distant areas of statistics closer, the development of agricultural statistics in an integrated manner will require creativity, innovations and advanced methodologies. A major capacity building effort will be necessary to achieve thematic and methodological content, from those of a more general nature to some very specific, as the crucial record linkage technique.

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