

Experience with Annual Censuses of Agriculture

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ABSTRACT: Australia has been conducting an annual agricultural census for more than 100 years. The need for an annual census has been based on the importance of agriculture to the Australian economy, the variability of climatic conditions across the continent and between years, and the range of agricultural activities conducted.

An annual census offers a number of distinct advantages. Maintenance of the list frame, historical editing and longitudinal analysis at small regional levels are among the benefits which have accrued to the ABS.

Major advantages to users of the data have been the availability of a comprehensive data set every year, the comparability of data between years and consistency in terms of quality of data. The providers of data have had a large degree of certainty in terms of the information they have been expected to provide each year and have been able to develop record keeping practices which enable the easy completion of forms.

Reductions in resources to the ABS Agriculture Program have required adjustments to the strategy, particularly in terms of the scope and content of the collection, and the approaches to data validation and dissemination. Further and more significant changes have been required as a consequence of the decision in 1997 to move to a sample survey approach to the collection of commodity statistics.

1. Introduction

1.1 The Collection of Agricultural Statistics in Australia

Agricultural commodity statistics have been collected in Australia since very early after European settlement, and a census covering major crop and livestock classifications has been conducted on an annual basis since the middle of the 19th century.

The Australian Bureau of Statistics (ABS) Agricultural Statistics Program now conducts a number of agricultural collections on an annual basis:

- an annual Agricultural Census and its associated supplementary collections,
- a monthly livestock slaughtering collection,
- a monthly collection of wool receivals by brokers and dealers, and
- an annual Agricultural Finance Survey (AFS), which is also part of an annual Economy Wide Survey.

The Agriculture Program also produces a range of derived statistics including estimates of the Value of Agricultural Commodities Produced (VACP) and the Apparent Consumption of Foodstuffs.

The Federal Government recently decided that the ABS should cease the conduct of an annual census of agriculture in Australia. Commencing with the 1997-98 collection, commodity statistics will be collected using a sample survey approach, with a census every 5 years. The next census will be conducted in respect to 2001-02. Hence, the remainder of the paper provides a retrospective overview of the ABS experience in conducting annual censuses of agriculture.

1.2 Why an Annual Census?

An annual census of agriculture has been justified on a number of grounds. Agriculture has historically played an important role in the development of Australia's economy. In the mid-1950s, agriculture contributed approximately 16 percent to GDP and about 80 percent of the total value of exports with wool being the dominant commodity. While agriculture's contribution to GDP has declined to about 3.5 percent and the value of exports of agricultural products has declined to about 10 percent of the total value of exports, it remains an important component of the economy in many regions within the country. In addition, food and fibre processing is an important element of Australia's manufacturing industry.

Climatic conditions obviously play an important role in agriculture in Australia. It has been argued that the range of climatic conditions experienced within Australia, together with the frequency of such threats as drought and floods, require an annual census so that forecasting the effects of these events and the development and implementation of programs to manage them can be more effective.

In addition, the large range of agricultural commodities produced in Australia, together with the propensity for farmers to change or expand their activities from one year to the next, have been used as a justification for an annual census as it would be difficult to measure the extent of these types of inter-year variations using a sample survey approach.

2. The Annual Agricultural Census

2.1 Scope and Coverage

The annual Agricultural Census, involving the despatch of approximately 150,000 forms towards the end of March each year, has been the largest annual mail-based collection conducted by the ABS.

The reference period for the Agricultural Census is the year ending 31 March, which most closely relates to a particular farming season for the majority of Australian farmers. Some commodities (including grapes, apples and pears, hops, tobacco, potatoes and cotton) are not usually harvested by the end of March and it has therefore been necessary to collect production and extra varietal information via supplementary questionnaires, despatched after completion of the harvest. For the most recent (1996-97) Agricultural Census, a total of 29,000 supplementary forms were despatched to agricultural providers throughout Australia. These forms are despatched during the period May to July.

The Agricultural Census population is based on a list frame drawn from the ABS Business Register. There are approximately 170,000 farming establishments on the Business Register. To minimise provider load and reduce processing costs, the ABS has gradually excluded from the Census those establishments which make only a very small contribution to overall agricultural production.

Prior to 1975-76, the collection unit for the Agricultural Census was defined as a *piece of land one hectare or more used for the production of agricultural products or the raising of livestock and the production of livestock products*. Two problems with such an area based definition were that:

- many small scale sub-commercial "hobby farms" that contributed very little to total agricultural output were *included* in the Census, and

- some highly productive small area agricultural properties such as poultry farms, commercial market gardens, vineyards and nurseries were often *excluded* from the collection because of the area criterion.

To overcome these problems, the concept of Estimated Value of Agricultural Operations (EVAO) was developed and adopted for the 1975-76 Agricultural Census. EVAO is an estimate of agricultural activity undertaken by an agricultural establishment and is used to provide an indication of size (for selection and stratification purposes) and to provide a basis for industry coding. EVAO is calculated for each agricultural establishment by allocating a unit value to all commodities reported on the Agricultural Census form. While it is expressed in dollar terms, EVAO is not a reflection of actual agricultural income for the farm as there are fluctuations in commodity prices across areas and over time not reflected in the EVAO estimation.

The scope of the 1975-76 Census included all agricultural establishments that had or were expected to have an EVAO of \$1500 or more. In 1981-82 this figure was raised to \$2500, from 1986-87 it was increased to \$20 000 and it was raised again to \$22 500 for the 1991-92 Census. Between the years 1986-87 and 1992-93, a smaller four page “Agricultural Activity Collection” (AAC) form was sent to holdings with an EVAO between \$5,000 and the threshold. This allowed the ABS to collect data for principal agricultural commodities (and hence produce a more accurate estimate of production for those commodities which are produced in relatively high proportions by smaller producers), keep the Business Register up-to-date, and monitor the scale of operations undertaken by farms within this smaller EVAO size category.

As a result of a review of the Agriculture Program in 1993, a revised Census strategy was adopted. This involved lowering the EVAO cut-off to \$5000 and running a Census on a three year cycle. Full commodity details were collected in the first year (1993-94), with a reduced number of commodities included the following two years. However, the provision of funding by major statistical users during these latter years allowed for some additional detail to be collected to the extent that the content of the forms was almost equivalent to the 1993-94 census form.

2.2 Population Frame Maintenance

Questions on the Agricultural Census form have been developed specifically by the ABS to gather important “frame maintenance” information that can be used to update the Business Register. These questions (called “front of form” because they have traditionally been located on the first page of the Census form) request details of name and address changes, purchases and sales of land and the extent of non-agricultural activities undertaken on farming establishments. In this way, the census has been the main source of information necessary to maintain the population. Each year, approximately 30 percent of all Agricultural Census forms require front of form updating and this type of feedback constitutes the single most important source of Business Register updating.

In addition to information obtained in Agricultural Census feedback, a range of other coverage sources is used to update the Business Register. These include group employer registrations for farms which employ labour (from the Australian Taxation Office), details of land ownership changes from some State Government Valuer-General’s Departments, lists of producers provided by industry associations and information from agriculture-related publications.

However, coverage of agricultural establishments remains a problem, particularly in those industries and regions dominated by small (in terms of both area and activity) producers. The move to a sample

survey has accelerated the need to investigate other coverage sources including extended use of taxation data (sales tax exemption registrations) and diesel fuel rebate registrations from the Australian Customs Service.

3. Type and Range of Data Collected in the Census

3.1 Core Content of Census

The Agricultural Census form is a general purpose form covering a broad range of rural activities, including: area and production of crops and vegetables, number of fruit trees and production of fruit, numbers of livestock, and wool production. It also asks providers to “write-in” details of commodities not printed on the form.

Data on the use of inputs to the production process have also been collected for many years via the inclusion of questions, some on a rotational basis. Typically, these questions have asked farmers to report:

- area of pastures and crops irrigated, the method of application and the source of water used,
- type and quantity of artificial fertiliser used and the area to which it was applied,
- quantity of insecticides, pesticides and herbicides used, and
- the use of soil conditioners (lime, gypsum, dolomite).

A number of questions have been removed in the last two decades, usually as a result of reductions in resources, but also as a result of concerns about data quality. These include employment, cereal crop forecasts, varieties for crops and fruit commodities, breed dissections for animals, some sex and age dissections for animals, usage of electricity and fuels and livestock deaths (including those slaughtered for human consumption).

Generally, users have in the past taken the option of reducing content as a means of absorbing resource reductions and/or varying the scope of the collection rather than moving away from an annual census.

3.2 User Funded Questions and Supplementaries

In recent years, an increasing proportion of questions asked on the Agricultural Census form have been funded by both internal and external users. This includes some of the questions referred to in 3.1 above. In the 1994-95 “short form” Census year, for example, the Australian Meat and Livestock Corporation (AMLC) contributed user funding to ensure the continued availability of detailed livestock demographic data. Several industry associations have also provided the ABS with the necessary funding to collect detailed varietal data on Agricultural Census supplementary collections.

User funding has also been made available for the ABS to collect data on a wide range of other topics, including:

- farm management practices, particularly with regard to sustainable agriculture (e.g. broadacre cultivation, disposal of crop stubble and tillage methods),
- emerging issues and industries (e.g. organic farming and agro-forestry),
- the use of insecticides, herbicides and fungicides,

- the perceived area of degraded land on farming establishments,
- the area of fencing for grazing management and the protection of native vegetation and river or creek frontage, and
- the area and purpose of tree planting on cleared agricultural land (e.g. to control irrigation salinity or to act as a windbreak).

For the 1997-98 commodity survey, one State Government has provided additional funds to increase the sample in that State mainly to enable the production of estimates down to small area level for that State.

3.3 Collection and Questionnaire Development

Agricultural Census forms are designed in accordance with the ABS' Forms Development Procedures and Design Standards Manual using Adobe Pagemaker software. A separate Census form is produced for each State and Territory to allow for the different mix of commodities grown across Australia, although considerable efforts have been made in recent years to standardise the forms to the extent possible.

Space for additional questions on the 12 page Agricultural Census form is at a premium and to finalise the content of the forms each year the Agriculture Program undertakes an extensive user consultation process. The consultation process involves meeting with users on either an individual or group basis over a period of three months, and culminates with a meeting of the Agricultural Statistics User Advisory Group (UAG) at the end of August. At this meeting, priorities for the forthcoming collection are determined by examining the full range of existing and new statistical user requirements and a broad collection strategy discussed and usually agreed to. (Where there is disagreement, the ABS must conclude the issue, taking into account advice it has received.) Where possible, decisions are then made about the content of the forthcoming Census. Proposed changes to existing questions may also arise as a result of field Post Enumeration Surveys (PES) or from other analysis which reveals design faults in the questions. Alternatively, questions may be adjusted to suit changing farm practices within the agricultural sector, based on advice from users received during the consultation process.

Form and question development is undertaken using a combination of various techniques, including observational studies and telephone interviews. Advice is also sought from users on appropriate wording and question structure. Despite the care taken in question testing and forms design, however, the Agricultural Census form experiences a number of problems commonly associated with self enumerated collections, as well as some that are more peculiar to the Agricultural Census itself.

Some landholders, for example, lack personal interest in rural statistics and therefore have little motivation to supply the ABS with a completed form. Others can be annoyed by having to complete lengthy forms and are therefore quick to suffer "form fatigue". This can result in errors and omissions in the data, and in some isolated cases, the provider returning an incomplete form annotated "same as last year". Poor record keeping practices and the degree of memory bias involved in the reporting of data required over a twelve-month period can also impact upon the quality of data. In a similar manner, respondents can on occasion self-define questions and ignore the accompanying instructions supplied on the form.

It is largely for many of the above reasons that questions asking for employment details were removed from the Agricultural Census form. Here, the tendency of many farmers to report part-time family

helpers as full-time employees in their returns (combined with a high turnover of property lessees and share farmers within the agricultural sector) made it very difficult to maintain comparability of employment data from year to year. As a result, employment data for the agricultural industry are now estimated on the basis of data collected in the ABS Monthly Labour Force Survey.

The next two sections outline various strategies that the ABS has adopted in order to minimise the effects of many of the problems listed above.

4. Despatching and Processing Agricultural Census Forms

4.1 Despatch and Collection Control Activities

Prior to 1993-94, the despatch, collection and compilation of agricultural statistics was conducted on a decentralised basis by each of the ABS State and Territory offices. Statistical output was then produced and disseminated by the ABS Central Office. In the early 1990s, the ABS decided to reorganise its statistical operations for many collections by forming National Project Centres (NPC) which covered all States and Territories. The 1994-95 Agricultural Census was the first conducted entirely by the Agriculture NPC in the Tasmanian Office.

Centralising the collection offered many operational efficiencies (e.g. economies of scale and the rationalisation and standardisation of procedures according to best practice), but it also posed its own particular logistical challenges. In any one collection cycle, for example, the Agriculture NPC needed to:

- conduct an initial census despatch (consisting of a Census form, a duplicate form for the providers' own reference, a reply paid envelope and a Census information brochure) to 150,000 agricultural establishments across Australia,
- despatch a total of over 150,000 Agricultural Census reminder postcards and letters,
- despatch approximately 30,000 Agricultural Census supplementary forms, followed by reminder cards and letters,
- resolve approximately 15,000 front of form queries and investigate and re-despatch 2,000 forms unable to be delivered due to incomplete or incorrect name and address information,
- respond to 14,000 telephone queries from respondents (during peak telephone periods, usually following the initial despatch of forms and reminders, the number of incoming calls would average 300 per day),
- achieve a "first estimates" publication target of 40 percent clean records within 8 weeks of the reference date (this equated to opening, sorting, bundling, marking in, processing and editing 3,000 forms per day), and
- capture over 2.5 million data items.

The ABS implemented NPCs in different offices concurrently covering several collections, so that as an office was forming a NPC for one subject matter, it was also relinquishing responsibility for various other collections, to approximately maintain the size of each of the 9 ABS offices (Central Office and one office in each State and Territory). Implementation of all of these NPCs required careful planning, phasing and management. These logistical challenges were exacerbated by a reduced program budget. In the final year of completely decentralised operations (1993-94), for example, the Agriculture Program in the ABS' State and Territory offices accounted for 97 staff years of effort. In 1996-97, the

Program spent 55 staff years of effort, 50 of which was attributed to the Agriculture NPC. The Agriculture Program and the NPC has therefore needed to adopt a number of innovative strategies to attain program objectives within the tight resource constraints.

The use of a mail contractor for the despatch of forms and reminders, for example, has allowed NPC staff to focus on core ABS statistical activities. Temporary contract staff have also been used extensively by the NPC, under the direction of experienced ABS staff, to assist with mail handling, query resolution, processing and editing functions.

Agricultural Census feedback to the Business Register has also been automated via the use of the Computer Assisted Feedback System (CAFS). The CAFS system creates data sets which list all changes that have been made to records on the ABS' computerised Despatch and Collection Control (DACC) system. These data sets are regularly applied to the Business Register for updating purposes. Upon their receipt in the office, forms are marked into the DACC system in a similar manner, with individual reference numbers on each form being captured by a CAERE wand system.

The NPC has also adopted a number of strategies designed to improve overall response rates (and thus improve the quality of statistical output more generally). Two such measures have been:

- stratification of the Census population, and
- identification of priority units for Intensive Follow Up (IFU) based on either their significance within strata, or alternatively, their previous response history.

While stratification has the principal benefit of improving the quality of data to compile preliminary estimates (i.e. it allows for number raised estimation using stratum weighted unit record data), it also enables the NPC to identify those "statistically significant" units (in terms of their size, contribution to aggregates or difference from other units in the same industry) to specifically target for IFU. These units are identified on the basis of their previous year's response to the Census and are specifically flagged on the DACC system. In 1995-96, 2,000 significant units were flagged and a 99 percent response rate was achieved from these units by using a combination of tailored reminder letters, telephone contact and personal visits.

In order to initiate a "pattern" of form completion, units are also flagged for priority reminder and IFU action if they are new to the collection (e.g. have recently bought land) or alternatively, if they are "chronic non-respondents" (those who have not returned a form for three consecutive years). IFU attention also centres on those units with relatively large EVAOs in "normal" strata and, resources permitting, on certain industries or EVAO ranges on an inter-year rotational basis.

To further improve response rates (and to minimise provider load), the NPC has also established special reporting arrangements with agricultural respondents who preferred to have their information collected by telephone. These are recorded on a "special cases" database, to ensure that reminders are not inadvertently despatched.

Despite the above measures, about 10 percent of units (mainly very small farms) do not furnish a return in a given Census year. In very few cases, farmers will actually refuse to complete the Census form. All ABS collections are conducted under the authority of the *Census and Statistics Act, 1905* which provides the Australian Statistician with the power to direct people to answer questions on the Agricultural Census form via a written "Notice of Direction" (NOD). While this recourse is available, every attempt is made by the ABS to secure the cooperation of providers. NODs are issued on the

basis of statistical significance and “eyes open” defiance. Non-compliance with a NOD may result in a formal prosecution in some cases. Very few formal prosecutions have been initiated in recent years.

4.2 Data Capture Strategies

Data capture currently constitutes a significant component of Agriculture NPC operations. Since 1993-94, the NPC has used the ABS designed “Input Processing System” (IPS) to capture data for the Agricultural Census and its related supplementary collections. IPS is a UNIX-based Computer Assisted Data Entry (CADE) system which displays a computer replica of the relevant Agricultural Census or Supplementary form on the screen. It also applies simple edits as data are keyed by processing staff.

Data capture via the IPS system, however, is a very labour intensive and often error-prone form of entering data, which also poses ergonomic risks to the staff involved. In recognising these limitations, the NPC has over the last two years trialed Optical Character Recognition (OCR) as an alternative method of data capture for several of the supplementary collections. Using OCR for data capture was particularly desirable given its potential to free up resources which could be better utilised for editing and data validation.

Despite the successful use of OCR in some other ABS collections, for agriculture the results to date have been less than satisfactory and several problems have been identified. These include:

- the inability to accurately scan unique identifiers from mechanically applied adhesive name and address labels,
- the significant time and computer cost involved in transferring data and the lack of suitable indexing facilities, and
- the considerable clerical resources required for data “repair” work generated by the incorrect scanning of reported data.

The Agriculture Program has therefore decided not to use OCR for 1997-98 collections and will reconsider when the problems with the current facility can be resolved. Other factors currently mitigating against the use of OCR for data capture include the:

- cost of despatch (when designed in OCR readable format, forms increase considerably in size from the current 12 pages which is just under the maximum allowable weight for a “standard” letter, significantly increasing postage costs per unit),
- sparseness of data on the form (OCR scanning is charged on a “per page” basis and at current costs, OCR data capture would prove considerably more expensive than manual data entry), and
- lack of a cost efficient direct printing facility for multi-page booklets.

Another alternative form of data capture currently under investigation is direct data capture via the Internet. Although the proportion of farmers with Internet access is currently quite low (less than 10 percent), the Internet take-up within rural communities is steadily increasing. One suggested method of collecting agricultural data on the Internet is via an interactive form (which would include basic on-line edits) that could be accessed on the ABS website. The Internet is also regarded as a potential vehicle for reminder and IFU action, and providers are being asked for their Internet e-mail address on the 1997-98 survey form.

4.3 Data Validation Strategies

One of the major problems associated with running an annual census has been to ensure that providers read and complete the whole form, rather than those parts which they consider will only relate to their activities. Historically, there has been a reluctance to change the form, particularly the order of questions. However, the introduction of a large range of new and quite different questions has forced the reordering of many questions in recent times. To help overcome this problem, the form includes filter questions at the beginning of each section of the form to guide providers through the form, and ensure all relevant sections and questions are completed.

The other significant problem, in terms of data validation, relates to the detailed level at which data can be released from the Agricultural Census. The dissemination of detailed commodity data at the small area level imposes a large editing load on to the NPC.

However, conducting an Agricultural Census on an annual basis does provide many unique opportunities for editing data, principally because it allows for the investigation of inter-year movements in reported commodities at the “unit record” (individual form) level and at all levels at which the data are aggregated and disseminated.

Specific data validation techniques are explored in more detailed below.

4.3.1 Clerical Scanning

Prior to being entered into the computer system, forms are physically scanned to identify “front of form” queries and other reporting problems (e.g. farmers reporting in acres instead of hectares, missing data fields) requiring correction prior to data entry. As resource levels within the Program have declined, so has the amount of effort put into clerically examining each return. The use of IPS by clerical staff to enter the data has also reduced the reliance on an initial clerical examination of forms.

4.3.2 Input Editing

Input editing is the process of identifying and resolving problems with the data supplied on individual forms. The main aim of input editing is to correct reporting and keying errors and to resolve logical inconsistencies within the form. To achieve this, edits which examine the data for conformity to specific tolerances, check that components equal totals and determine whether certain ratios fall within specified ranges have been built into the computer processing system. Edit failures for each record are printed on an Edit Transaction Listing (ETL) and a cycle of editing and amending continues until all records are satisfactorily “clean”. As a general rule, the ABS seeks to contact providers as little as possible during input editing, but there are many occasions where contact is required to resolve apparent inconsistencies on the form.

4.3.3 Output Editing

Following a cycle of input editing, and when a significantly large proportion of forms have been received and processed, output editing commences. Output editing involves the examination of tabulated data at different levels of aggregation intended for dissemination. Particular emphasis is placed upon identifying large year to year movements in aggregated commodity data. Forms that significantly contribute to such movements are re-examined for possible errors. Another objective of

output editing is to identify inconsistencies between commodities and regions, for example, tropical fruit grown in temperate regions and production of broadacre crops in metropolitan areas.

This is an iterative process and records found to be in error are amended and again subjected to the range of edits applied during the input edit phase.

4.3.4 Significance Editing

The Agriculture NPC has consistently sought to refine the above editing methodologies to find efficiencies and to improve the overall quality of data released. One such methodology used in recent years is significance editing. This involves editing only those forms which have a significant impact upon commodity estimates at the aggregate level. While front of form information still receives considerable attention, only a minimal clerical scan is now conducted to correct the most serious of commodity reporting errors on the form. Similarly, at the input edit stage, edit tolerances have been modified (on the basis of univariate and bivariate SAS analysis) to ensure the best return for the least amount of effort in editing forms. Most logical inconsistencies, for example, are now only investigated for those units that report statistically significant numbers of livestock and/or area of crops.

A number of SAS based packages have also been developed to assist with significance editing. The “top down” SAS editing package eliminates the need for staff to examine several thousand pages of aggregate commodity tables by:

- examining the entire database and highlighting only those commodities that have undergone statistically significant inter-year movements, and
- identifying the appropriate level at which to investigate units that have contributed to these movements.

Once the particular commodities requiring further investigation have been identified by the “top-down” editing system, a suite of SAS edit modules is used to identify the major contributing units to the inter-year movement (in descending order) for each of the commodities under investigation. Alternative data sources are also used as a basis for comparison when attempting to determine the validity of apparent movements in commodity estimates between years.

In conjunction with top-down editing, a “bottom-up” editing program is also used to identify the occurrence of reported commodities in seemingly inappropriate areas of Australia. PC SAS univariate and bivariate graphical analysis is also increasingly being used to identify potential outliers.

4.3.5 Imputation of Missing Data

The majority of establishments which do not return a form are “computer estimated” by automatically copying commodity data from the previous year and adjusting it in accordance with current year trends. Establishments which do not have previous years’ data are computer estimated on the basis of data provided by other establishments in the same stratum.

An automatic commodity imputation system has also been developed to impute missing commodity values on a form that is otherwise complete. For example, if the area of wheat is reported, but production isn’t, the latter is derived by multiplying the area reported by the median “live respondent” wheat yield for the particular State. Automatic imputation also works in the reverse case where production has been reported but no area (or number of fruit trees) has been supplied.

5. Disseminating Agricultural Census Data

Agricultural Census data provides users with a comprehensive range of agricultural commodity statistics which can aid in decision-making and assist them in meeting their policy, planning and administrative obligations or business commitments.

Under Section 12 of the *Census and Statistics Act, 1905*, the ABS is obligated to publish results from its statistical collections. National totals from the Census first appear for the most important broadacre and livestock commodities in late May, when about 40 percent of the collection has been processed. When 80 percent of the forms have been processed in August, a second series of estimates are released at both the Australian and State levels. Final estimates are published at the State and National levels during March and April in the following year.

Printed publications are often the first reference point for users of the data and can satisfy many of their requirements. However, users are increasingly accessing agricultural statistics in electronic formats such as floppy disk, CD ROM and via the Internet. Agricultural Census publications do not contain spatial data below the broad regional level, and to meet the demand for small area data in electronic format, the ABS developed *AgStats*, a “Clipper” based software package which is available on either floppy disk or CD ROM. *AgStats* is an extremely useful dissemination tool which is used widely by clients and ABS customer servicing staff. *AgStats* is being redeveloped to provide a more sophisticated mapping facility and to allow agricultural data to be combined with other important economic, social and demographic regional data.

In addition to the standard products mentioned above, customised data services are also undertaken for clients on a fee-for-service basis. A significant number of these are serviced by accessing the “ABS Data Base” (ABSDB), a central repository of published ABS data and data descriptors (metadata). This database provides a “one stop statistical shop” and eliminates the need to compile data from different sources. A principal benefit for agricultural client servicing staff is the easy access to time series data that the ABSDB provides.

5.1 Small Area Statistics

One of the most important outputs from the Agricultural Census is small area data. Using the Australian Standard Geographical Classification (ASGC) as a spatial framework for agricultural statistics, the ABS can provide agricultural data for Statistical Local Areas (which usually equate to Local Government municipal or shire boundaries) and aggregate this to provide data at the Statistical Subdivision, Statistical Division, State and National level.

The ASGC, however, is based upon administrative boundaries and it is becoming increasingly difficult for the ABS to provide data according to users’ alternative spatial classifications (e.g. agro-ecological regions, drainage basins and irrigation areas). The ASGC is also susceptible to changes, resulting from local government amalgamations and restructuring. In these instances, longitudinal (time-series) analysis of small area data can be a very difficult exercise.

Because of the increasing user demand for “tailored” spatial statistics, the ABS has conducted a number of trials to assess the viability of geocoding agricultural establishments on the Business Register. A geocoded database would provide the flexibility necessary to meet user demands and would also allow the generation of a range of environmental indicators. Following a successful geocoding trial in Western Australia, the ABS, in association with the Bureau of Resource Sciences (BRS), is considering

a proposal to geocode all farming establishments in Australia and link this with data from the BRS Geographic Information System (GIS). This would enable the ABS to build a profile of land use and land management practices across Australia and facilitate the creation of a digital land use database, which BRS could use with other scientific data to develop a biomass map of Australia.

5.2 Confidentiality

When releasing Agricultural Census data at the regional level, it is possible that some commodity data may be released which could allow the identification of a particular provider. A determination (Statutory Rules 1983, No. 19.2) under Section 13 of the *Census and Statistics Act, 1905* enables the ABS to legally disclose this information unless a provider is able to show that the statistics enable the identification of his/her farming operation. When providers request non-disclosure of a particular commodity, the ABS will confidentialise those data.

5.3 Other Related Agricultural Statistical Series

The results from the Agricultural Census play an important role in the production of the national accounts. Census production data are used to compile the Value of Agricultural Commodities Produced (VACP) series, the important input to the derivation of an estimate of agriculture's contribution to Gross Domestic Product (GDP). The VACP for each commodity is derived by multiplying the quantity produced by a weighted average market price, and then aggregated to produce a total estimate for agriculture. Estimates of value of production of livestock items are produced using data from the monthly livestock slaughterings collection, not the census. Hence, decisions regarding the content of the census form in recent years have been taken based on the need to maintain the veracity of the VACP series. In some instances, it has been decided to reduce the level of detail collected for livestock to ensure that the crop data collected in the census remains as detailed as is required for VACP.

In addition, Agricultural Census data constitute a major input to the Apparent Consumption of Foodstuffs series, an important output of the ABS Agriculture Program.