RESEARCH PAPERS AND REPORTS IN ANIMAL HEALTH ECONOMICS

AN ACIAR THAI-AUSTRALIAN PROJECT

Working Paper No. 25

Animal Health Information Systems

by

Gavin Ramsay

November 1996

THE UNIVERSITY OF QUEENSLAND
Working Paper No. 25

Animal Health Information Systems

by

Gavin Ramsay

November 1996

© All rights reserved

---

1 School of Economics, The University of Queensland, St. Lucia Campus, Brisbane QLD 4072, Australia
Contact Clem Tisdell: Email: c.tisdell@economics.uq.edu.au
RESEARCH PAPERS AND REPORTS IN ANIMAL HEALTH ECONOMICS is published by the Department of Economics, University of Queensland, Brisbane, 4072, Australia as a part of a research project sponsored by the Australian Centre for International Agricultural Research, viz., Project No. 9204, ‘Animal Health in Thailand and Australia: Improved Methods in Diagnosis, Epidemiology, Economic and Information Management’.

The Commissioned Organization is the Queensland Department of Primary Industries. Collaborating institutions in Australia are CSIRO-ANHL, Geelong, Victoria and the University of Queensland (Department of Economics; Department of Geographical Sciences and Planning). In Thailand, the collaborating institutions are the Department of Livestock Development (National Institute of Animal Health; Disease Control Division), Chiang Mai University (Department of Agricultural Economics; Department of Animal Husbandry) and Thammasat University (Faculty of Economics). The collaborating institution in Laos is the Department of Livestock and Veterinary Services. Dr F.C. Baldock, Senior Principal Epidemiologist, Queensland Department of Primary Industries is the Project Leader in Australia and Dr P. Chamnanpood, Senior Epidemiologist, Thai Department of Livestock Development is the Project Leader in Thailand. Professor Clem Tisdell and Dr Steve Harrison, Department of Economics, University of Queensland are responsible mainly for the economic component of this project.

‘The overall goal of this project is to develop and evaluate the necessary tools to provide decision-makers with reliable animal health information which is placed in context and analysed appropriately in both Thailand and Australia. This goal will be achieved by improving laboratory diagnostic procedures; undertaking research to obtain cost-effective population referenced data; integrating data sets using modern information management technology, namely a Geographical Information System (GIS); and providing a framework for the economic evaluation of the impact of animal diseases and their control.

A number of important diseases will be targeted in the project to test the systems being developed. In Thailand, the focus will be on smallholder livestock systems. In Australia, research will be directed at the northern beef industry as animal health information for this sector of livestock production is presently scarce.’

For more information on Research Papers and Reports Animal Health Economics write to Professor Clem Tisdell (c.tisdell@economics.uq.edu.au) or Dr Steve Harrison (s.harrison@uq.edu.au) Department of Economics, University of Queensland, Brisbane, Australia, 4072.
ANIMAL HEALTH INFORMATION SYSTEMS

ABSTRACT

This paper examines the development of animal health information systems at the farm, national and international level, with examples of some systems that have been developed. Methods for the assessment of animal health information systems are then examined. This is followed by an outline of the national animal health information system (NARIS) currently being developed in Australia, with special emphasis on the system of Structured Animal Health Surveillance (SAHS) being set up in Central Queensland.

**Keywords**: Animal disease, animal health information systems, animal disease prevention

**JEL Classification**: Q160
ANIMAL HEALTH INFORMATION SYSTEMS

1. Introduction

Animal health information systems are systematic methods for the collection and analysis of animal health data. Animal health information is recognised as necessary for the setting of animal health priorities (Morris, 1991).

Animal health data can consist of observations on the occurrence of disease, laboratory diagnoses of disease and the results of serological studies. These data can be transformed by a variety of methods of analysis into animal health information. Animal health data can be collected and analysed on an individual farm, regional, state, national or international level (Morris, 1991; Blajan and Chillaud, 1991) and are used for a variety of purposes including:

- determining the level of disease occurrence and the effect of disease on livestock production. This information can then be used to estimate the benefits of controlling the disease (Faugere et al., 1991);
- determining if a disease is present or absent from an area for the purposes of trade. This may involve certifying that an area is free of a disease for, export certification or to prevent imports from areas where the disease occurs (Blajan and Chillaud, 1991);
- detecting new disease outbreaks or the onset of epidemics of specific diseases (Moore et al., 1992). This includes detecting the spread of a disease from one place to another within and between countries;
- providing information on the way diseases not currently present in a country may spread should they gain access (Ellis, 1993: Sanson et al., 1991);
- monitoring the progress of specific disease control or eradication programs (Ryan and Yates, 1994);
- maintaining consumer confidence in the quality of the product (Anon., 1996)

Each of these requires different information from the analysis of the animal health data and may require that specific methods of data collection and analysis are set up to meet the requirements (Dohoo, 1994; Morris, 1991).

In the past, national disease information systems have been of limited value. This has been
especially so where government veterinary services have simply collated and published the distribution of outbreaks of diseases that are legally notifiable and have been reported to them (Ellis, 1993; Leech, 1971). In this case the information rarely provides a useful indication of the disease situation in the country because of under-reporting of disease by farmers and the inability of government veterinary services to provide coverage of all livestock producers (Ellis, 1993). Additional data were in some cases collected by the use of national surveys such as those carried out in Britain (Leech, 1971). The aim of these surveys was to provide a general picture of the diseases affecting farm livestock.

Dohoo (1994), Martinez et al. (1992), Morris (1991) and McLeod and Tyler (1991) have reviewed the requirements of, and methods for, the development of animal health information systems. In the development of a system it is important that the purpose for collecting the data and the method for the analysis of the data are clearly defined before the collection of data begins. Once in place, the system should be reviewed regularly to determine the validity of the findings and the effectiveness of the collection and analysis (Morris, 1991). The users of the information may require training to enable them to make effective use of the information being produced (Dohoo, 1994).

This paper examines the development of animal health information systems at the farm, national and international level, with examples of some systems that have been developed. Methods for the assessment of animal health information systems are then examined. This is followed by an outline of the national animal health information system (NARIS) currently being developed in Australia, with special emphasis on the system of Structured Animal Health Surveillance (SAHS) being set up in Central Queensland.

2. Individual Farm Animal Health Information Systems

Animal health information systems are used by individual farmers and their advisers to determine ways in which livestock productivity and profitability can be improved by the implementation of disease prevention measures. This section examines information systems developed for cattle farms.

Early information systems were developed to support herd health programs on dairy farms. Dairying is an intensive enterprise which allows regular data collection on cow health and production (Morrow, 1963; Cote, 1963). The herd health programs were developed as a result
of the realisation by farmers and veterinarians that subclinical disease is a significant contributor to reduced livestock production (Radostits and Blood, 1985, p. 4). These systems collect and analyse health and production data that can then be compared with targets set by the farmer and his advisers. The reasons for failure to achieve the targets are identified, and changes in management are made to improve the herd's health and production (Radostits and Blood, 1985, p.4).

Initially, card systems were used to record health and performance data for individual animals (Cote, 1963). In the 1970's computer programs were developed to record health and production data and enable rapid analysis of those data (Blood et al., 1978; Weaver et al., 1987; Radostits and Blood 1985, p. 13). Lissemore (1989) has reviewed the development of dairy herd health programs and examined their development from production recording systems to microcomputer programs.

Sophisticated computer-based decision-support systems have also been developed which make use of the information produced by animal health information systems and allow the farmer to simulate the effects of disease control decisions on herd production. An example of such a system is the one developed by Jalvingh (1994) which uses a computer model to simulate herd dynamics and can be used to calculate the consequences of disease management strategies on herd structure and production. In another example, the decision support system, DairyORACLE, has been designed to link directly to an animal health information system, DairyCHAMP (Marsh et al., 1987).

Animal health information systems for beef cattle properties have been fewer and slower to develop. One reason for this is beef cattle production is less intensive. Stock are yarded less frequently hence there are fewer opportunities to collect animal health data, and to make use of these data in decision making. Methods to collect data on disease and production, other than the collection of individual data, are needed for these systems. Some animal health information systems developed for individual farms are listed in Table 1.

3. National and Regional Animal Health Information Systems

The most common aim of national animal health information systems is to provide quantitative and reliable information that can be used by veterinary administrators and field veterinarians to evaluate progress in disease control and determine future directions for
disease control efforts (Morris, 1991).

Table 1 Examples of animal health information systems

<table>
<thead>
<tr>
<th>International</th>
<th>National and regional</th>
<th>Farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>OIE (Blajan &amp; Chillaud, 1991)</td>
<td>NAHIS (Gamer and Canon, 1994)</td>
<td>DairyCHAMP (Marsh et al., 1987)</td>
</tr>
<tr>
<td>HandiSTATUS (Bernardo et al., 1994)</td>
<td>NAHMS (King, 1990)</td>
<td>APIDN (Dohoo, 1988)</td>
</tr>
<tr>
<td>CAPdat (Pegram et al., 1996)</td>
<td>Namibia (Hare and Biggs, 1996)</td>
<td>FAHRMX (Bartlett et al., 1986)</td>
</tr>
<tr>
<td>Haemoparasite Information Network (Vokaty et al., 1994)</td>
<td>Israel (Van-Ham, 1994)</td>
<td>Daisy (Stephens et al., 1982)</td>
</tr>
<tr>
<td></td>
<td>CDR (Ogwang &amp; Heinonen, 1994)</td>
<td>DHMS (Menzies et al. 1988)</td>
</tr>
<tr>
<td></td>
<td>Nigeria (Ogundipe et al., 1989)</td>
<td>COSREEL (Russell and Rowlands, 1983)</td>
</tr>
<tr>
<td></td>
<td>APHIN (Dohoo, 1988)</td>
<td>Danish pig health scheme (Willeberg et al., 1984)</td>
</tr>
<tr>
<td></td>
<td>CORRAL (Lees &amp; Fedorick, 1994)</td>
<td>Switzerland (Stark, 1995)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>QARDS (Elder, 1976)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thailand (Meephuch, 1993)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New Zealand (Ryan &amp; Yates, 1994)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>REPS (Christensen et al., 1994)</td>
</tr>
</tbody>
</table>

Many national systems are passive and rely on disease outbreaks to be reported to government officials or specimens to be submitted to diagnostic laboratories. Such a system is in place in Nigeria but has been found to suffer from late and inaccurate reports as well as under-reporting (Ogundipe et al., 1989). However, in spite of these difficulties the system was felt to have a beneficial role in several areas, including epidemiologic and economic studies, determining vaccine requirements on a regional basis, the planning of veterinary education and, assisting decisions on the most appropriate locations for new livestock enterprises (Ogundipe et al., 1989).

In other national animal health systems, information is provided on the progress of specific disease control programs. An example of such a system is the one developed for the monitoring of bovine tuberculosis in New Zealand (Ryan and Yates, 1994).

Two systems, one national, the National Animal Health Information System (NAHMS) in the U.S.A, and one that is at both farm and regional level, the Animal Productivity and Health Information System (APHIN) in Canada, are examined in Sections 3.2 and 3.3 respectively.
The two systems contrast in the way they have been developed, with NAHMS developed by a government organisation and APHIN by a group comprising government, university and producer agencies.

3.1 The use of geographical information systems in animal health

An advance in information systems, which provides a powerful tool in spatial analysis, has been the development of geographical information systems (GIS). The role of a GIS has been defined as to "efficiently capture, store, update, manipulate and analyse geographically referenced data" (Sharma; 1993). Modern GIS provide a number of capabilities including:

- the rapid generation of maps indicating the spatial characteristics of animal health information, for example, livestock populations, disease incidence, risk factors and control activities, and
- the examination of the association between partial variables by the combination of database layers within the system, for example, the association between disease incidence and characteristics of the livestock population.

Animal health information has spatial characteristics and the GIS are becoming an integral part of animal health information systems. Applications of GIS in animal health were reviewed by Sanson et al. (1991) who notes that GIS has been applied in three main areas, namely:

- to support general disease surveillance, control and eradication (Arambula and Astudillo, 1991; Vander Logt et al., 1994),
- to manage information for specific livestock diseases and information on disease spread (Norman et al., 1994; Carpenter et al., 1994; Marsh et al., 1991; Lessard et al., 1990), and
- to support major national exotic disease eradication programs (Glanville et al., 1994; Sanson et al., 1994; Sanson et al., 1991).

A complex integrated animal health information system using a GIS as a base is being developed in Thailand to collect and analyse animal health information as part of an ACIAR project (Baldock, 1994; Sharma, 1994).
3.2 The national animal health monitoring system

In the United States a system was developed in response to calls to monitor endemic diseases of livestock. The system was developed following a recommendation that a national system be implemented to define animal disease problems through effective morbidity and mortality reporting (Poppensieck and Budd, 1966 cited in King, 1990).

The National Report of Animal Diseases (NRAD) that was developed used monthly reports from private veterinary practitioners augmented by records from veterinary school clinics and state diagnostic laboratories. The National Animal Morbidity Report (NAMR) was developed to supplement the NRAD and covered disease control and eradication programs. The NRAD was discontinued because it was expensive to maintain and regarded as biased, often misleading and of little practical use (King, 1990).

The need for a system that would allow the collection of valid data and its unbiased interpretation was recognised. In order to produce such a system the objective was further defined as “to develop methods for accurately estimating the prevalence, incidence, trends and economic impact of economically significant diseases and conditions in the United States” (King, 1985). This system is known as the National Animal Health Monitoring System (NAHMS). Initially a number of pilot programs were carried out to examine the methods to be used. The results of these programs have been published by Gardner et al., 1990, Hurd and Kaneene, 1990, Kaneene and Hurd, 1990, Salman et al., 1991, Hird et al., 1991 and Wittum et al., 1990.

The sampling design used in NAHMS was stratified random sampling with the probability of selection proportional to size (King, 1990). Randomly selected herds and flocks are also stratified relative to herd or flock size and according to species and production type. Inferences can therefore be made within each of these defined sub- populations (King, 1990).

The NAHMS data are collected using several methods which include interviews of livestock owners and the maintenance of health and productivity diaries by participating farmers. In addition, biological specimens such as blood samples are collected and analysed. Locally collected data are analysed and forwarded to a national centre where they are aggregated and regional and national reports produced. Reports for individual producers are also produced.

NAHMS has concentrated on the collection of data from pig and dairy industries but has also
examined the more difficult area of rangeland beef production (Salman et al., 1990; Wittum et al., 1990, Hird et al., 1991). Management and environmental inputs are characterised in terms of farm performance, profitability and risk through the combination of descriptive statistics and risk factor identification (Heuston, 1990).

Information on the cost of various disease problems has also been collected in an attempt to clarify and define the disease priorities (Kaneene and Hurd, 1990; Miller and Dorn, 1990; Sischo et al., 1990; Hird et al., 1991; Salman et al., 1991). The cost data provides a baseline on the health and production of the herds sampled. The main use of this information has been to compare the animal health performance between properties and to enable producers to improve management of animal health. This information has been that most desired by the producers (King, 1990). While NAHMS examines the expenditures made by farmers on controlling and treating specific diseases, the system does not provide a framework for the analysis of the costs and benefits of controlling these diseases.

Brown et al. (1993) have made use of these baseline data to estimate the benefits of internal parasite control. They found the NAHMS information provided a useful description of a typical farm and provided most of the high quality information needed to determine the economic impact of animal health problems. However, they also noted several deficiencies in the database and raised the issue of the ability of NAHMS to detect animal health problems not considered important by the survey designers. NAHMS now provides, on the internet, the results of its studies.

3.3 Animal productivity and health information network

The Animal Productivity and Health Information Network (APHIN) was developed at the Atlantic Veterinary College and makes use of a number of microcomputers located on farms, in veterinary practices, in the processing industry, in Department of Agriculture laboratories and offices, and in the Atlantic Veterinary College, all of which are linked to a central computer. These computers operate independently of the central computer and use farm-based animal health information systems which meet most of the needs of local users. The central computer collates and analyses the data to provide regional information and information to allow comparisons to be made on animal health and production between farms (Dohoo, 1988).
4. International Animal Health Information Systems

The major international animal health information system is that run by the Office International des Epizooties (OIE). This system has three main aims (Blajan and Chillaud, 1991); they are:

- to alert countries threatened by an epizootic,
- to strengthen international cooperation on the control of animal diseases, and
- to facilitate international trade in animals and animal products.

To meet these aims the OIE collects information from member nations, analyses and summarises the information and provides reports for all member nations. In doing so it provides information on the geographical distribution of diseases throughout the world.

HandiSTATUS is the computerised interface for the exchange of information on animal health between countries and international organisations (Bernardo et al., 1994). It was originally developed for use by people working in isolation in small countries but has come into much wider use. HandiSTATUS can be used to provide information on the international distribution of diseases that are considered in the international trade in livestock and livestock products and it is used in over 100 countries in the world (Bernardo et al., 1994). The internet is used to provide updated copies of the software, the submission of disease reports to OIE and receipt of summary reports from OIE (Bernardo et al., 1994). The aim of this system is to improve the timeliness, accessibility and accuracy of international animal health information.

The Haemoparasite Information Network for the Guinas was established to enable three neighbouring countries, French Guinea, Guyana and Suriname to share information on a small number of diseases, in particular, haemoparasite infections in livestock. This system was set up in order to increase knowledge of the epidemiology and clinical and economic importance of haemoparasite infections (Vokaty et al., 1994). The Animal Health and Production Information System (AHPISA) for the Association of South-East Asian Nations (ASEAN) is a collaborative effort of the ASEAN countries with much broader aims. This system has been set up to improve animal health information systems at both national and international levels within the ASEAN region. Initially each country is strengthening its national information system with benefits to ASEAN through harmonisation, and information sharing achieved by the use of standardised software and collaboration in the development of
common information systems where common needs exist (Hutabarat et al., 1994).

5. **Australia's National Animal Health Information System**

The national system being developed in Australia aims to produce representative information on the health status of Australian livestock in order to quantitatively demonstrate which diseases are present and to provide evidence to support claims of freedom from specific disease agents (Baldock, 1995).

In Australia several reasons have been given for the collection, analysis of animal health data and reporting of animal health information. These mostly relate to the need to provide a reliable assessment of animal health status in Australia. In 1975, the Australian national animal health information system (ANADIS) was proposed as a computer-based system for recording, analysing and reporting animal health information. The system was initiated using the production of information for the brucellosis and tuberculosis eradication campaigns as a first step; however, it did not progress beyond this role (Garner and Canon, 1994).

In 1989 animal health authorities in Australia formed a working party to review animal health information needs. The findings of the working party were further examined by a taskforce set up by the Australian Animal Health Committee in 1993. The emphasis of this meeting was to determine the information needed and how such information could be obtained economically (Garner, 1993). The taskforce agreed with the working party's finding that the main areas in which better quality animal health data are needed are:

- to support Australia's exports of live animals and animal products,
- to provide high quality information to satisfy Australia's international reporting obligations on animal health,
- to aid decision making in relation to policies on imports of live animals and animal products,
- to assist in the assessment and setting of research priorities, and
- to assist in planned allocation of State, Commonwealth, and industry resources to animal disease control activities and programs, and to monitor the effectiveness of these programs (Garner, 1993).
The first of these was considered to be the most important. However, the groups did not consider private decision making, and the information produced in the national animal health information system can be used to assist farmers decide on disease control priorities.

There is difficulty in setting targets for an animal health information system to support exports because specific guidelines, accepted by the World Trade Organisation (WTO), have not been set. OIE is responsible for establishing these guidelines. The criteria OIE use for a country to demonstrate freedom from a specific disease provide some guidance as to what these guidelines will be (Morris, 1995). They may be summarised as:

- effective veterinary services must be present in the country and these services must be able to monitor animal health status throughout the country,
- for at least ten years no control measures have been used for the disease in question which would tend to suppress signs of that disease,
- throughout the ten year period no clinical or pathological evidence of the disease has been found,
- all evidence suggestive of the disease is investigated by field and laboratory methods, and
- there is an effective system in place to prevent the introduction of infection.

An animal health information system would be expected to provide information to support the above if it is to provide effective information for use in trade negotiations.

The taskforce proposed that the Australian national animal health information system would make use of data that were already being collected routinely by state services (such as laboratory diagnoses), but would need additional data on specific diseases and from specific regions.

To meet the expected trade requirements NARIS will collect information on disease occurrence, surveillance effort, livestock distribution, distribution of disease vectors and cases of zoonoses (Garner and Canon, 1994). The states submit summaries of field and laboratory data quarterly. Using these data NARIS produces annual reports of Australia's disease status, reports on trends of specific diseases, animal disease situation updates, information to fulfil international reporting obligations as well as information to support trade negotiations (Garner and Cannon, 1994). These reports take the form of:
- Animal Health Surveillance Quarterly,
- Animal Health in Australia, an annual report,
- Reports to the OIE quarterly and annually, and
- World Wide Web page for which a prototype has been developed.

In addition reports are produced as required for specific purposes such as trade negotiations.

6. Animal Health Information in Queensland

In order to meet the needs of NAHIS, QDPI is developing a system to collect and analyse animal health data. In particular, methods to collect animal health data from extensively grazed areas are being developed. The animal health information system in Queensland is part of a broader project known as the Queensland Animal Information Network (QUAINT). The main aim of this project is to provide a framework for the integrated management of information on livestock disease and production to meet international, national, state and regional animal health information requirements for market protection, exotic and endemic disease management and productivity (Baldock, 1995).

The QUAINT system involves the integration of a number of existing databases, including the existing diagnostic laboratory database. To this information is added information from newly developed activities, and in particular, Structured Animal Health Surveillance. A schematic representation of QUAINT is presented in Figure 1.

The figure shows the databases that make up QUAINT and the integrating shell that enables the production of animal health information from the data in the databases.
5.1 Structured animal health surveillance

SAHS is defined as a planned method of data collection, collation, analysis, interpretation and reporting to provide information representative of the population tested for defined purposes (Anon, 1995). It is a significant part of the animal health information system in Queensland and aims to provide representative data on disease occurrence for the QUAIN T system. SAHS involves the active collection of animal health data (Baldock, 1995) and is a particularly important part of animal health surveillance in areas where animals are grazed in extensive systems and disease information is scarce.

Baldock (1995) outlines six guiding principles that are being used in the development of Structured Animal Health Surveillance in Queensland. These principles can be summarised as:

- a pilot model should be developed initially for the extensive beef industry,
- contributors should have access to the information derived,
• the system should operate on an annual cycle with a major visit to producers for detailed data and specimen collection on an annual basis,
• confidentiality needs to be maintained to ensure the cooperation of livestock producers,
• the database developed must be flexible to allow continuing development, and
• those involved in the data collection and use of the information should be involved in the development of the system.

Regular visits by government veterinary staff to selected properties to collect data on disease occurrence and the collection of blood specimens for serological testing were felt to be the most effective way of collecting disease information (Baldock, 1993). However, while planned annual property visits were seen as the ideal method of data collection, the need to explore other methods was also acknowledged. The collection of blood samples from animals at an abattoir, followed up by a telephone questionnaire, is one of the alternatives (Baldock, 1995).

Structured Animal Health Surveillance in Central Queensland involves the collection and analysis of serum specimens from cattle in randomly selected herds and the completion of a questionnaire on the occurrence of disease in the cattle herd in the past year. The serum samples are tested for antibodies to a number of infectious diseases. The diseases are selected on the basis that suitable serological tests are available and the diseases are of economic importance (Baldock, 1993). The diseases tested and the type of laboratory tests used are indicated in Table 2.2.
Table 2  Diseases tested for and serological tests used in Structured Animal Health Surveillance in 1994

<table>
<thead>
<tr>
<th>Disease tested</th>
<th>Test used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Babesia bovis</td>
<td>ELISA/IFAT</td>
</tr>
<tr>
<td>Babesia bigemina</td>
<td>IFAT</td>
</tr>
<tr>
<td>Anaplasma marginate</td>
<td>CAT</td>
</tr>
<tr>
<td>Bovine ephemeral fever</td>
<td>SNT</td>
</tr>
<tr>
<td>Bovine pestivirus</td>
<td>SNT</td>
</tr>
<tr>
<td>Bluetongue</td>
<td>ELISA/SNT</td>
</tr>
<tr>
<td>Leptospira pomona</td>
<td>SAT</td>
</tr>
<tr>
<td>Leptospira hardjo</td>
<td>SAT</td>
</tr>
<tr>
<td>Akabane virus</td>
<td>SNT</td>
</tr>
</tbody>
</table>

CAT  card agglutination test  
ELISA  enzyme linked immunosorbent assay  
IFAT  indirect fluorescent antibody test  
SNT  serum neutralisation test  
SAT  micro agglutination test

7. Assessing the value of an animal health information system

In assessing the value of an animal health information system it is important to define exactly what is to be assessed. While this is a problem faced in any evaluation, it is particularly so for animal health information systems where the setting of the system boundaries, variables and relationships is difficult. This is because the system that must be considered is wider than the information system alone and because information does not have an intrinsic value but only has value if it is used to improve decision making. It is, therefore, necessary to consider how the information generated will be used. In addition, the economic evaluation of an animal health information system needs to examine costs and benefits from the individual producer through to the national and international level (where the information is used to improve the decision making of importing as well as exporting countries). In doing this it is important to be aware the animal health information system is only part of the overall animal health management system.
In general terms an animal health information system would be expected to:

- reduce the costs of providing decision-support information. In practice computerised information systems rarely reduce the costs of producing information but rather produce higher quality information at a greater cost (Harrison, 1996);
- provide information more rapidly to support animal health programs; and
- increase the tasks that can be performed within an animal health program due to the better quality and more rapidly accessed information (Harrison, 1996).

More specifically the information system would assist decision makers by providing improved information in specific areas including

- the demonstration of freedom from specific diseases
- development of infrastructure and planning
- setting disease control priorities

These are very similar to the uses of an animal health information system suggested by Garner (1993).

7.1 Valuing the improved decision making due to improved animal health information

Rarely in animal health studies have attempts been made to value animal health information. Sanson (1995) describes an approach to quantify the benefits of a national animal surveillance system in New Zealand. The role of the system is to provide early warning of the introduction of a new disease into the country and to measure the occurrence of existing diseases. This system requires the collection and analysis of animal health data and can be classified as an animal health information system. Sanson (1995) considered the effect of delayed detection or delayed diagnosis of a disease, due to reduced animal health surveillance, which resulted in considerably larger outbreaks of disease than would have occurred with more effective surveillance. While examining the difference in the size of the outbreaks Sanson (1995) did not value the benefits of having a more effective surveillance system in place.

Verstegen et al. (1994) examined the benefits of a management information system (MIS) developed for pig producers in the Netherlands. They found that farmers using the MIS increased production more rapidly than farmers not using the MIS. To do this the results of
two surveys carried out nine years apart were used.

In other studies examining the benefits of herd health programs, such as that carried out by Williamson (1980), the analysis involved not only the value of the information collected as part of the herd health program but also the actions of the veterinarian in using that information to control disease. Menzies et al. (1988) carried out a study of the use of dairy herd management software for dairy farms and veterinary practices but did not examine the benefits from the better decisions made using the software. These studies demonstrate the difficulty in defining boundaries for the assessment of the value of collecting additional information.

Harrison (1996) suggests the use of the expected value of perfect information (EVPI) and expected net gain from sampling (ENGS) as methods to determine the benefits of information. Use of this approach will be examined in a later discussion paper.

In Australia there are two main benefits of improved animal health information via an animal health information system. These are, the maintenance of export markets and improvement of public and private decision making on livestock disease control.

Animal health information systems are systematic methods for the collection and analysis of animal health data into information for decision makers. It has been noted that a variety of systems have been developed on a farm, regional, national or international level. A national animal health information system is presently being developed in Australia. This system requires data inputs from each of the states in Australia. QDPI is developing a system of structured animal health surveillance which will be used in association with data from the diagnostic laboratory database to provide information for the NARIS. In Central Queensland SAHS is based on the collection and analysis of serological specimens from cattle from a representative sample of properties in the region.

8. References


Medicine, 8: 127-140.


Morris, 1995. Convincing other countries we have eradicated a major disease, Epidemiology Chapter, Australian College of Veterinary Scientists, Proceedings, Australian Veterinary Association Conference, Melbourne, pages 238-244.


disease incidence and prevention in Colorado cow-calf herds participating in rounds 2
and 3 of the National Animal Health Monitoring System from 1986 to 1988. *Journal of
the American Veterinary Medical Association*, **198**: 968-973.

The National Animal Health Monitoring System in Colorado beef herds: disease rates

Sanson, R.L., 1995. A modelling approach to the quantification of the benefits of a national
surveillance program, Epidemiology Chapter Proceedings, Australian College
of Veterinary Scientists, Jubilee Conference, Sydney 10-12 February 1995.

Sanson, R.L., Liberona, H., Morris, R.S., 1991. The use of a geographical information system

Sanson, R.L., Stern, M.W., Morris, R.S., 1994. InterSpread- a spatial stochastic simulation

Sellers, F.B., 1971. A critique of the methods and results of the British national surveys of
disease in farm animals. II. Some general remarks in population surveys of animal

Sharma, P., 1993. Use of geographic information systems in animal health information
programs. In: Copland, J.W., Gleeson, L.J., Chamnanpood, C. (Editors), Diagnosis and
epidemiology of foot-and-mouth disease in Southeast Asia. ACIAR, Canberra, pp. 119-
125.

Sischo, W.M., Hird, D.W., Gardner, L.A., Utterback, W.W., Christiansen, K.H., Carpenter,
T.E., Danaye-Elmi, C., Heron, B.R., 1990. Economics of disease occurrence and
prevention on California dairy farms: a report and evaluation of data collected for the
**8**: 141-156.

Stark, K.D.C., 1995. Animal health monitoring and surveillance in Switzerland,
Epidemiology Chapter Australian College of Veterinary Scientists, Proceedings,


ANIMAL HEALTH ECONOMICS

WORKING PAPERS IN THIS SERIES

13. Foot and Mouth Disease: An Overview of its Global Status, Control Policies and Thai Case by T. Murphy, August 1996.
16. Optimal Livestock Disease Control Models and Their Possible Application to Thailand by T. Murphy, August 1996.
27. Sampling Considerations for Active Surveillance of Livestock Diseases in Developing Countries, November 1996.