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SOURCES AND RELIABILITY OF ANIMAL HEALTH INFORMATION FOR ECONOMIC ANALYSIS IN DEVELOPING COUNTRIES

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La prise de décision en matière de santé animale nécessite une information substantielle. Quelquefois, des politiques optimales sont apparemment possibles mêmes avec des données réduites. A l'autre extrême, on observe un manque désespérant d'informations de base pour la prise de décision concernant les dépenses majeures. Un plus grand investissement est nécessaire pour collecter les données d'analyses économiques comme partie intégrante des programmes de suivi en santé animale. Des données de précisions variables sont nécessaires pour des analyses économiques diverses dans le cadre des programmes européens de santé animale. Les statistiques officielles qui proviennent d'un large ensemble de pays sont d'un intérêt limité. Des techniques telles que la simulation et les suivis d'experts Delphi peuvent être utilisées pour parvenir aux estimations quand un suivi individuel détaillé des producteurs n'est pas possible. Une approche coordonnée de la collecte des données par des économistes et des vétérinaires est essentielle s'il faut disposer de données utiles. Lorsqu'une faiblesse de la collecte est observée ou suspectée, les analyses économiques peuvent être assumées par des tests de sensibilité.

INTRODUCTION

Livestock diseases impose high costs on producers, consumers and traders, hence public animal health programs can have a high payoff. However, decision making about animal health has substantial information requirements. Sometimes, optimal policies are readily apparent even with limited data. At the other extreme, a desperate lack of sound information upon which to base major expenditure decisions may be apparent.

A variety of data sources are available, of varying cost and reliability. Acquisition of data needs to be viewed in a cost-benefit context. Benefits will depend on who uses the information (private and public sector, locally to nationally) and for what purposes (e.g. planning animal health programs, monitoring disease eradication).

ACIAR project 9204 has been concerned with examination of costs and benefits of animal health programs including information systems in Thailand and Australia[2]. This paper draws on experiences from the Thai project, examining the various sources of data available for decision support in control and eradication programs for infectious diseases, and their nature, relative cost, usefulness and reliability.

INFORMATION REQUIREMENTS FOR ECONOMICS ANALYSIS

Animal diseases can cost many millions of dollars to producers (in production, reproduction, draft, transport), to industry (as a constraint on genetic improvement and intensification of production), to traders (including international trade) and to consumers (Harrison and Tisdell, 1997). Control and eradication (C&E) programs partially eliminate these costs, while themselves incurring costs of veterinary infrastructure and services, vaccination, stock movement controls, response to outbreaks (including quarantining, additional vaccination and "stamping out" of infected animals), information systems and extension. Estimates of these various cost components, and the extent to which disease costs will be eliminated, are needed when comparing animal health program options. Such information is a basis for decision support in guiding planning and management decisions at the individual producer, industry body and government (local to national) levels. As well, information is needed on how producers are likely to respond to the incentives or regulations involved in C&E programs. Since the measures adopted in any animal health program are likely to vary between locations, data may be needed on a provincial or regional basis.

Data requirements of economic modelling are highly variable. They can range from the farm scale to the national scale, from simple dollar values to behavioural data and from simple numeric indication of numbers to details of infections by sex and age. Such varied requirement is unlikely to be managed by a centralised national system; it is problematic as to whether even a distributed system may be able to achieve this as some of the required data require sophisticated interviewing by well trained interviewers – such data collection is not likely to be collected as part of a traditional animal health information system.

Data need to be collection for three types of coverage, viz. thematic, spatial and temporal. Spatial data relate to individual enterprise or farms, villages, districts, provinces and whole countries. Time series data requires periodic collection, such as regular surveys. Not all data collected is released, e.g. release may be restricted to aggregated data at say provincial level. It would be unrealistic to think that any national statistical system could satisfy needs of all researchers either in terms of resolution or in terms of themes covered. No developed country has been able to achieve this largely because it has not been possible to achieve agreement on the

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minimum design requirement of such a system. Animal health data may pose some additional problems: diseases may be episodic, and respondents may have incentive to conceal information.
Important animal health data usually includes the basic "demographics" of the animal population (animal type, sex, age), disease and mortality statistics by animal type as well as movement data (i.e. animals born/killed, bought/sold). These data would enable a minimum production-disposition analysis to be conducted.

SOURCES OF DATA FOR ECONOMIC ANALYSIS

Some potential data sources are the following:
Animal health information systems. Progress is being made in development of animal health information systems, including electronic databases and geographical information systems, e.g. Morris 1991, Ramsay 1997. Unfortunately, these are often set up to capture data that are easily collected across a country, or are needed for official reporting purposes, rather than data which are relevant to planning and monitoring disease control programs. They rarely contain data suitable for substantial epidemiological analysis let alone economic analysis of disease planning and monitoring programs.
Periodic reports by government departments. Various government departments produce periodic livestock statistics. In Thailand, annual reports by the Department of Livestock Development (e.g. DLD, 1996) and the Office of Agricultural Economics (OAE, 1996a) provide a snapshot of animal industries, including livestock populations, turnoff numbers, market prices, foreign trade, vaccination numbers and numbers of disease cases. Comparing statistics for different years yields information on trends. Reports in the local language contain more detailed on some aspects than those designed for an international audience (OAE, 1996b). "Passive" data from routine notifications of animal diseases is notorious for under-reporting of disease incidence (Ogundipe et al., 1989).
Occasional government reports. These often deal with specific issues, e.g. the Thai FMD C&E strategy (DLD, 1997a) proposal to establish a new FMD free zone, e.g. DLD (1997b).
Reports of international agencies. Data for some diseases (under List A) are forwarded monthly to the Office International des Epizooties (OIE), and available in monthly bulletins, annual reports and electronically on the World Wide Web (ASEAN/OIE, 1997). These tend to be subsets of infection and mortality data available in national government reports.
Active surveillance. Random sampling of village livestock and taking blood samples and testing for seroprevalance provides reliable information of protection levels, but is costly and time consuming for field and laboratory staff. Abattoir sampling suffers from bias in that age, source area and health status distributions are likely to be unrepresentative, and "markers" can be detected for some past or chronic diseases only.
Results of biological research projects. Animal health and production research projects in the target country and elsewhere will provide an indication of the likely normal performance and perhaps impacts of diseases. Transferring results of research conducted elsewhere to a particular developing country is a useful guide though imprecise.
Reports of previous economic investigations. These studies can produce conflicting results, but provide ballpark figures for economic analysis. Their usefulness can be limited because circumstances have changed, or there may be disagreement with some of the assumptions in the light of new information. Also, their spatial coverage may relate to another part of the country or used a more generalised data collection unit. For Thailand, two previous cost-benefit analyses for FMD eradication are available, having conflicting results (von Kredener, 1985, Bartholomew and Culpitt (1992).
Village surveys. Official statistics often provide little information about small-scale village livestock producers, and survey methods may be essential to obtain data about livestock numbers, management systems and performance parameters. Due to language problems, sometimes these are best carried out by local agencies such as universities (e.g. Thani et al., 1996).
Eliciting expert opinion. Where documented data are scarce, resort may be needed to expert opinion, e.g. from veterinary epidemiologists. This may involve direct interviews, delphi surveys or focus groups. Delphi surveys seek consensus estimates while avoiding direct interaction between experts, so as to avoid bias due to dominance by individuals due to rank or personality. Focus groups on the other hand promote interaction between experts to stimulate deeper thinking. While subjective "guesstimates" are not backed by "asterisked significance levels", they may be highly useful and robust data.
Public media. Sometimes information of value can be obtained in newspapers and television reports, e.g. Maneerungsee (1997) provides details of feedstuff prices and tariff policy.
Input-output (I-O) and closed general equilibrium (CGE) modelling. These techniques can provide estimates of the impacts on income and employment of changes in levels of activity on particular sectors, including livestock production. They rely on input-output tables derived from national accounts together with supporting data, and are not highly precise, but can provide important macroeconomic estimates, e.g. Purcell (1996).
Simulation and epidemiological modelling. Animal health program options may be evaluated through computer simulation experiments with models of livestock systems. This approach is relatively data demanding and costly, but can yield high quality information. Cameron et al. (1995) simulated protection levels against FMD by cattle and buffaloes in Thailand under various vaccination programs, while Ramsay (1997) applied simulation to evaluate vaccination programs for cattle disease in Australia.
Market research. Studies of consumer behaviour yield estimates of demand elasticities and hence how demand and price will respond to a change in production as a result of improved animal health. Market research may also be applied to determine how availability and prices of stockfeeds will respond to an increase in livestock numbers. Various techniques are available to predict international demand for livestock products, e.g. balance sheets of predicted supplies and demands and econometric models.

DATA USEFULNESS, RELIABILITY AND COST

The various sources above may be considered in terms of the nature of the data they provide, and the quality (relevance to economic analysis, comprehensiveness, accuracy, timeliness, cost). Official statistics can be obtained off the shelf at little cost, and provide a guide to base livestock production figures. However, under-reporting is a universal problem with passive surveillance systems. For example, official statistics indicate that in 1988 one only beast died from all infectious diseases in the whole of Thailand (OAE, 1996). The official statistics also tend to be at a low level of detail. Livestock owners may not be able to identify diseases or causes of death, and veterinary field and diagnostic services may be inadequate to assist them. Livestock owners may not bother to notify authorities of disease cases, for lack of incentive to do so or because they may fear economic loss say from affected stock being destroyed without full compensation. Livestock authorities or statistical agencies may under-report disease incidence for fear this will have adverse trade impacts. Hence, passive disease reporting (including data submitted to international agencies) is unlikely to be accurate enough for economic analysis. Active surveillance will provide much more accurate information, but due to high cost is likely to be applied for specific problem locations only. Livestock owner surveys and simulation modelling can also provide high quality information, at high cost. Departmental reports, newspapers and so on provide occasional and opportunistic data.

VALIDATION AND SENSITIVITY ANALYSIS

Validation of data on livestock disease reporting is an important and neglected activity. Various strategies can be adopted, e.g. a check may be made for consistency of values for a particular variable in different data sets. Thus, for example, discrepancies arise in reported numbers of FMD cases from various Thai statistics. Another approach is to seek subjective estimates from experts to compare with published values, taking into account variations in definitions. Where concern remains as to data reliability, an expedient solution is to carry out sensitivity analysis in which uncertain parameters are set at pessimistic and optimistic levels.

CONCLUDING COMMENTS

Greater acceptance is needed of the requirement to collect data for economic analysis as part of monitoring the progress of animal health programs. Data at varying resolutions are required for various economic analyses of disease C&E programs. Official statistics which provide country wide coverage and are available over time are limited to basic statistics. Techniques such as simulation and Delphi surveys of experts can be used for arriving at estimates when detailed producer surveys are not possible. A coordinated approach to data collection between economists and veterinarians is essential if useful data are to be obtained. Where under-reporting is apparent or suspected, economic analysis should be supported by sensitivity testing.

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