

RESEARCH PAPERS AND REPORTS IN ANIMAL HEALTH ECONOMICS

AN ACIAR THAI-AUSTRALIAN PROJECT

Working Paper No. 1

**Assessing Public Programmes for Control of
Animal Diseases in Developing Countries:
General Economic Issues with Thai Examples –
An extended ISVEE Paper**

by

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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.

ASSESSING PUBLIC PROGRAMMES FOR CONTROL OF ANIMAL DISEASES IN DEVELOPING COUNTRIES: GENERAL ECONOMIC ISSUES WITH THAI EXAMPLES

ABSTRACT

Funds for public programmes for control of animal diseases are limited and especially so in less developed countries. Therefore it is important from an economic point of view to get the 'best value for money' from such control expenditure. After briefly reviewing the economic rationale for government intervention in control of animal diseases, this paper provides a basic analysis of the economics of optimal private and public decisions about control of animal diseases. It explores the role for cost-benefit analysis in this decision-making, taking into account informational constraints and the resource demands of multiple diseases requiring control. The analysis is illustrated by examples and issues from Thailand and pays particular attention to foot-and-mouth disease. A research proposal to help assess public programmes for the control of animal disease in Thailand is briefly sketched. The need for a dynamic approach to disease-control policy is emphasised.

Keywords: Animal disease, foot and mouth disease, Thailand

JEL Codes: Q160

ASSESSING PUBLIC PROGRAMMES FOR CONTROL OF ANIMAL DISEASES IN DEVELOPING COUNTRIES: GENERAL ECONOMIC ISSUES WITH THAI EXAMPLES

Economic losses due to animal diseases in developing countries are serious because of the high degree of dependence of many villagers on livestock for their subsistence. The health of livestock in developing countries is of particular interest, especially to the international aid-donating community, because in less developed countries, livestock are an important source of:

1. of animal protein (in very short supply) for humans
2. draught power
3. fibres and
4. leather and other products of a utilitarian nature.

Also, a store of wealth and security for credit.

In addition,

5. livestock often enable human food to be produced from land which is unsuitable for cropping or at least production (supply) of edible crops suitable for humans, and hence livestock are often concentrated in the poorer regions, where food scarcity is least and need for welfare assistance greatest.
6. in many cases, grazing leads to more sustainable land-use than cropping, e.g. less soil erosion (e.g. Dwyer and Deuter, 1993).¹

While animal diseases give rise to considerable economic losses and risks in most countries, the relative economic loss seems to be most serious in developing countries. This raises the question of whether an economic improvement can be brought about in developing countries by their governments intervening in the control of such diseases, either on their own or with foreign aid. Assessing this question requires account being taken of the rationale for government intervention, the nature of public and private decision-making about the control

of animal diseases, and the role for cost-benefit analysis. A new research project being funded by the Australian Centre for International Agricultural Research (ACIAR) will help to address such issues concentrating on six animal diseases in Thailand. Let us consider some of the general economic issues and this project.

1. Economic Rationale for Government Intervention in Control of Animal Diseases

If government intervention is to be justified from a social economic cost-benefit point of view, it must yield a net economic benefit compared to the alternatives. Only if the net economic benefit from government intervention in the control of animal diseases is positive can this intervention be justified from an economic viewpoint. In estimating these benefits, all relevant costs must be deducted from gross benefits. Relevant costs not only include the direct costs of the control measures such as prophylaxis vaccination, drenching or other dosing costs but also the costs of the government agency or agencies in managing the intervention plus both explicit and implicit costs imposed on owners of livestock or others dealing with them. Implicit costs may involve the costs of mandatory mustering of livestock, restrictions on livestock movements, and time lost by carriers due to required certification and health checks on livestock in transit. The Thai government produces FMD vaccine and supplies it free at cost to farmers. However, the village headman has to collect the vaccine and there are some economic costs in administering it and these should be factored into its cost.

The importance of taking into account all costs, namely those incurred by the government agency, explicit costs incurred by livestock owners and others as well as the implicit costs involved in the control of an animal disease can be illustrated by means of Figure 1. In Figure 1 the line GH represents the marginal national benefit from the control of a disease and line AB represents the marginal costs incurred by a government agency in this control. Where marginal explicit costs incurred by livestock owners and others in control of livestock disease are added to this, marginal total cost of control is as indicated by curve CD. If marginal implicit costs are added as well, marginal total costs are as represented by the line EF. If only government agency costs are taken into account, the optimal level of control to maximise net national benefits is x_3 , but when the explicit costs imposed on others is taken into account this reduces to an optimal level of control of x_2 and is lowered even further to x_1 when account is

taken of implicit costs. If incomplete account is taken of the costs involved in control of an animal disease this is liable to lead to attempts at excessive control from the point of view of national economic benefits.

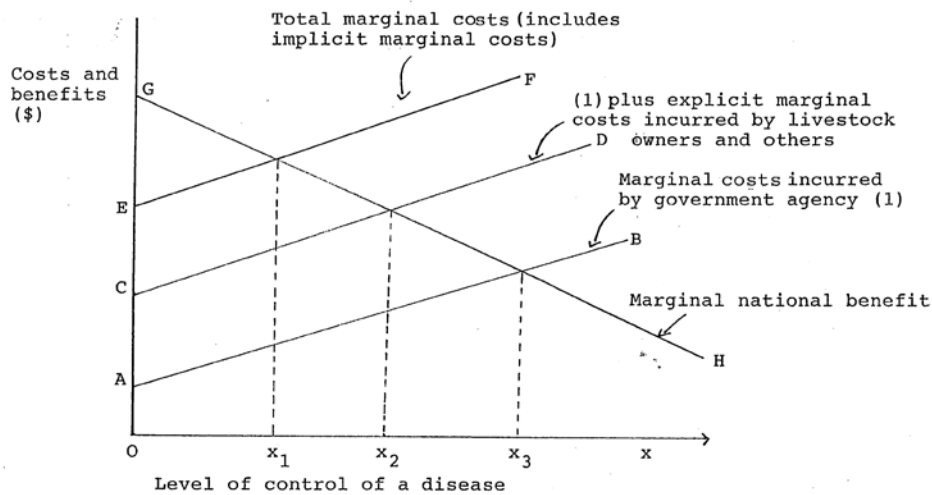


Figure 1: The importance of fully accounting for all costs associated with the control of an animal disease

In Western countries, economists usually regard government intervention in the economy as a last recourse to be considered only when there is some form of market failure, for example if markets fail to promote economic efficiency (that is to maximise production and economic benefits from the resources employed in the economy) or to ensure a desirable distribution of income. Both of these factors can provide grounds for government intervention in the control of animal diseases. This is actually true in market economies as well as in subsistence or semi-subsistence economies, the latter being relatively common in most developing countries.

Economic efficiency (in the sense mentioned above) may be impeded in a country by the presence of favourable or unfavourable externalities or spillovers. These are very important in relation to the control of many animal diseases. For example, the adoption of measures to prevent disease in livestock by one livestock-holder or a group (e.g. vaccination of their cattle against foot-and-mouth disease) reduces the risks of the spread and occurrence of disease in the livestock owned by others. Consequently, a favourable externality exists in relation to such preventative measures and the social benefits obtained by their adoption exceed the

benefits obtained privately. As a rule, individuals and small groups will not take into account spillover benefits in making their decisions about control of animal diseases and so preventative measures will be undersupplied from a social or national point of view. Furthermore, action to prevent spread of contagious diseases is likely to be undersupplied, e.g., owners may dispose of cattle in early stages of a disease so spreading the disease to the livestock of an unsuspecting purchaser, sometimes far' distant from the original outbreak of an animal disease. Such circumstances can also justify government intervention, e.g., controls on movement of livestock from high-risk areas for the presence of a disease to low-risk areas.

The significance of externalities or spillovers for optimal decision-making can be illustrated by Figure 2 assuming that livestock owners or villagers act to maximise their private gains in controlling diseases in their animals. This means that they ignore any incidental spillover benefits or externalities to other livestock owners or other villages. As can be seen from Figure 2, this results in less than socially optimal decision-making. In Figure 2, curve AB represents the marginal cost to the village (or depending on the case, individual villagers) of control of an animal disease within the village. Line CD represents the marginal benefit to the village of such control. Supposing that the village makes a collective decision, it will maximise its economic net benefit from disease control by undertaking a level of control equivalent to x_1 . But in doing this it ignores the benefit to other villages. Suppose that these spillover benefits are equivalent to the vertical distance between curves CD and EF so that the marginal social benefit is equal to that indicated by line EF. Maximisation of social benefit requires disease control on a larger scale than the village would undertake on its own accord. Because the village engages in a lower level of control, x_1 , then the socially optimal level, x_2 , there is an unrealised social economic benefit equivalent to the area of the hatched triangle in Figure 2 and this may call for government intervention in the control of the disease to increase the degree of control.

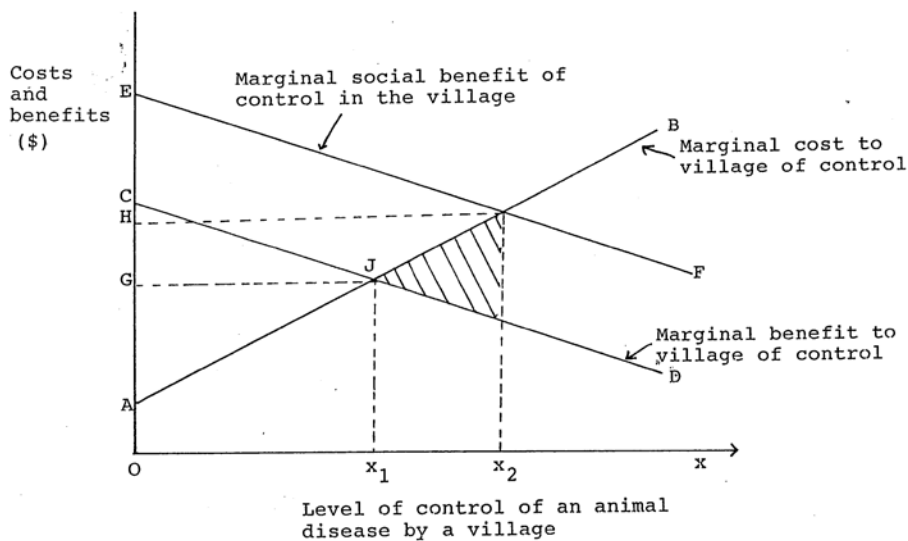


Figure 2: Illustration of a case in which decisions to control disease at the discretion of a village does not maximise social benefits because of the existence of spillovers.

Government intervention may also be justified on economic grounds when there is information failure. This can arise in relation to some forms of research and development (R & D), dissemination of information about preventative measures, diagnosis and treatment, as well as the ability to diagnose diseases when they are present. Up to a point, such factors can support government intervention in the control of animal diseases from an economic viewpoint, e.g. to support R & D, to provide extension services, and to supply veterinarians and specialist facilities to identify animal diseases and monitor their prevalence.

It should also be noted that income distribution grounds may provide a rationale for government measures to improve animal health. In many developing countries, it is often the poorest rural communities which show a relatively high degree of dependence on livestock for their livelihood, e.g., in the Northeast region of Thailand.

2. Optimality, Cost-benefit Analysis and Control of Animal Diseases

Any system for government intervention in animal disease control must take into account the motivation and behaviour of livestock-holders in husbanding their livestock because this will influence the effect of government intervention.² Motivations and behavior in village-based societies may differ from those in essentially market-based economies. Furthermore, account

must be taken of the nature of the organisation of the public bodies responsible for intervention and limits to the effectiveness of organisations. Limits to their perfectibility are likely to vary from society to society, and may vary with the stage of economic development achieved by a country and with its cultural background. Consequently, methods of government intervention that may be very successful in 'advanced' market economies may not be capable of successful application in developing countries or may only be applicable with a great deal of modification. So the type of optimising models often used for modelling economic behaviour may require considerable modification in the context of developing countries. Nevertheless, there may still be a role for cost-benefit analysis (CBA), that is both private cost-benefit analysis and social cost-benefit analysis.

In this context, private cost-benefit analysis is concerned with net economic benefits obtained by livestock holders of adopting alternative strategies to control different animal diseases. Often these are not well known and so information failure occurs. Even if stockholders wish to maximise their private net benefit, they may be ignorant about how to do it. The government may undertake research and disseminate information to assist in this respect.

Social cost-benefit analysis takes account not only of net private benefits but also externality benefits so as a rule social net benefits exceed private net benefits as far as disease control is concerned.

While farm- or village-based evidence can be used to estimate the net economic benefits of controlling and eliminating an animal disease, mere aggregation or summation of the results may underestimate the benefits as far as the nation is concerned because favourable externalities may not be fully accounted for.³ Furthermore, the elimination or containment of an animal disease may open up new export markets for a country thereby increasing the economic value of a country's livestock. Thailand, for example, by eliminating foot-and-mouth disease (FMD) or containing it in restricted zones, could increase its meat exports. The economic value of this is unlikely to be picked up by farm-level or village surveys. A further aspect that one must be aware of is that most CBA is historical in character - it depicts the situation as it is or was recently. However, the actual situation is dynamic. Not only does the economic benefit of controlling a disease vary with 'natural' changes in its prevalence, but also with changing socio-economic conditions and the structure of the livestock industry. Government policy therefore must be designed taking such trends into account. In Thailand for example, the size of the commercial livestock sector compared to the semi-subsistence

sector is increasing and off-farm employment is increasing, both of which have consequences for the net benefit of controlling different types of animal diseases.

3. A Thai-Australian Project (ACIAR Research Project No. 9204)

Some of the above issues are being studied in the economics component of the ACIAR-funded project, 'Animal Health in Thailand and Australia – Improved Methods in Diagnosis, Epidemiology, Economics and Information Management'. Dr F.C. Baldock of the Queensland Department of Primary Industries is the overall project leader, and in Thailand the project leader is Dr P. Chamnanpood of the Department of Livestock Development. Professor Clem Tisdell and Dr Steve Harrison of the University of Queensland will be mainly responsible for the economic component.

The project is centred on the following animal diseases in the livestock indicated:

Cattle/buffalo

Foot-and-mouth disease
Gastrointestinal parasitism

Pigs

Hog cholera
Aujeszky's disease

Poultry

Newcastle disease
Infectious bursal disease

Outputs from the economic project will include:

1. A review of the Thai livestock industry, trends in it and possible implications for disease control.
2. Collection of data from villages in northern Thailand to provide a basis for cost-benefit analysis of control measures for the diseases listed above.
3. Reviews of economic evaluation techniques for making decisions about control of animal

diseases.

4. The international trade implications of livestock disease control in Thailand.

It is planned initially to include economic research results in this working paper series entitled *Research Papers and Reports in Animal Health Economics* to be produced by the Department of Economics, The University of Queensland.

4. Notes:

1. Dwyer, G. and Deuter, P. (1993) 'Towards an Evolution of Sustainability of Steplands in Steplands in Coastal Queensland – The Lethbridge Workshop Approach', DPI, Gympie, Qld. (mimeo).
2. As pointed out in note 4, the presence of externalities may call for government intervention in the control of animal diseases. Types of government intervention may take many forms, not all of which can be discussed here. However, one possible way would be to subsidise the cost of control by villagers. In the case illustrated in Figure 2, assuming that villagers wish to maximise their economic benefits a subsidy of equivalent to GH dollars on each unit of control would bring about the optimal degree of control in the village. However, this all supposes that villagers want to maximise their economic benefits and are well informed about how to do it. If not, such a policy may not work. For example, if villagers believe they have a satisfactory income from livestock already, they may not be interested in instituting greater control to increase their income further.
3. The results of aggregation or scale-up from a sample of villagers or livestock owners to obtain estimates of the national benefits of disease control, will of course vary with the method used to estimate benefits at the village or unit-level. Some methods may only result in private benefits being estimated rather than social benefits (that is estimates based on a marginal 'private' benefit curve such as CD in Figure 2) and do not capture spillover benefits. Various willingness-to-pay approaches to estimation of benefits can lead to such an underestimate. If, however, village data are such as to take account of overall costs and benefits at the level of units (e.g., villages) in the livestock sector, aggregation may still over or under estimate national net economic benefits of disease control for reasons discussed in C.A. Tisdell, 'Animal Health and the Control of Diseases:

Economic Issues with Particular Reference to a Developing Country', Department of Economics, University of Queensland, 1994, mimeo, a paper presented to the Australian Agricultural Economics Society (Victorian Branch), 25 July, 1994. This is to be No.2 in the series *Research Papers and Reports in Animal Health Economics*, and provides explanations of the above issues.

ANIMAL HEALTH ECONOMICS

WORKING PAPERS IN THIS SERIES

1. Assessing Public Programmes for Control of Animal Diseases in Developing Countries: General Economic Issues with Thai Examples – An extended ISVEE Paper by C. A. Tisdell, S. Harrison and F. C. Baldock, August 2004.
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