Pro-Poor
Livestock
Policy
Initiative

# A Public Choice Approach to the Economic Analysis of Animal Healthcare Systems

Ana Riviere-Cinnamond


PPLPI Working Paper No. 11

# TABLE OF CONTENTS


Preface ..... ii
Acronyms ..... iv
Executive summary ..... v
Background ..... v
Objectives ..... v
Conclusions and recommendations ..... v
1. Introduction ..... 1
1.1 Background of the study ..... 1
1.2 Objectives ..... 1
1.3 Methodology and materials ..... 2
1.4 Organisation of the paper ..... 2
2. Economics of Animal Health Systems ..... 3
2.1 Rationale for the comparative analysis of human and animal healthcare sectors ..... 3
2.2 Defining animal health systems ..... 3
2.3 The structure of animal health services ..... 4
2.4 A public choice approach to the analysis of animal health services ..... 5
2.5 Market failure in the animal healthcare field ..... 7
3. Defining public goods ..... 14
3.1 The taxonomy of public and private goods ..... 14
4. Publicly-provided private goods ..... 24
4.1 The case of remote rural/pastoral areas ..... 24
5. Conclusions and recommendations ..... 28
References ..... 29

# PREFACE

This is the eleventh of a series of Working Papers prepared for the Pro-Poor Livestock Policy Initiative (PPLPI). The purpose of these papers is to explore issues related to livestock development in the context of poverty alleviation.

Privatisation of animal healthcare systems in developing countries, particularly in sub-Saharan Africa, has had very limited success. Introduced with inadequate transition time and too few resources, many livestock owners either cannot afford or, just as likely, are unable to gain access to the services they need. Poor livestock owners in remote rural areas suffer the greatest disadvantage. This fact is undisputed but, since privatisation, the primary focus has been on analysing the performance of animal healthcare systems and few authors have studied the underlying economic theories that have driven privatisation policy nor examined in what ways these may have been detrimental.

This working paper examines how the economic analysis of animal health services has evolved since the '90s. A comparison is made with economic theories underlying the provision of human healthcare services where the debate started much earlier (in the '60s). Special emphasis is put on how these perspectives have influenced privatisation policy and, in particular, based in general economic literature, how the way in which 'public goods' is defined affects their financing and provision. Following this perspective, the role that governments should expect to play in the animal healthcare sector post privatisation is also debated.

A relatively new approach to the economic analysis of animal health services is therefore presented, one that has been propounded recently by a number of economists working in this field. This economic theory, based on the perspective of 'public choice' argues that the process of decision-making may be highly significant in influencing efficiency and effectiveness. Traditional 'outcome' analysis omits factors such as self-interested behaviour and political interference. These may have contributed to higher than expected 'transaction' costs and, therefore, to the failure in many instances of the privatisation process. Given that much greater attention than in the past should be paid to issues of governance, governments in future may expect to act not only as external agents with regulatory power but as part of the nation's animal healthcare system with responsibility for defining overall goals and harmonising and facilitating the market economy.

We hope this paper will provide useful information to its readers and any feedback is welcome by the author, PPLPI and the Livestock Information, Sector Analysis and Policy Branch of the Food and Agriculture Organization (FAO).

## About the Author

Ana Riviere-Cinnamond is a PhD candidate at the London School of Hygiene and Tropical Medicine. She holds an MSc in health economics from the London School of Economics. Her research interests focus on the interface between health and agriculture. Her main areas of work relate to animal health and public health policy, as well as financing mechanisms and service delivery for the livestock sector. Email: Ana.Riviere-Cinnamond@lshtm.ac.uk

## Disclaimer



## Keywords

Animal health services, privatisation process, market failure, taxonomy of goods, poor livestock keepers, developing countries, community animal health workers.

**Date of publication:** 17 March 2004

For more information visit the PPLPI website at: http://www.fao.org/ag/pplpi.html
or contact: Joachim Otte - Project Coordinator Pro-Poor Livestock Policy Facility
Email: Joachim.Otte@fao.org or Livestock-Policy@fao.org Tel: +39 06 57053634 Fax: +39 06 57055749
Food and Agriculture Organization - Animal Production and Health Division Viale delle Terme di Caracalla 00100 Rome, Italy

## ACRONYMS

| | |
|---|---|
| **AH** | Animal Health/Healthcare |
| **AHA** | Animal Health Assistant |
| **AHS** | Animal Healthcare Services/System |
| **BSE** | Bovine Spongiform Encephalopathy |
| **CAH** | Community-based Animal Health |
| **CAHW** | Community-based Animal Health Worker |
| **CBPP** | Contagious Bovine Pleuro-Pneumonia |
| **DoH** | Department of Health |
| **FFS** | Fee-for-Service |
| **HH** | Human Health |
| **HHS** | Human Healthcare Services/System |
| **KVB** | Kenyan Veterinary Board |
| **MoA** | Ministry of Agriculture |
| **MoE** | Ministry of Education |
| **MoH** | Ministry of Health |
| **NGO** | Non-Governmental Organisation |
| **OIE** | Office Internationale des Epizooties |
| **PHC** | Primary Health Care |
| **PAHC** | Primary Animal Health Care |
| **RVF** | Rift Valley Fever |
| **SPS** | Sanitary and Phyto-Sanitary Standards |
| **UC** | User Charges |
| **WHO** | World Health Organisation |
| **WTO** | World Trade Organisation |

# EXECUTIVE SUMMARY

## Background

The first economic analysis of the provision of animal healthcare services (and of livestock services in a broader sense) was undertaken by the World Bank in 1991-1992 (1, 2). Its aim was to provide guidance to governments in developing countries, especially in sub-Saharan Africa, on the privatisation of services based on economic principles. In most developing countries however, privatisation has not delivered the desired results. Since privatisation, the primary focus of research into livestock services has been directed towards analysing their performance while only few authors have revisited the underlying economic theories that had driven the policy of privatisation in the first place (3-8).

The perspective taken in the present study differs from most previous ones. Firstly, it takes a retrospective look at the evolution of economic theory of animal health service privatisation, providing alternatives for examining the sector following various pure economic theorists and their underlying philosophical perspectives. Secondly, the study builds on a comparative analysis using economic theories developed in the human healthcare sector, which were developed in the 1960s and 1970s, that is much earlier than in the animal health sector, in order to identify reasons for the failure of the process of privatisation of animal healthcare in many developing countries. This study also highlights explores ways of improving the current sub-optimal performance of animal healthcare services.

## Objectives

The specific objectives of the study were fourfold:

1. To highlight the evolution of the perspectives taken in the past in relation to the economic analysis of animal health services (AHS) and their implications.
2. To explore the value of adopting a new approach to the empirical economic analysis of animal healthcare systems.
3. To examine what the role of government should be in the animal healthcare sector.
4. To provide guidance on how to smooth the transition process of privatisation of animal health systems (AHS) in developing countries.

## Conclusions and recommendations

### To objective (1) & (2):

- The application of economic theory to guide the process of privatisation of animal health systems varies in relation to several factors: The privatisation process cannot to be applied in a homogeneous way. Influencing factors such as the physical, political and institutional contexts need to be taken into account. There is no standard model applicable to the privatisation process.

### To objective (3):

- The role of government should be viewed at a broader level as coordinator of activities in the animal healthcare sector (increasing cross-sector collaboration),

the aim being not only to reduce transaction costs, but also, and especially, to guide current initiatives towards a common goal for AHS.

## To objective (4):

- In countries that have not undergone privatisation, cost-containment measures could be applied in order to smooth the transition process to a privatised AH market (where applicable).
- In countries where privatisation has been undertaken, efforts should focus on governance of the AHS, such as the creation of an integrated national animal health system in which activities of the different actors involved are coordinated.
- There is a need of further research in relation to the overall organisation of animal health systems and their financing in order to enhance efficiency and effectiveness.

# 1. INTRODUCTION

## 1.1 Background of the study

The first economic analysis of the provision of animal healthcare services (and of livestock services in a broader sense) was undertaken by the World Bank in 1991-1992 (1, 2). Its aim was to provide guidance to governments in developing countries, especially in sub-Saharan Africa, on the privatisation of services based on economic principles. In most developing countries however, privatisation has not delivered the desired results. Since privatisation, the primary focus of research into livestock services has been directed towards analysing their performance while only few authors have revisited the underlying economic theories that had driven the policy of privatisation in the first place (3-8).

The perspective taken in the present study differs from most previous ones. Firstly, it takes a retrospective look at the evolution of economic theory of animal health service privatisation, providing alternatives for examining the sector following various pure economic theorists (other than Samuelson) and their underlying (different) philosophical perspectives [such as Williamson, Buchanan, Peston, Coase, Cullis, Stiglitz, etc]. Secondly, the study builds on a comparative analysis using economic theories developed in the human healthcare sector, which were developed in the 1960s and 1970s, that is much earlier than in the animal health sector, in order to identify reasons for the failure of the process of privatisation of animal healthcare in many developing countries.

The study focuses on the rationale for comparing human and animal healthcare sectors, reviews the different perspectives taken by economic theorists in empirical economic studies and examines the implications of differing perspectives for the analysis of the animal healthcare sector. It aims to provide guidance on the possible role of government in countries where the privatisation of animal healthcare services has been undertaken and attempts to identify the actors and factors that determine how these services function and, in turn, how these actors and factors can be influenced. Further, the study endeavours to draw lessons from past experiences that could be of use for those countries that still have to undergo privatisation of animal health services.

## 1.2 Objectives

The specific objectives of the study were fourfold:

1. To highlight the evolution of the perspectives taken in the past in relation to the economic analysis of animal health services (AHS) and their implications.
2. To explore the value of adopting a new approach to the empirical economic analysis of animal healthcare systems.
3. To examine what the role of government should be in the animal healthcare sector.
4. To provide guidance on how to smooth the transition process of privatisation of animal health systems (AHS) in developing countries.

## 1.3 Methodology and materials

The reference materials used for the study were extracted from the extensive literature review undertaken during the author's doctoral thesis research on the linkages between animal health care systems and public health (i.e. split responsibilities between ministries of agriculture and health). Only selected references from the larger pool of literature are quoted in this study.

The literature selected for the present study pertains to two major topics: the economics of animal health services and economic theory.

The literature review for the first topic was performed in the following databases:

| Database | Years | Key words used for the search |
|---|---|---|
| Ingenta (including Medline) | 1997-2002 | ▪ Economics animal health<br>▪ Animal health services<br>▪ Veterinary services<br>▪ Livestock health<br>▪ Community animal health worker<br>▪ Community health worker<br>▪ Finance veterinary services<br>(Available tools in each database were used to expand, limit or combine the above key words) |
| BIDS | 1997-2002 | |
| Web of Science | All years | |
| SIGLE | All years | |
| Agris | 1975-2003 | |
| Agrícola | 1984-2003 | |
| CAB Abstracts | 1984-2003 | |
| PubMed/Medline | 1976-2003 | |
| International Bibliography of Social Sciences | 1981-2003 | |

Databases were limited to articles in English, French and Spanish languages.

Literature for the second topic was based on the review of key authors in economic theory.

## 1.4 Organisation of the paper

The paper is divided into four chapters. Chapter two introduces the underlying rationale for the comparison of animal and human healthcare sectors, followed by a definition and description of AHS and related activities. This chapter also presents the philosophical perspective taken in the study and argues the reasons for market failure in the AH sector. Chapter three provides an overview of the taxonomy of goods (and services) following different viewpoints in economic theory and their implications. Chapter four focuses on publicly provided private goods and the role of government, with special attention on remote rural areas in pre- and post-privatisation settings. Finally, chapter five presents the conclusions and proposes some policy recommendations.

# 2. ECONOMICS OF ANIMAL HEALTH SYSTEMS

## 2.1 Rationale for the comparative analysis of human and animal healthcare sectors

Umali-Deininger and de Haan (2) were pioneers in analysing the livestock service (and thus animal healthcare) sector from an economic perspective as was D.K. Leonard by comparing animal and human health systems. The underlying rationale of Leonard's comparison was based on the similarities existing between the two systems at **scientific** and **structural/organisational** levels. Hence, Leonard's starting point for the comparison lies in that *"the biological science that undergirds human and veterinary medicine is the same; in fact a great deal of medical research on which the treatment of humans depends is actually veterinary research, for it is conducted on an array of animals. Although the various species of mammals do have important differences in their responses to disease and treatment, there are significant physiological parallels and many diseases – and cures - pass back and forth across the human / animal divide"* (4). Not only did he match the scientific side of the two professions but he also highlighted that *"physicians and veterinarians receive similar training, work in professions that are structured much like one another, and oversee analogous hierarchies of paraprofessionals and auxiliaries"*, and enjoy an information advantage over their clients (4).

However, important differences exist between the two professions. First, the two professions have different histories and thus different conventions and goals. Second, specialisation is not as extensive in veterinary medicine as in human medicine. Third, hospitals play different roles in the two professions in relation to treatment. Fourth, distance is a heavier constraint for receiving or obtaining professional care in the animal health field than in the human health one (4, 5). And fifth, different values are attached to human and animal life.

While accepting that there are differences, nevertheless their similarities give sufficient common ground to enable empirical comparisons between the systems. However, before beginning a market analysis of animal healthcare systems it is necessary to define their components and structure.

## 2.2 Defining animal health systems

Defining the boundaries of AHS has been attempted by several authors (1, 2, 9). Some services, for example clinical services, are always included in such definitions. However, other aspects affecting animal and human health, e.g. extension, public health[1], are not always systematically taken into account.

One of the main purposes of AHS evidently is to improve animal health in order to increase animal production and hence human nutrition and welfare. There is, however, another aspect of AHS that is usually overlooked: its contribution to the protection of human health. This follows the lines of thought of Murray and Frenk (10), who define human healthcare systems after the concept of 'health action[2]. Their

[1] Public health would not only include the classical zoonotic disease control and prevention and meat inspection, but also some aspects generally neglected to date such as hygiene, food processing and conservation, as well as animal waste management. Other aspects related to public health are those linked to research and development such as the use of animals as models for the development of new technologies'.

[2] "A health action is defined by any activities whose primary intent is to improve or maintain [human] health" (10). Given that AHS are also intended to, first, prevent the occurrence of disease (from food or animal origin) in humans (hence helping

definition puts forward the conflict arising when dealing with some parts of the animal healthcare sector. Due to the dual nature of public health aspects of AHS, frameworks for analysing the subject with a systematic and methodical approach (of either economic aspects or funding mechanisms) have not yet been sufficiently developed.

The next sections introduce the different components of the 'broader' definition of AHS that will be followed by a taxonomy of AH services along the perspectives of different economic schools.

## 2.3 The structure of animal health services

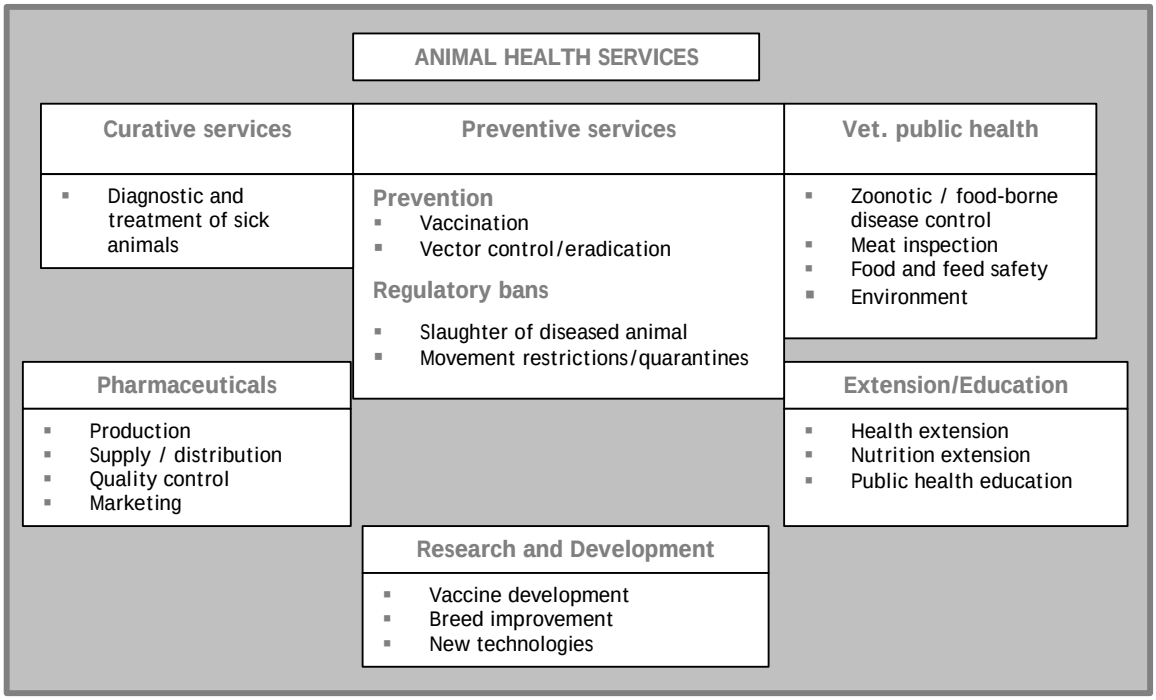
Umali *et al*. (2) divided animal health services (AHS) into three main categories: (i) curative services, (ii) preventive services and regulatory bans and (iii) pharmaceutical supply. In this study, this definition is enlarged to include three other components: (iv) public health, (v) education/extension and (vi) research and development. Of course all these elements are closely intertwined.

First, curative services relate mainly to the treatment of diseased animals through diagnosis and the use of drugs. Second, preventive services are meant to stop occurrence of new cases of disease in animals. This is achieved through the use of vaccines, the eradication or control of vectors and/or carriers, and through the application of measures such as segregation. Examples of preventive services include: dipping, quarantine, slaughter of at risk animals, movement restrictions, import and export control of livestock products, inspection and control of animal products, etc. Third, the supply of pharmaceuticals for livestock (for both curative and preventive measures) includes the production of veterinary pharmaceuticals, and the quality control, marketing and distribution of the products. The fourth category, public health, relates to the control of zoonotic and food-borne diseases, hygiene, food and feed safety and environmental aspects[3]. The fifth component encompasses extension in animal health and nutrition and public health education. Finally, the sixth component relates to research and development. Although Umali *et al.* included this category in preventive services it is important to treat it separately as it concerns not only research in livestock vaccines and disease-resistant or tolerant breeds but also to the elaboration and assessment of new technologies and delivery mechanisms.

to "maintain [human] health"), and second, to increase production and as a consequence human nutrition and welfare (thus to "improve [human] health"), it can be argued that AHS are eligible as part of the activities included in the concept of 'health action'.

[3] Environmental aspects relate to, for example, water contamination due to mismanagement of animal waste, vector control (e.g. zoonotic vector-borne diseases control such as Sleeping Sickness, Rift Valley Fever, Chagas disease, etc.)

***Figure 1:*** *Components of Animal Health Services (adapted from Ahuja et al., 2000) (7).*




However, rather than by technical concepts, animal health services can also be classified and defined following economic concepts. Some of these economic concepts, which are important for the analysis of animal healthcare systems, are introduced in this chapter.

## 2.4 A public choice approach to the analysis of animal health services

In 1975, Buchanan (12) drew attention to methodological issues regarding the analysis of public expenditure and the nature and structure of collective decisions of what was the traditional public finance approach. Following theories on government behaviour, the government's role can be analysed (i) through the public interest approach or (ii) through the public choice school (11).

The *public interest* approach looks at markets and governments in an idealised way, based on the underlying assumption that public interventions are able to *eliminate inefficiencies* caused by market failure. Using this approach, to date, economic analysis in the animal healthcare market has mostly focused on *outcome* efficiency. This refers to the Pareto optimum or top-level efficient economy[4]. This is the perspective that was taken by most authors in the AH field at the beginning of the privatisation process in developing countries (see authors like Umali-Deininger, de Haan, and Bekure). Briefly, what this perspective emphasizes are the requirements for allocation of resources to reflect individual preferences and ensure that each good or service is priced at its marginal cost, relative to the other services these resources might have produced. This traditional 'outcome' approach, exemplified in the

[4] Pareto efficiency: resource allocations that have the property that no one can be made better off without someone being made worse off (13).

economic literature by Musgrave (1959) (14) and Musgrave and Musgrave (1989) (15), is normative in orientation in that it tries to demonstrate how 'economically correct' decisions can be determined for the public sector.

The public interest perspective was taken by the above-mentioned authors with the aim of advising governments in developing countries, especially in sub-Saharan Africa in view of the fiscal collapse of most of the states, also known as the 'Great African Depression' during the 1980s and 1990s (4), on which components should be privatised in the animal healthcare sector. This approach was new in the early 1990s and economic theory backed up the reasoning, but it should be noted that, to date, the privatisation process of AHS has in most countries not resulted in the expected positive outcomes. Hence, there is a need to consider other economic theories that could be applied to the analysis of AHS, to assess the main differences between the previous and other economic theories, and to identify possible reasons for the failure of the privatisation process while giving feasible alternatives to redress the current situation.

The perspective taken in this paper for the analysis of AHS is that of public choice theorists, who consider that public interventions and interests can add inefficiencies to existing regulation. They believe that governments are not free in their choices but depend on powerful interest groups. Hence, given the context and political interests behind national agricultural agendas in most developing (as well as developed) countries, policy-makers' choices and behaviours cannot be separated from the interests affected by the decisions taken. Similarly, an economic perspective first used by Wiseman in 1980 (16) is referred to as *process* efficiency, which recognises the weakness of the principle of marginal equivalence in detracting attention from the equally important efficiency in allocative techniques[5]. Thus, the perspective has changed from viewing the government as 'outside' of the analysis and largely 'unproblematic' (interested in outcome efficiency) to a point of view that includes non-market determined decision-making. Wiseman emphasises that attention should be drawn towards the procedures of decision-making and not exclusively to the outcomes. The underlying challenge is to determine whether an alternative decision-making process could have produced a 'closer to optimal' outcome. In relation to the AH field, this is the most recent perspective taken and mostly relates to authors like Leonard, Koma and Ahuja. This perspective is new in the AHS in that previous authors did not consider decision-making processes to hinder reaching optimal outcomes.

Along the lines of public choice theory, Stigler (1971) (17) first discussed the idea that regulation is the result of special interests that provide financial and political support in return for favoured legislation. Hence, there is a demand for political favours arising from special interest groups. An example of this situation is given by the current reluctance of some members of the Kenyan Veterinary Board in legalising the status of community-based animal health workers (CAHWs). Laffont and Tirole (18) have tried to extend the public choice perspective to reflect the regulatory environment and capture the nature of the constraints that prevent the regulator from implementing the preferred policy. Three key constraints were highlighted: information gaps[6], transaction costs[7] and administrative and political constraints[8]. Relating to the agricultural and public health context is the example highlighted by Propper in 1995 (19) where she raised the issue of *regulatory capture*. This refers to a

[5] Refers to how access to animal healthcare services will be rationed or priorities set to attribute resources efficiently.

[6] Referring to whether the regulator has sufficient information or if it has to be obtained, and how costly this process may be.

[7] In the presence of a regulatory contract the cost of writing this contract as well as the surrounding contingencies should be taken into account.

[8] Administrative procedures.

regulating agency which has close association with the regulated and thus may be more sympathetic towards the latter than to other stakeholders. The regulatee 'captures' or takes control of the regulator and sets the regulatory process to work on their behalf. An important policy example of this situation was provided by the handling of the BSE crisis in the UK. The UK's Ministry of Agriculture, Fisheries and Food (MAFF)[9] was 'captured' by powerful industrial interest groups and therefore failed in its way of dealing with the crisis (19).

In summary, the *outcome* or 'traditional approach' refers to normative or welfare economics[10], which shows how 'economically correct' decisions can be arrived at in the public sector, while the *process-oriented* or public choice school, although implying normative analysis, takes a more positive economics[11] perspective as it takes into consideration the self-interested behaviour of the different actors in the public sector context. What these two schools have in common is the fact that they are based in the so-called 'methodological individualism'[12].

Given the highly politicised environment surrounding the agricultural sector, a move from a traditional economic analysis of the animal healthcare market towards a public choice school analysis is recommended. The reasons for market failure in the animal healthcare sector should also be analysed using the same 'public choice' perspective.

## 2.5 Market failure in the animal healthcare field

Following Stiglitz (13), there are six conditions under which markets are not Pareto-efficient. These conditions are referred to as market failures and they provide a rationale for government activity. These are (i) failure of competition, (ii) existence of public goods, (iii) presence of externalities, (iv) presence of incomplete markets, (v) information asymmetries or failures and (vi) macroeconomic distortions. This paper will focus on the conditions existing in the animal healthcare market and the presence of failures and rationale for government intervention will be discussed.

For markets to result in Pareto efficiency there must be ***perfect competition***. This means there must be a sufficiently large number of 'firms or producers' each believing it has no effect on prices. Taking into account that the 'producer' in the AH sector refers to animal health related workers[13] it is possible to highlight at least two settings, which are likely to differ in terms of competition. The first one is the urban setting where, as in the human health field, theoretically there is more availability of private primary healthcare facilities and the consumer is able to choose between what the market offers and prices will be 'adjusted' by the competition[14] between service providers. The second setting refers to remote rural areas. In these areas, there are not enough private suppliers of health services (either for animal heath or human health) for market competition to lead to Pareto-efficiency.

For the prices of animal health services to be determined by competitive pressure in either of the two settings there is a need for sufficient availability of veterinarians and animal health assistants. Because veterinarians and animal health related

[9] Now called DEFRA (Department of Environment, Food and Rural Affairs).

[10] Normative economics attempts to evaluate or judge alternative policies, weighing up the various benefits and costs.

[11] Positive economics uses and constructs models that describe and predict either how the economy will change or the effects of different policies.

[12] Individuals are the units of analysis and best judges of their welfare, individual valuations of arrangements are what matter.

[13] Veterinarians, animal health assistants (AHAs), community animal health workers (CAHWs), etc.

[14] Of course at this stage information asymmetries arise so that this competition is not perfect. But this is another market failure which is analysed later in this section.

professionals usually require licenses in order to practice, licensing practices are likely to have an effect on competition. Veterinarians may therefore have a degree of power over the market if they are able to control the granting of licences to prospective colleagues. They may be in a position to restrict the competitive forces that should help to minimise animal healthcare costs. If entry to the profession is restricted (*barriers to entry*) the amount of healthcare provided will be less than what would be expected by market forces as there will be fewer veterinarians. As there is a limited supply, prices of veterinary services will be higher than what they would have otherwise been. Yet, it has often been argued that licensing is required to maintain standards[15]. This however leads to the recurrent problem in most remote rural settings of unlicensed providers of services and advice. Even if standards are set to deliver quality animal healthcare services, the lack of staff in remote rural areas[16], combined with the existing demand from livestock keepers for AHS, has led to the emergence of black markets and illegal drug sellers.

Nevertheless, delivering veterinary services exclusively through a private market would also incur failures as there are ***public goods***, that either will not be supplied by the market or, if supplied, would be supplied in insufficient amounts. Although the existence of ***'pure' public goods*** has been widely debated in the economic literature and will be further elaborated on in relation to the AH field in Chapter 3, it is possible to acknowledge the presence of goods of low-rivalry and low-excludability in the AHS. Also, following Stiglitz (13), public goods can be seen as an extreme form of ***externality***. Or, stated in another way, externalities might be seen as a form of impure public goods[17]. Several examples can be found in the AH sector which highlight the presence of externalities arising from farmers' or producers' actions and some are given in Chapter 3. Therefore another market failure applies to the animal healthcare market, as economic theory predicts that resource allocation driven by pure market forces under the presence of externalities will not lead to optimal efficiency.

Public goods and services are not the only goods and services that private markets do not provide adequately. Whenever private markets fail to provide a good or service, even though the cost of providing it is less than individuals are willing to pay, there is a market failure referred to as ***incomplete markets***. In a perfect market, consumers know exactly what they want, when they want it and where they can get it. In the healthcare setting this would be possible only if the 'consumer' could foresee and plan for what is going to happen in the future. There are situations in animal healthcare that can be planned in advance as, for example, the avoidance of production losses due to worm infections through regular deworming. However, there are many items of animal healthcare consumption that cannot be planned in this way as animal disease may strike suddenly and/or unexpectedly. In addition, the health care required to overcome such problems might be expensive or even unaffordable (either as one-off payment or, if the condition persists over a period of time, through accumulation of costs). These situations are at the origin of health insurance markets, both whether state owned or privately run, that help counteract the financial burden of uncertain effects of animal ill-health.

Two types of incomplete markets can arise: insurance markets and complementary markets. The question why ***insurance markets*** are imperfect has been extensively researched in the past two decades (13) and three answers have been put forward:

[15] The imbalance of information between consumer and provider arises also at that level.

[16] Depending on the country, the fact that there is no staff in those areas is not because of lack of licensed veterinarians but to the fact that they are not willing to work in remote rural areas due to the lack of infrastructure and amenities and often presence of insecurity. This is the case for example of Kenya.

[17] For a clear distinction between public goods and externalities, please refer to Evans 1970 (20).

deterrents to innovation; transaction costs; and asymmetries of information and enforcement costs.

*Innovation* refers not only to the creation of new technologies, diagnostic methods and drugs, but also to the design of new (animal health or livestock) insurance policies. The fact that there is no patent protection for such policy innovations creates a disincentive to innovation and as a result there will be under-investment in the development of insurance mechanisms (13). As mentioned by Williamson (21), following Arrow's earlier debates in relation to property rights and information, "if investment in innovation cannot lawfully be protected or if nominal protection (e.g. patent) is ineffective, then (i) the *ex-ante* incentives to make such investments are impaired and (ii) the incentives to embed such investments in protective *ex-post* governance structures are increased" (21).

The non-introduction of many of 'insurance products' is related to *transaction costs.* Williamson pioneered the analysis of markets using the 'transaction cost' approach[18]. The underlying principle introduced by Williamson into economics is the organisation of transaction costs to minimise effects of individuals' bounded rationality[19] whilst safeguarding them from opportunism. Along these same lines, Dugger (22) highlights the role of the State as a transaction cost minimiser. However, he regards the State differently than the traditional public finance school and sees the state as an agent that "defines property rights, resolves disputes and monitors performance" (11). When engaging in the AH market, an insurance firm[20] might be reluctant to invest in the design of a (new) insurance policy if it is unsure whether anyone will buy the policy.

Large organisations have the possibility of reducing the costs per unit produced as they can distribute the fixed costs across their products[21] leading to economies of scale. In markets where there are several competing insurance companies, economies of scale are unlikely to arise as each company has its own administrative and marketing costs[22]. A larger administration could spread the administrative costs over more consumers and thus costs per consumer would be reduced. However the problem of an insurer monopoly which could be exploitative may arise. A public monopoly would be an alternative as low costs could be maintained without the risk of exploitation. This 'friction cost' or transaction cost could also reduced if premium collection were 'piggy-backed' on to the tax collection system.

Neoclassical economic theories consider transaction costs to be zero or very small and this is why market mechanisms are often thought to be better than any form of government intervention[23]. However, as mentioned above, Williamson shows that transaction costs are likely to arise in the real market economy. As an example in the human health care field, a study by Evans (1984) (23) demonstrated that the

[18] Briefly, analysing market from a transaction cost perspective pinpoints the difficulties in which markets run in the presence of the following three conditions (i) asset specificity with respect to user/s, (ii) bounded rationality of individuals (i.e. individuals exhibit limited computational and information processing capacities), and (iii) opportunistic self-seeking behaviour. In situations where all three apply, contracts cannot successfully deal with the situation (11).

[19] Individuals' bounded rationality refers to the limited computational and information processing capacities of individuals (11).

[20] For example a cooperative delivering AHS to several farmers, livestock insurance, etc.

[21] An example might be marketing as no matter how many people are insured, marketing costs remain the same. Thus the more people insured the less expensive are marketing costs per consumer. This also applies for administrative tasks as processing bills and collecting premiums.

[22] The administrative and marketing costs per individual might be higher than when these costs are shared within a bigger population size.

[23] To decide whether a good or service should be provided publicly, there is a need to compare the savings in transaction costs plus the gain from increasing consumption, with the loss from excessive consumption of the good plus the loss from distortions created by the taxes required to finance the provision of the good or service (13).

expenditure on administration as a percentage of total human health care expenditure in the USA was 5.2 percent compared to 1.5 percent in Canada. Thus, the more privately-oriented human health care system in the USA appears to be administratively more costly than the more publicly-oriented Canadian system. When looking at animal health services, some similarities with Evans' comparison arise. Transaction costs in animal health services can comprise transport costs for accessing services, to social distance (as mentioned by Woods (24), which refers to gender, wealth and educational differences between the animal health service provider and the herder, as well as with the systems of drug sales/distribution. High transaction costs can be expected in remote rural remote areas not only because access is generally limited due to lack of infrastructure and/or means of transport but also because of the likelihood of wide social distance. Unfortunately, in the animal health literature there is little data on the economic burden incurred as a result of different types of transaction costs.

A large number of animal health service initiatives can be found in African countries post-privatisation, either private (i.e. business oriented) or not-for-profit. According to Williamson (21), given the absence of a clearly defined governance mechanism, the presence of overlapping activities leads to an increase in 'friction costs'. The fact that logistics of service delivery are not coordinated between many of these initiatives increases transaction costs. There is also a problem of lack of willingness to harmonise work, not only among for-profit organisations, but especially, and (perhaps) strikingly, among not-for-profit initiatives. Some of the ongoing projects are competing for the same market; hence they have no incentive to coordinate their logistics, nor their ultimate goals. In Asian countries, the setting is different as most services continue to be delivered, at least in theory, by the public sector. However, government veterinarians have recently been allowed private practice after fulfilling their public duties. This creates an incentive for them to deal with clients during their private practice time and not during public work hours. Hence, inefficiencies (thus costs) arise as practitioners 'draw' work they would be paid for under public funds into 'private' domain.

The third set of reasons for imperfections in insurance markets relates to *asymmetries of information and enforcement costs*. An insurance company or cooperative that provides animal health services is normally less aware of the animal health risks than the farmer enrolling. Hence, adverse selection is likely to arise. Adverse selection is a consequence for insurance markets arising from information asymmetry. Herders tend to have better knowledge about the risk status of their animals than insurers. Insurance companies may have no idea of the risk status of particular animals or herds and a premium reflecting the general animal health risk would be collected[24]. The premium paid by all those who take out insurance would be the same. This is called 'community-rating' and reflects the 'average risk' level of the insured livestock population. For those livestock keepers who perceive that their animals are at low disease risk, this premium might seem too high. Therefore they will choose not to insure their livestock. The consequence will be that the average risk of the insured livestock population will rise due to low risk herders not insuring. As the average risk will now be higher, the premium will need to rise and other farmers will opt out of the insurance scheme. This process, whereby the lowest risks drop out of the insured group is called adverse selection. In a competitive market the response of insurance companies will be to tailor their insurance premiums to the risks of various groups of herders (for example in relation to the number, age, and breed of animals as well as bio-security measures adopted), rather than leaving a low risk group of non-insured farmers. This method of premium setting is called 'experience rating'. As a result of

[24] Risk can be calculated in relation to different variables. These can be: the number of animals, type of breeds, disease status in the zone where the farmer is settled, probability of disease occurrence…

this process, higher risk groups[25] might have to pay higher insurance premiums to maintain coverage which they might not be able to afford. This process, whereby low risk individuals are drawn into low-premium plans is referred in the literature as 'cream-skimming' or 'cherry picking' (25, 26).

Furthermore, in the animal health sector there are also problems associated with the absence of ***complementary*** markets. This is of most relevance in developing countries where large-scale coordination is required in order to develop certain types of programmes (13). The integration of the sparse initiatives that deliver animal health in rural and peri-urban areas (NGO programmes, private initiatives, etc.) into a wider national animal health system will need some degree of government coordination. Therefore one of the objectives of government development agencies is to provide that coordination. However, as mentioned earlier, governments too face transaction costs, enforcement problems and asymmetries of information although in many instances they differ from those in the private sector. As pointed out by Leonard (4, 5), a number of countries have suffered a significant increase in transaction costs within the state activities since their independence. These come, for example, from corruption, patronage and inflated public payroll. Incentives in these conditions tend to be perverse, negative or weak, leading to low levels of public sector performance.

It has been shown that in incomplete animal healthcare markets there are ***information failures***. Assuming perfect knowledge in a healthcare market means that the consumer (herder) is aware of the health status of his animals and knows all the options available to contribute to the improvement of their health. It is also assumed that the herder knows how much each of these options can contribute to enhance their animals' health and is able to evaluate the relative quality of each of these options. From a market economic perspective, customers of both human and animal health services have less knowledge and information on the available treatment/preventive options than the physicians or veterinarians respectively (4, 5). Buyers and sellers have unequal information, which is easily explained by the fact that physicians and veterinarians have invested considerably in their education and training. For minor common ailments and chronic diseases, herders may be aware not only of the condition of their animals but also of the treatment options available (e.g. mastitis). However, this is less likely to be the case for acute, severe and rare conditions, while sub-clinical disease would go unnoticed. Accumulation of knowledge by livestock keepers is determined by the regularity in which they uses the market as some elements of knowledge are obtained by accumulation of 'learning from mistakes'.

Given the technological relationship between veterinary services and animal health, and taking into account that the health market is not regularly visited, herders will often not be in a position to judge what the consequences of certain diseases would be in the absence of a veterinary service. In these cases the advice of a qualified and knowledgeable 'expert', who is familiar with the 'market', i.e. a veterinarian, is required. The need for an expert is further enhanced by the nature of the decision faced by the consumer. Depending on the commodity, taking the wrong decision might only have minor consequences. However, in the animal healthcare market errors in decision making can lead to serious consequences, which might go well beyond what an individual might afford. A farmer might for example lose his entire herd, a country might lose an export market or a zoonotic disease could seriously affect consumers. The information asymmetry between the practitioner and herder leads to an agency

[25] The higher risk groups could be poor and uneducated (in animal health) smallholders, but could also include those who are not necessarily poor, but start raising livestock without animal health knowledge.

relationship between the provider and the recipient of animal health services[26]. Such relationship links with Arrow's agency theory (27) highlighting the possibility that moral hazard[27] arises.

In insurance-based healthcare systems there is the possibility of 'excess demand', known as moral hazard, not only from the consumer's side but also from the provider's side (30). *Consumer's moral hazard* arises in two facets and will depend on what the stock owner is insured against. First, the fact of being insured reduces the financial burden of having diseased animals. Thus, these situations become less undesirable and incentives to apply preventive measures are diminished resulting in increased probabilities of requiring veterinary care. Second, should disease appear, the insured herder does not have to pay (or very little) for veterinary services at the point of use, which encourages him to use more than he would otherwise have done.

*Provider's moral hazard* can result from a lack of awareness of costs[28], or from the use of fee-for-service (FFS) remuneration for veterinarians in which fees depart from 'market' prices. In systems using FFS as a remuneration method, veterinarians are paid a fee for each item of service provided to herders. Conventional wisdom in such systems says that veterinarians have an incentive to provide care in excess of what would be the case if trading were done with fully informed consumers. This phenomenon is also known in the literature as 'supplier-induced demand' (30). If the fee is greater than the true competitive price, then there will be an incentive for over-providing. On the other hand, if the fee is lower than its true competitive price, there will be an incentive to under-provide.

Because of the asymmetry of information, consumers are not able to temper this behaviour and when using a third party payer or insurer, consumers do not even have an incentive to moderate such behaviour. It is therefore important to counteract moral hazard and this is normally done through financial incentives or disincentives as for example a capitation[29] form of payment. However, these mechanisms will depend on the financing structure of the healthcare system in each country, which in turn is related to what consumers (herders) want from the providers (veterinarians). There is an added agency problem in so far as agents (service provider) and principals' (third party payer) utility curves will differ. The agent may well be able to indulge in many complex moral hazards as well as over-supply. This agency problem may be acute in rural areas where unsupervised staff are left to undertake tasks that few can monitor.

---

[26] The principal / agent theory has been extensively discussed in the human health literature (27, 28, 29). However, an attempt of comparison between the two health fields has only been done by D.K. Leonard (4). Following his reasoning, and adapting Mossialos *et al.* transaction model to the animal health setting, we are able to explain the interactions between the different actors in this triangle. The simplest form of transaction is by direct payment where the consumer (first party: stock owner or herder) pays the provider (second party: veterinarian and/or auxiliaries) directly in return of the good or service. However healthcare systems have often developed another player: the third party or insurer. This can be a public or private body and has been created to offer protection to a population (herders, stock owners and the society) against the financial risk of falling ill (in the animal health setting it refers to the risk of animal illness and/or zoonosis occurrence) and allows risks to be shared within a defined population. It is a means to achieve interpersonal redistribution (in this case between herders and between herders and the society). To finance healthcare services, the third party must collect the revenue from the population in a direct or indirect way. This revenue is then used to reimburse the herder or the veterinarian.

[27] Following the assumption of perfect knowledge consumers (herders) would act freely in their own interest when deciding what to consume/purchase and what not to consume/purchase. Under the same conditions, suppliers (veterinarians) would also act in their own interest when providing commodities most highly valued by consumers relative to their prices. But taking into account the lack of perfect knowledge in the health care market on the part of the herders or stock owners, veterinarians are often placed in the position of providing expert advice to herders about care to be provided by themselves or their colleagues. Thus the supplier of care is able to influence substantially the demand for that care.

[28] Lack of awareness of the price of the drugs prescribed for example.

[29] Capitation is often used in the human healthcare sector as a method of payment in primary care (this applies to the private – e.g. health maintenance organisations (HMOs) - as well as public context). "Doctors receive an annual payment in advance to care for each individual who elects to join their lists. The main advantage claimed for this method is that it motivates doctors in the primary care sector to practice in a way that encourages patients to join their lists although it could be in the doctor's advantage to attract only low-cost people" (25). Calculating the capitation fee may differ from a single flat rate for all patients to a risk related calculation fee.

Finally, the last failure that can arise in the animal healthcare market relates to ***macroeconomic distortions***. AHS in many developing countries are highly dependent on foreign aid coming from different countries' donors and/or development agencies. Recommendations from international agencies on how funds should be allocated also relate to the overt and hidden agendas of donors, which may positively or negatively affect the animal health sector.

# 3. DEFINING PUBLIC GOODS

Economic theory and principles have been largely used for the analysis of different types of markets. The neoclassical economic theory applied to the human healthcare field developed rapidly in the 1960s and 1970s. In the animal health sector, however, the debate about the provision of animal health services only started roughly a decade ago[30] (1992, see Umali-Deininger *et al.* (2)). The fundamental reason for this debate related to the widespread public financial crisis in various countries in the developing world at that time. Given the context of lack of public or government funds, animal healthcare services were classified following the 'outcome' approach rationale and governments were advised to privatise all animal health services which fell in the category of delivering 'private goods' and only to finance those providing 'public goods'.

Given the meagre success of the privatisation process in many developing countries, it is possible that the analysis failed to take into account some important and decisive factors. As mentioned earlier, this classification of goods or services did not consider some influencing factors such as the political and institutional context nor physical constraints. It is therefore relevant to re-examine the taxonomy of goods applied in the analysis of AHS under the outcome approach and highlight the pitfalls and consequences that might have derived from its application.

## 3.1 The taxonomy of public and private goods

Rather than elaborating on the distinction between private and public goods, this study focuses on the degree of 'publicness' of goods because this determines whether such goods or services are financed and/or provided by the market or by governments (11). However, in order to assess how 'public' goods and services are, they need to be examined and only then can the appropriateness of provision and finance be determined.

Public goods were categorised by Samuelson in 1954 (31) along the lines of the principles of rivalry[31] and excludability[32]. This categorisation has been widely debated in the economic literature. Samuelson's definition of public goods began a debate in which several leading economists argued the difficulty in finding public goods in the purest sense. Examples such as law and order and defence, typically assumed to be public goods in the purest sense, were criticised by authors like Margolis (32) and Sandler (33). They argued that even these examples did not fully comply with Samuelson's definition[33]. The same applies to the classical example of lighthouses, which was counteracted by Coase for the same reasons (34). Hence the debate should not focus on the two extremes, namely *pure* private goods and public goods, but on the myriad of *impure* public goods existing between the extremes.

Three ways have been argued in which good can be classified (11). The first derives from Head (35) and Peston (36) and focuses on the characteristics of the good, i.e. the classical approach to excludability and rivalry in consumption. The second, supported by authors such as Musgrave (14) and, in a similar way, Weisbrod (37), is based on the

[30] Although one might argue that Leonard started talking about user fees for the AHS in 1985 (3).

[31] Rival principle: two persons cannot enjoy a specific benefit at the same time.

[32] Exclusion principle: access is denied to persons who have not paid for this product or service.

[33] "In the provision of law and order (or medical care), the use of individual A of law courts (or hospitals) subtracts from consumption by individual B if they must now wait". Defence, generally associated with protection, may not either completely satisfy the 'pure' public good definition. For example, a situation in which armies are employed in the north, "will this not detract from protection for communities in the south?" (11).

assessment of the mix of services/benefits that stem from the provision of the good, also referred to as 'mixed goods or quasi-public goods'. Finally the third, supported by Buchanan (38), relates to the different levels of consumption sharing, which refers to the relationship existing between the degree of indivisibility and the number of people consuming the good.

In the animal healthcare sector only one type of analysis has been performed to date and this relates to the first categorisation (see Umali *et al.* (2) and Holden (9)). This approach is re-examined below and two new ways of approaching AHS taxonomy are proposed.

### 3.1.1 Excludability and rivalry

One approach to the taxonomy of goods is to focus on their characteristics with respect to excludability and rivalry. Following Head and Peston's classification, four categories can be obtained (Table 1). Category D, goods that are non-rival and non-excludable in consumption, are *pure public goods*. At the other extreme, category A, lie the *pure private goods*, which are both excludable and rival in consumption. Category B refers to sharing of common resources, known as *common pool goods*, where no one can be denied access but the service profits exclusively the user[34] and detracts from the possible use by others. Finally, excludable but non-rival goods are also referred to as *toll goods* (C) because a payment limits the number of users asking of the service, but once paid, each individual admitted may consume services without subtracting from the benefit to others (within capacity limits)[35].

***Table 1:*** *Taxonomy of goods (adapted from Cullis and Jones, 1998 (11))*

| | Excludable | Non-excludable |
|---|---|---|
| **Rival** | A | B |
| **Non-rival** | C | D |

Several authors have used these terms in order to classify goods and services provided by animal health systems (2, 40, 41). However, the most extensive interpretation of this technique was elaborated by Holden (9). Given the previously mentioned controversy regarding the existence of *pure public goods* following the two principles, Holden's categorisation followed the criteria of 'low' and 'high' rivalry and excludability. She then associated the categorised goods to what empirically is supposed to be the adequate funding mechanism. The results her assessment are presented in Table 2. The list of goods and services included in the example is not exhaustive and does not include some of the major components of AHS (refer to Figure 1, page 12). The classification of some of the examples is also debatable, as well as their associated source of financing. These examples (items *(a)* to *(l)* in Table 2) are discussed below.

In relation to goods included in category A, given their characteristics – high rivalry and high excludability - theoretically there is a strong incentive for the private buyer

[34] For further detail, refer to Meade (1952) (39) for the classical example of bees from hives of different beekeepers and the collection of nectar from a nearby orchard of apples.

[35] For further detail, refer to Buchanan (1965) (38) and the 'Theory of Clubs'.

or consumer to pay for the good or service. Examples of these, mentioned by Holden, include clinical services, use of vaccines and veterinary pharmaceuticals and prevention and control of endemic diseases. However, one might argue that even items in category A (particularly item *(a)*) may have positive spillovers to other herders, for example under common grazing. However, Holden mentions that 'private benefits of vaccination against endemic diseases usually outweigh the benefit to others' (9), which is true, but holds equally true for vaccination against epidemic diseases.

Some debate may also surround the association of clinical services *(e),* and vaccine and drug sales *(b)* to private financing (i.e. by the end user). One of the underlying reasons behind private goods delivery is the need for enough aggregated demand for these services or goods to be delivered through adequate market competition. This implies the existence of multiple service providers and users. Therefore, depending on the context, either physical or institutional, such aggregated demand might not be sufficient to leave these goods or services to end users' private funding. An example of such situation are remote pastoral areas where subsistence farming is common. The ability to pay[36] for such services or goods might be too low and the aggregated demand for the services would not be sufficiently high to stimulate provision through market competition. Thus, the goods or services, despite having characteristics of private goods, might not be adequately delivered without a certain degree of public (co-)funding.

[36] We separate ability to pay from willingness to pay (WTP) in this example as many studies (e.g. Ahuja *et al.* (7) have demonstrated that poor livestock keepers are willing to pay for clinical services but are not always able to pay for such services given their low economic situation.

***Table 2:*** *Classification of goods following the rivalry and excludability principles (adapted from Holden, 1999 (9))*

| | | **EXCLUDABILITY** | |
|---|---|---|---|
| | | **HIGH** | **LOW** |
| **RIVALRY** | **HIGH** | **PRIVATE GOODS**<br>▪ Endemic disease control and prevention ***(a)***<br>▪ Sales of drugs and vaccines ***(b)***<br>▪ Some extension ***(c)***<br>▪ Some research ***(d)***<br>▪ Clinical services ***(e)***<br>***PRIVATE FINANCE***<br>***A*** | **COMMON POOL GOODS**<br>▪ Tsetse control on communal land using traps, targets or aerial spraying ***(j)***<br>***PUBLIC FUNDING***<br>***B*** |
| | **LOW** | **TOLL GOODS**<br>▪ Vaccine production ***(f)***<br>▪ Diagnostic services ***(g)***<br>▪ Veterinary clinics **(h)**<br>▪ Dips ***(i)***<br>***PRIVATE FINANCE***<br>***C*** | **PUBLIC GOODS**<br>▪ Epidemic or zoonotic disease control (surveillance, movement control, quarantine services) ***(k)***<br>▪ Some extension<br>▪ Some research<br>▪ Control of food borne diseases ***(l)***<br>***PUBLIC FINANCE***<br>***D*** |

Given the characteristics of *toll goods*, economic theory suggests that these should mainly be financed or paid for by end users. Examples mentioned by Holden include vaccine production units *(f)*, units for diagnostic/laboratory services *(g)*, veterinary clinics *(h)* and dipping facilities *(i)*. Her stated reasons for inclusion of such goods or services in this category are that these examples include treating several animals or process several samples at the same time, i.e. there is low rivalry, but non-paying users can be excluded from the service. i.e. high excludability. However, one might argue against veterinary clinics being classified as toll goods given that services are generally paid as a function of the animal treated and the amount and type of drugs

needed. Therefore, it might be more accurate to classify them into the private good category in Holden's interpretation of Head and Peston's classification. Because of their high excludability characteristics, toll goods are usually financed privately by the consumer. However, the same argument would apply to these goods in relation to the end user payment as was used for the provision of private good, namely that in remote rural areas these services would not be economically reachable for subsistence livestock keepers. Most of these services, though, exist in highly production areas. Aggregated demand in such settings is high enough to enable market competition; nevertheless some public sector co-financing might be needed in the first phase of establishment of these facilities given their high set-up costs.

In relation to vaccine production *(f)*, diagnostic services *(g)* and dipping facilities *(i)*, Holden argues that these services "may treat several animals or process several samples at one time (i.e. low rivalry) but can exclude non-paying users from the service (high excludability)" (9). Dipping facilities represent an example of the questionability of the applied allocation of goods into Head and Peston's classification as the efficiency of the product used in the dips will be reduced by increased use and hence the service is indeed rival. The first herd passing through the dipping facility will be better protected than the third. Rivalry might therefore be higher than postulated. The same can hold true for diagnostic services, where the number of samples that can be processed at any one time is limited leading to at least rivalry in the timing of consumption of the service (i.e. some consumers may have to wait until their samples will be processed). The characteristic of these examples lead to Buchanan's theory of clubs (38), which is based on a classification of goods which uses the degree of consumption sharing of a good among a certain population. This classification will be further elaborated later in this chapter.

It is when talking about categories B (common pool goods) and D (public goods) that we encounter most difficulty in classifying goods into separate and distinctive cells following Umali and Holden's rationale. Given the nature of common pool goods, non-paying users cannot be prevented from using the good or service, while increased consumption of the good diminishes supply for others. As non-paying users cannot be prevented access, there is no incentive for the consumer to pay for the service. Hence people tend to 'free-ride'. Trypanosomosis control on communal land using traps, targets or aerial spraying *(j)* to make the land accessible by cattle is an example mentioned by Holden. In one sense this example would perfectly fall into its assigned category. However, trypanosomosis control may have positive externalities not only related to decreasing cattle mortality rates but also by lowering the occurrence of (human) sleeping sickness. Therefore, trypanosomosis control may not only have characteristics of a common pool good but also of a public good if its zoonotic disease aspects are considered.

Due to the low excludability of public goods, access to their benefits cannot be restricted to the people paying for them. Thus, as with common pool goods, there is a tendency for some people not to pay for the good or service and free-ride. These situations tend to lead to under-provision or no provision of such goods by private providers. The control of highly contagious animal diseases with high mortality rates and severe socio-economic implications (for example rinderpest), and of zoonotic diseases would fall into this category. In the event of occurrence of such diseases, the socio-economic and/or public health repercussions for the nation can be high, which might be especially important in developing countries given their relatively high contribution of agriculture to wealth generation and employment. It is only the intervention of the state, financed through a form of taxation, which can force all beneficiaries to pay for the good or service. Therefore, vaccination, surveillance, quarantine and movement restrictions for epidemic diseases and the control of zoonotic/food-borne diseases are normally covered by state finance. When focusing on the control of food-borne diseases *(l)*, Holden rightly mentions that this task has

"traditionally been considered as public good as the state benefits from lower health care costs" (9).

However the above examples of public goods raise the issue of who is the end beneficiary of animal health services: society as a whole, the population of farmers or the state government? To put it differently: What 'public' is referred to when talking about 'public goods'? The example of an outbreak of foot-and-mouth disease in a meat exporting country may be taken to illustrate this point. In the event of an FMD outbreak in this country, the poorest consumers may be the main beneficiaries as prices of beef and other exported bovine products are likely to fall as export markets close down. However, farmers and governments will not benefit as export bans will be imposed, reducing their economic benefits (lower prices for beef in the case of cattle farmers and less revenue from export duties for the state).

The above example relates to the previously described influence of powerful 'interest groups' over decision-making processes (Section 2.4). Economic theory defines a good as 'public' when it affects society as a whole. The extent to which an export ban due to an outbreak of FMD negatively affects society as a whole is debatable and will vary between countries. In most instances the control of epidemic livestock diseases, although it requires government participation to put into place required legislation for the avoidance of free-riders and the enforcement of control measures, provides a 'public' good only for a subset of society.

Although the financing of public goods will need to be of public origin, the actual delivery of the good or services can be contracted out to private service providers. At this level, regulation and enforcement are of crucial importance to guarantee the quality of services delivered. Regulation and quality assurance are not always simple and an added incentive for the provision of quality services is through enhancement of consumer awareness about the service they can expect. The BSE episode in the UK represents an important example of power shift from an industry to consumers. Consumers' associations pressed for increased transparency in relation to the origin and processing methods of food products. As painful as the episode might have been, the results are that consumers are more 'educated' and sensitised in relation to hazards coming from the food they consume. They therefore demand the enforcement of regulations for consumer protection, diminishing the power of the food industries in the decision-making processes.

It must remembered that the economic nature of given services is dynamic. Rivalry and excludability of a service are subject to change over time due to development of new techniques for disease control, changes in the regulatory framework or in the information environment. An example of technological improvement is trypanosomosis control. Originally, trypanosomosis control was carried out through aerial spraying, benefiting all farmers in an area, regardless of who had paid for the service (i.e. low excludability). However, technological advances have led to the development of drugs and 'pour-on' insecticides, therefore changing the degree of publicness of trypanosomosis control as the intervention can be more 'individualised' and therefore of higher excludability (9).

Head and Peston's technique might be questioned in so far as the "same 'good' may fall into one category under one set of circumstances and into another category under other sets" (36). Even so, within the different categories it is possible to develop the requirements for efficiency in provision. Perhaps the most susceptible category for that is category C (see Buchanan and theory of clubs). Valid as it might have been, Umali and Holden's categorisation of goods, as we have argued, can be contested. Two main questions derive from the above debate that might shed light on the reasons for failure of the privatisation process. These are: (i) For whom is a good "public" in

the AH sector (i.e. what is the targeted population)? and (ii) What is the context (physical and/or institutional) in which it has to be delivered?

The following sections will re-examine the classification of goods taking into account the two above questions and will highlight their implications for policy making.

### 3.1.2 Mixed goods/quasi-public goods

The second type of approach to the classification of impure public goods focuses on the mix of services that stem from the provision of the good. This approach was first taken by Musgrave (14) and in the AHS field it has been adopted by Leonard (4) and Koma (6). Research of the latter in Uganda strongly suggested that the method of conceptualising goods based on their externalities is preferable to the initially used public-private good categorisation. Reasons stated were first that the externalities approach lends itself more readily to degrees of difference as public versus private goods is categorical and handles mixed types awkwardly; and second, that the approach "leads one to do a better job in evaluating the adequacy of private demand, because it quantifies rather than categorises both internal and external benefits" (4).

Starting with two abstract examples, extension *(c)* and research *(d)* have shown the difficulty of categorising goods in separate 'cells' following the public private good technique. The outcome of research might have characteristics of a private good in that a patent on a product results in economic profits for a specific company. However, at the same time, it enhances knowledge on, for example, disease prevention and treatment. This has external benefits therefore bears characteristics of a public good as the whole society will profit from it. Similarly, education/extension directed towards individual farmers might have the potential of increasing the farmer's future production and income. But at the same time it may, for example, (i) limit disease outbreaks which could have affected other farmers or even a nation's economy, (ii) might increase future generations' knowledge regarding production management and (iii) facilitate basic research, creating non-rival and non-excludable knowledge or information which benefits others in the community[37].

This perspective contrasts with the previous categorisation as, in the case of extension, public good characteristics were considered only if the extension messages were broadcast (radio etc) and were classified as private goods only if given to farmers individually. A more concrete example would be a farmer who vaccinates his herd against CBPP. He benefits from the protection conferred to his animals, but at the same time as he creates a personal benefit he may also create an external benefit in so far as the chance of infection of the neighbouring herds is diminished. It is clear that the external effect of the consumption of a private good (the vaccine) may bear characteristics of public good. Recognition of private-public mix means that goods can be viewed as having private benefits as well as external effects, which support the characteristic of public goods (for a clear distinction between public goods and externalities see Evans, 1970 (20)).

This externality approach to dealing with the blend of privateness and publicness in goods was dealt with by Musgrave in 1969 (14) and its importance lies in that it provides an important framework for policy purposes. It would allow the effects of a new policy to be determined by calculating the costs and benefits of its introduction. However, given the pervasive characteristics of externalities, operationalising this approach may prove to be difficult. One attempt may be to take the ratio of spillover

[37] Of course one might argue that these examples are distant consequences of extension and education, and therefore disagree with the classification of impure public goods in relation to their degree of externalities.

benefit to private benefit and classify items in a range order between 1 and 0 (11). Measuring the effect of spillover at different levels (animal and human) might be a cumbersome and debatable task, although one way to approach it would be through cost-benefit analysis (CBA), taking the ratio of external benefits to private benefits as an indicator of the private-public mix and the extent of publicness.

CBA can be used in the private as well as in the public context. In the case of private CBA, the objective is to decide whether to undertake investment in the context of a particular firm, in the case of livestock a farm. In the public context, social CBA is a useful tool for deciding which policies to implement. Two main differences arise between private and social CBAs (13). First, in relation to private CBA, profitability is the major concern whereas, in the government context, concerns focus on a much broader range of consequences (e.g. public health, environment, equity, etc). Second, while private CBA uses market prices for evaluating costs and benefits, social CBA cannot use market prices in evaluating projects for outputs and inputs that are not sold in the market[38], and when there is market failure. The latter refers to a situation where prices do not represent a project's social costs or benefits. Social CBA focuses on developing systematic ways in which costs and benefits can be analysed when market prices do not reflect social costs and benefits (13).

When talking about the evaluation of public expenditure through CBA, concerns focus on how governments 'should' appraise alternative expenditure projects. CBAs have been established on the assumption that governments seek "benevolently to maximise social welfare" (11). It is a framework for incorporating the multitude of considerations that arise when assessing the desirability of projects. However, no claims are made that it is a perfect method capable of yielding unambiguously correct estimates of change of welfare associated with different investment programmes. Rather, it should be viewed as a method for governments to tackle the questions arising when appraising public sector investment.

Two problems arise in CBA in the public context. First, and in relation to positive economics, problems arise when trying to estimate social benefits[39] obtained from a certain animal health intervention. In other words, the problem relates to how investments are *valued*. Several authors in the AH field have attempted to make the case for further elaboration of CBA techniques in relation to animal healthcare services (42-44). However, as argued by Ramsay *et al.* (45), most of the existing studies lack carefully documented analysis and procedures or, as mentioned by Roth *et al*. (personal communication), there is a lack of reliable data. Second, and in relation to normative economics, CBAs are not exempt from political influence and interference. The question behind the use of CBA for normative issues is that of *which* investment should be chosen. Hence, the public choice analysis of how investment is *chosen* is related far more to political costs and benefits (11). As mentioned by Cullis and Jones, "the fact that government departments invest time and effort when undertaking cost-benefit analysis does not preclude the possibility that they are motivated far more by political factors than by welfare economics" (11) and highlights the susceptibility to regulatory capture from powerful industries.

[38] Such as clean water or lives saved.

[39] In the case of performing CBAs for an animal health intervention, the obstacles and criticisms, and especially technical difficulties and surrounding controversies, will arise from (i) giving an economic weight to a certain human health condition (in the case of zoonosis), (ii) to give an economic weight to the consequences in human health due to protein loss for human diet as a consequence of animal mortality or productivity loss, (iii) to evaluation of the health care costs incurred due to the (human) disability condition and (iv) estimating the social costs experienced by an epidemic animal disease which, for example, bans animal and derived products exports for a determined period of time. This is not an exhaustive list therefore other causes may feed into the above-mentioned controversy.

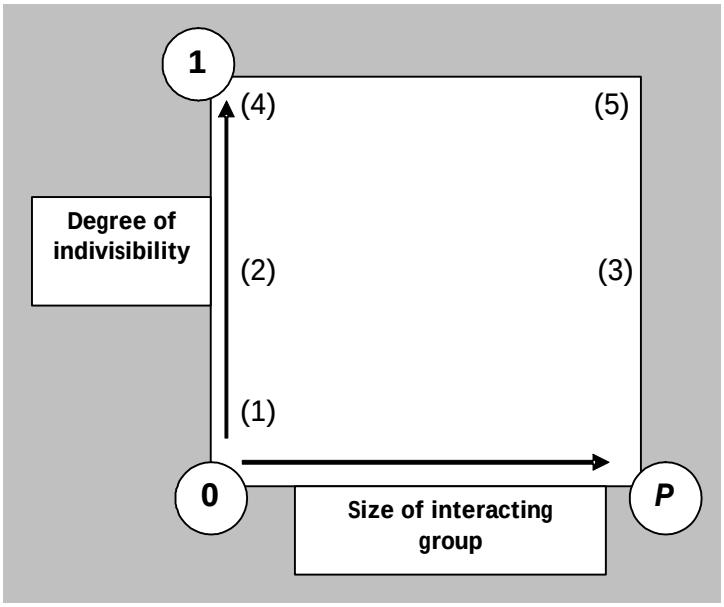
In a similar way, but approaching the problem from the opposite end, Weisbrod in 1988 (37) tried to use the way in which goods are financed as an indicator of the public and private benefits of a good or service. The more public the benefits of a good are, the less organisations will finance themselves through sale of the good, as there are no direct property rights that can be enjoyed on a non-excludable basis. Therefore, the more an organisation relies on gifts, grants and donations, the more public are the effects this organisation has. Weisbrod argues along these lines to defend the subsidy given to not-for-profit organisations. An example of this perspective in the AH field would relate to the 'split-financing' of FMD eradication in Europe.

The 'quasi-public good' perspective differs from the public-private categorisation of goods in that it tries to evaluate in economic terms the private-public mix of benefits stemming from a policy intervention. This implies that context, both physical and institutional, is taken into account in the evaluation, as well as assessing the 'blend of publicness' of consequences deriving from it. Therefore, this taxonomy type may well serve as a tool for decision-making processes in the animal healthcare sector. However, what this approach does not take into account are the arrangements related to optimisation of resource allocation at lower levels within subgroups (i.e. service provision level). This is explored next.

### 3.1.3 Consumption sharing

Finally the third approach to classifying goods and services was developed by Buchanan in 1968 (46). He portrayed the relationship existing between the degree of indivisibility and the number of people consuming the good or service[40] (Figure 2). Special attention should be drawn to situations (2), (3) and (4).

***Figure 1:*** *Consumption sharing (adapted from Buchanan, 1968) (46)*




[40] His categorisation was based on the assumption of a given population and given property rights.

In essence, the key of Buchanan's theory is the degree to which consumption sharing is possible in a given population. As in the case of this study the perspective taken when applying Buchanan's theory to AHS will focus on farmers or livestock keepers.

Item (1) refers to private goods or services which are fully divisible between few individuals (or farmers). An example for the AHS would be clinical treatment or diagnostic tests for a given farmer[41]. Services that are fully divisible between farmers or livestock keepers 'should' be left to market provision. On the other extreme, item (5) relates to public goods, completely indivisible over a large group of people. An example would be trypanosomosis control in a specific district, which would be fully indivisible between livestock keepers, and each farmer, as well as the rest of the population of this district[42], will profit from the services. Item (3) may refer to services such as vaccination against a highly contagious disease, which provides a degree of protection for all neighbouring farmers.

When focusing on group (2), extension services at a community level might be taken as an example. Extension (a relatively indivisible service) under these conditions may be given to a small number of livestock keepers. Hence, services are shared between a small number of people. Following Buchanan, service provision in this category might be left to voluntary arrangements between the individual members of the small group concerned, in this case livestock keepers.

Category (4) contains goods or services that are highly indivisible and are used by a small number of people. These are the so-called 'Clubs'. These could be cooperatives or farmers' associations where, for example, dipping facilities could be used by all members (i.e. those who have paid a premium or fee). The service will be provided as long as the number of members is not excessive[43] (i.e. no congestion). Clubs are arrangements in the private sector by which goods are to a certain degree non-rival in consumption and voluntarily provided. Typically the good is excludable (i.e. membership fee) but this is by no means private (i.e. below capacity limits consumption is non-rival). Buchanan (38) contributed to the understanding of the establishment of efficiency conditions for the provision of such goods via clubs.

Viewing impure public goods in this way enables consideration of the appropriate provision of a range of goods bearing both 'public' and 'private' characteristics. In some instances this approach has called into question the appropriate role for the public sector. Goods that are not perfectly public might perhaps be better supplied through the market. On the other hand, there are some conditions under which it might be appropriate for governments to provide private goods.

[41] Evidently, tests are done to the animals, but the farmer is considered as an entity by itself (might well also be called farm).

[42] In that case not only livestock keepers or farmers will profit from not losing their animals because of the disease (hence reducing productivity loss), but collaterally the inhabitants of the district will also profit from not being at risk of sleeping sickness.

[43] It could be argued that the effectiveness of the dipping product diminished with use, thus incurring some level of rivalry.

# 4. PUBLICLY-PROVIDED PRIVATE GOODS

Prior to the drive towards privatisation animal health systems initiated by the World Bank, component services tended to be mainly funded and provided by government. This has been particularly the case in sub-Saharan African countries prior to the 1990s. Conversely, in Asian countries these services continue to be financed and supplied mostly by the government[44]. In the following, this study will focus on ways in which governments are theoretically able to control over-consumption of publicly provided private goods. The analysis also aims to provide options to limit the negative consequences the privatisation process might have in remote rural remote areas. This does not imply, however, that AH service delivery in remote rural areas was of high-performance prior to privatisation.

Following economic theory, publicly provided private goods or services are those for which there is a large marginal cost associated with supplying additional individuals. An example is service delivery in remote rural areas where the costs of reaching an additional farmer might be high. Though the costs of participating in a market (for example distance deters private involvement as transport costs are higher the farther places are - e.g. pastoral setting – thus hindering profitability) provide one of the rationales for public supply of some of these goods, it is not the only or even the most important rationale. Sometimes when governments provide a private good publicly it simply allows individuals to consume as much as they want without charge. Hence, if provided publicly there is a tendency of over-consumption. In some cases this over-consumption might be limited as in the case of water supply (where satiation can be reached), but in the case of animal healthcare market the distortion from over-consumption may be very large.

When there is a marginal cost associated with each individual using a good, it may be more efficient to provide the good publicly and finance the good through general taxation even though providing the good publicly causes distortion (13). In the human health setting, as mentioned in Evan's example in the previous section (23), the high costs related to private markets providing insurance has been used as an argument for the public provision of insurance. The role of government in the context of pastoral and remote areas is discussed next, first for the case that the privatisation process has not yet been fully implemented and, second, for the case that such process has already been undertaken.

## 4.1 The case of remote rural/pastoral areas

In most developing countries animal healthcare was publicly provided before the 1990s. As a result of the macroeconomic context and the crisis of national public finances, an abrupt process of privatisation of most government services, including animal healthcare, was initiated. The fact that there was a very short or even no transition period from public to private service provision in the animal health sector, caused serious disruptions in many areas. Especially vulnerable were the remote rural areas where, after government pulled out, no animal health service was available with the exception of some NGO initiatives.

It is interesting to compare this process in the animal health field to the counterpart in human healthcare. Given that in most developing countries, and especially in sub-Saharan Africa, there was a widespread lack of funds, human health services were also harmed. However, and probably the main difference with the AH sector, was that at

[44] In India privatisation has started to a certain degree.

the same time as the privatisation process took place, there was a widespread acknowledgement of the need to maintain a minimum standard of healthcare. This crystallised in 1978 through the Alma Ata conference (organised by the World Health Organisation) (47) where the idea of primary health care arose and a common objective was set. A programme was created, which was called "Health for All". Most countries adhered to this view and hence ministries of health around the world and other stakeholders put effort into attaining this goal.

As mentioned by Berman (48) in relation to the human healthcare sector and the Health for All programme, in order to expand and integrate community-based programmes into a national structure, there should be an enabling institutional context. This implies a common goal and willingness on the part of the involved policy makers. The debate surrounding this integration of community-based initiatives into a wider health system and the related problems has been widely debated in the human healthcare literature (49-51). It is evident that AHS do not convey the same ethical implications as HHS. However, the relevance of this comparison relates to governance. The AH sector has not been able to describe a common goal or purpose during or even after the privatisation process, and this refers not only to national governments but, more importantly, to the international community. Consequently, there has been an uncoordinated transition without a common vision. Such lack of coordination has led to an important increase in transaction costs, rendering the AH services more and more ineffective and inefficient.

### 4.1.1 The role of government in a pre-privatisation setting

Continuing the comparison with the human health care sector, rationing devices were progressively introduced in the human health field through Primary Health Care[45] (PHC) programmes with the aim of cutting healthcare costs. Measures to reduce demand, either from suppliers or patients, were therefore implemented. Such planning was missing during AHS privatisation in most nations.

In countries where privatisation of AHS has not been yet fully or even partially implemented, i.e. cases where 'private' animal health services are still being provided to a certain extent by the government, there are three ways in which the government could control the (over-) consumption of publicly-provided private goods (13). These are (i) rationing consumption (i.e. user charges), (ii) uniform provision, and (iii) queuing.

As previously mentioned, inefficiencies arise from over-consumption of publicly-provided services. In the HHS, governments imposed *user charges* on services provided in order to reduce or limit their consumption and hence government expenditure. Independently from the controversy surrounding the use of charges (especially when referring to poor income earning people[46]), rationing methods could have been used during the transition process to limit the 'superficial' demand for animal health services. In the same way that the introduction of charges would have limited demand, it would also have helped to increase the government's budget (at a local, regional or national level, depending on the country's decentralisation status) for animal health services and using the public funds for targeted public good interventions. It should however be mentioned that partial cost-recovery methods have already been introduced in some AH delivery programmes.

[45] In the human healthcare system, primary health care (PHC) refers to the first point of access or attendance of care. Secondary health care refers in the same context, to services offered in hospital facilities.

[46] Equity issues arise when referring to user fees.

*Uniform provision* refers to supplying the same quantity of the good to everyone. However, this mechanism does not allow for adaptation of different individual's needs and desires as does the private market (13). This characteristic is of most importance in the animal healthcare field as the needs in different rural or pastoral areas might greatly vary. A government policy of uniform provision of animal healthcare services would not be advisable.

Finally, the third way through which the government might control over-consumption of publicly provided services is through *queuing*. The underlying rationale is that, rather than charging individuals for access to publicly provided services, the government requires that they pay in waiting time. This measure is based on the idea that money is an undesirable way to ration medical related services. Queues are supposed to be an effective device to discriminate between those who are truly needy and those less in need. Willingness to pay has in effect been replaced as a criterion for allocating medical services by 'willingness to wait' (13). However, one might argue that waiting time incurs alternative social costs to the government that might be higher than with other rationing devices.

In the case of animal health services however it does not seem reasonable to make herders and livestock travel long distances to reach veterinary assistance as diseased animals may not be able to walk or will lose too much weight and condition during the trip. Most herders would therefore be more interested in selling the diseased animal at a lower price or slaughter it (without inspection, therefore possibly incurring human healthcare costs), rather than risking its complete loss. Hence, costs incurred due to the lack of access or the waiting time to receive animal health services may impact at the individual level (loss of the economic value of the animal), at the community level (as livestock has high social value in these areas) and at national level. In relation to the latter, if herders do not have access to animal health services, or have to wait for the services to come to them (in the case of community-based workers or other services), an outbreak of an epidemic disease such as FMD or rinderpest would go undetected and uncontrolled for longer than necessary thus increasing the risk of substantial spread. If the outbreak is not contained, the entire nation's exports might be hindered due to the imposition of an export ban. Therefore, the consequences of this 'waiting time' would have high social costs at a national level.

The underlying assumption for public provision of private goods or services is the existence of an 'efficient' government. It has been shown that many governments fail to provide services efficiently as they incur high transaction costs related to political and individual interests. Quantification of transaction costs to compare differences in efficiency between market and government provision of goods or services might, however, be technically and practically difficult.

Applying user charges would therefore be the main device to help limiting government expenditure, hence slowly moving towards a more privatised system where government would play an added role, concentrating on provision of goods with high degree of publicness.

### 4.1.2 The role of government post-privatisation

In countries where privatisation of AHS has been undertaken, there is a need to explore ways in which the delivery of services can be improved and their financing can be secured. As in the previous section, special attention is given to remote rural areas. Given the physical context encountered in these areas (lack of infrastructure, water, electricity and often the presence of high insecurity) it would seem there is a rationale for public provision of animal healthcare. Following Williamson's economics,

what is being advocated here is the action of the government as an overall coordinator. Additionally, another role for the government would be facilitating the institutional context.

The first role would involve the remaining government animal health services in rural areas as well as at other levels such as district and national. These could play a key role in decreasing the existing transaction costs by coordinating current ongoing field activities. These activities might range from private or business-oriented delivery of animal health service, to NGO initiatives. Examples of this coordination role would vary from setting national goals for delivery of primary animal healthcare (PAHC) (such as integrating into a common PAHC goal the existing programmes, be they private or not-for-profit), to more logistical activities, such as facilitating networks for drug supply.

The second activity, which in turn relates to the previous one, is facilitating an institutional context for PAHC[47] delivery. This function is of interest for developing countries as it might help rural livestock owners accessing regional markets[48] (i.e. in the same country or in some instances in neighbouring countries). For stock owners to be able to sell their livestock and derived products in these zones there is a need for a coordinated and integrated animal healthcare service at a national level so as to assure minimum quality standards in live animals and derived products[49]. Delivery of AH services in remote rural areas therefore represents a challenge in terms of AHS reliability to reach these standards. An interesting case is that of Kenya and the acceptance of CAHWs. Reluctance exists from some members of the Kenyan Veterinary Board (KVB) to legalise and integrate CAHWs in the Veterinary Act, in spite of the latest recommendations of the OIE in relation to veterinary para-professionals (52). If these para-professionals are not legally accepted (and in practical terms adequately supervised[50]) there is the possibility that livestock and derived products may be rejected in local or regional markets on public health and/or animal health grounds.

There is, nevertheless a need to assess effective ways to increase government resources for funding animal health services. There is also the need to explore existing and new possibilities for the private sector to fund and provide these Services.

[47] The Primary Animal Health Care (PAHC) concept refers to the AH system's service delivery branch. That is: the first contact point for livestock keepers with AH services. PAHC would therefore include initiatives such as CAH systems (which might be business oriented, NGO managed or government run), veterinary aid centres, mobile dispensaries, etc. The nature of PAHC will differ between countries. Hence for example in sub-Saharan Africa PAHC will mainly include CAH systems as AH service delivery branch, whereas in India veterinary aid centres and mobile dispensaries will be more common.

[48] However, other factors are needed (such as transport and infrastructure) and that does not exclude the existence of illegal export markets.

[49] Of course one might argue that in some of these localities official inspection is lacking and, if to some extent it exists, parallel markets tend to arise due to the lack of enforcement.

[50] This would relate to the organization and structure of CAH systems, especially in relation to the supervision of CAHWs by qualified professionals.

# 5. CONCLUSIONS AND RECOMMENDATIONS

This study demonstrates that the economic analysis of AHS has moved from an *outcome* oriented perspective towards a more *process* oriented point of view. Hence, the animal healthcare market is viewed in a broader context where political interference, self-interested behaviour and other transaction costs are considered. This relatively new perspective (in the AH sector) leads to the identification of factors that were not taken into account in the first economic analyses of AHS, factors that may however have had some influence on the failure of the privatisation process in some countries.

The public choice school's perspective gives a new approach to the analysis of the animal health care sector and sheds light on how to avoid similar errors in ongoing and future privatisation processes. Central to the public choice school is the view of the government as part of the AHS market and not only as an external agent with regulatory power. Special attention has been given to its role in relation to governance. This perspective contemplates the government as a key element in harmonising and facilitating not only the market economy, hence as a means for reducing existing transaction costs, but also in defining overall goals for the animal healthcare system. An important factor to be taken into account relates to corruption at a governmental level.

The following conclusions and policy recommendations emerge from this study:

- The application of economic theory to guide the process of privatisation of animal health systems varies in relation to several factors and the privatisation process cannot to be applied in a homogeneous way. Influencing factors such as the physical, political and institutional contexts need to be taken into account. There is no standard model applicable to the privatisation process.
- The role of government should be viewed at a broader level as coordinator of activities in the animal healthcare sector (increasing cross-sector collaboration), the aim being not only to reduce transaction costs, but also, and especially, to guide current initiatives towards a common goal for AHS.
- In countries that have not undergone privatisation, cost-containment measures could be applied in order to smooth the transition process to a privatised AH market (where applicable).
- In countries where privatisation has been undertaken, efforts should focus on governance of the AHS.
- There is a need of further research in relation to the overall AH system's organisation and financing in order to enhance its efficiency and effectiveness.

## REFERENCES


1. deHaan, C., and Bekure, S. Animal health services in sub-Saharan Africa. Initial experiences with alternative approaches. Washington D.C.: The World Bank, 1991.
2. Umali-Deininger, D., Feder, G., and deHaan, C. "The balance between public and private sector activities in the delivery of livestock services," World Bank Discussion Paper 163 (1992): 114.
3. Leonard, D. K. "African practice and the theory of user fees," Agricultural Administration 18 (1985): 137-158.
4. Leonard, D. K. Africa's Changing Market for Health and Veterinary Services. The New Institutional Issues. London: MacMillan Press LTD, 2000.
5. Leonard, D. K. "Structural reform of the veterinary profession in Africa and the New Institutional Economics," Development and Change 24 (1993): 227-267.
6. Koma, M. P. K. "Can private veterinarians survive in Uganda?," in Leonard, D. K., ed., Africa's Changing Market for Health and Veterinary Services. The New Institutional Issues. London: MacMillan Press LTD, 2000.
7. Ahuja, V., George, S., McConnel, K. E., Kurup, M. P. G., Gandhi, V., Umali-Deiniger, D., and de Haan, C. Agricultural Services and the Poor: Case of Livestock Health and Breeding Services in India: India: Indian Institute of Management, Ahmedabad; Washington D.C.: the World Bank; Bern, Switzerland: Swiss Agency for Development and Cooperation, 2000.
8. Ly, C. "Veterinary paraprofessionals in Senegal: Allocation of priorities and working behaviour," in Leonard, D. K., ed., Africa's Changing Markets for Health and Veterinary Services. The New Institutional Issues. London: MacMillan Press LTD, 2000.
9. Holden, S. "The economics of delivery of veterinary services," Revue Scientifique et Technique 18 (1999): 452-439.
10. Murray, J. L., and Frenck, J. "A fremawork for assessing the performance fo health systems," Bulletin of the World Health Organization 78 (2000): 717-731.
11. Cullis, J., and Jones, P. Public finance and public choice. Great Claredon Street, Oxford: Oxford University Press, 1998.
12. Buchanan, J. M. "Public finance and public choice," National Tax Journal 28 (1975): 383-394.
13. Stiglitz, J. E. Economics of the Public Sector. London / New York: W.W. Norton and Company, 2000.
14. Musgrave, R. A. "Provision for social goods," in Margolis, J., and Guitton, M., eds., Public Economics. New York: St. Martin's Press, 1969.
15. Musgrave, R. A., and Musgrave, P. B. Public Finance in Theory and Practice. New York: McGraw-Hill, 1989.
16. Wiseman, J. "The choice of optimal social expenditures," in Roskamp, K., ed., Public Choice and Public Finance. Paris: Editions Cujas, 1980.
17. Stigler, G. J. "The theory of economic regulation," Bell Journal of Economics and Management Sciences 2 (1971): 137-146.
18. Laffont, J.-J., and Tirole, J. A Theory of Incentives in Procurement and Regulation. Cambridge: MIT Press, 1993.

19. Propper, C. "Agency and incentives in the NHS internal market," Social Science & Medicine 40 (1995): 1683-1690.

20. Evans, A. W. "Private goods, externality, public goods," Scottish Journal of Political Economy 17 (1970): 79-89.

21. Williamson, O. E. The Mechanisms of Governance. New York: Oxford University Press, 1996.

22. Dugger, W. M. "Transaction cost economics and the state," in Pitelis, C., ed., Transactions, Markets and Hierarchies. Oxford: Basil Blackwell, 1993.

23. Evans, R. G. Strained Mercy: the Economics of Canadian Medical Care. Toronto: Butterworths, 1984.

24. Woods, P. S. A. "The importance of proximity, transport, and gender as transaction costs in the use of veterinary services in Zimbabwe," in Leonard, D. K., ed., Africa's Changing Markets for Health and Veterinary Services. The New Institutional Economics. London: MacMillan Press, 2000.

25. Donaldson, C., and Gerard, K. Economics of Health Care Financing. The Visible Hand. London: MacMillan Press LTD, 1993.

26. Mossialos, E., Dixon, A., Figueras, J., and Kutzin, J. Funding health care: Options for Europe. Buckingham, Philadelphia: Open University Press, 2002.

27. Arrow, K. J. "The Economics of Agency," in Pratt J, Zeckhauser R. (1985), Principals and Agents. The Structure of Business. Boston: Harvard Business School, 1985.

28. Pratt, J., and Zeckhauser, R. Principals and Agents. The Structure of Business. Boston: Harvard Business School, 1985.

29. Evans, R. G. "Going for gold: the redistributive agenda behind market based health care reform," in Chinitz D., Cohen J., Doron C., ed., Governments and Health Systems : Implications of Differing Involvements. Chichester: Wiley, 1998.

30. Evans, R. G. "Supplier-induced demand: empirical evidence and implications," in Perlman M., ed., The Economics of Health and Medical Care. New York: John Wiley and Sons, 1974.

31. Samuelson, P. A. "The pure theory of public expenditure," Review of Economics and Statistics 36 (1954): 387-389.

32. Margolis, J. A. "Comment on the pure theory of public expenditure," Review of Economics and Statistics 37 (1955): 347-349.

33. Sandler, T. "Impurity of defence: An application to the economics of alliances," Kyklos 30 (1977): 443-460.

34. Coase, R. "The lighthouse in economics," Journal of Law and Economics 17 (1974): 357-376.

35. Head, J. G. "Public goods and public policy," Public finances/Finances publiques 17 (1962): 197-219.

36. Peston, M. Public Goods and the Public Sector. London: Macmillan, 1972.

37. Weisbrod, B. A. The Nonprofit Economy. Cambridge, Mass: Harvard University Press, 1988.

38. Buchanan, J. M. "An economic theory of clubs," Economica 32 (1965): 1-14.

39. Meade, J. E. "External economies and diseconomies in a competitive situation," Economic Journal 62 (1952): 54-76.

40. Umali-Deininger, D., Narrod, C., and Deininger, K. "Private sector development in agriculture: constraints, opportunities and new approaches," Private Sector Development Department, World Bank. Washington D.C.: World Bank, 1994.

41. Holden, S., Ashley, S., and Bazeley, P. "Delivery of animal health services: synthesis of research needs." Crewkerne, Sommerset: Livestock in Development, 1996.

42. Morris, R. S. "The application of economics in animal health programmes: a practical guide," Revue Scientifique et Technique 18 (1999): 305-314.

43. Rushton, J., Thornton, P. K., and Otte, M. J. "Methods of economic impact assessment," Revue Scientifique et Technique 18 (1999): 315-342.

44. Marsh, W. "The economics of animal health in farmed livestock at the herd level," Revue Scientifique et Technique 18 (1999): 357-366.

45. Ramsay, G. C., Philip, P., and Riethmuller, P. "The economic implications of animal diseases and disease control at the national level," Revue Scientifique et Technique 18 (1999): 343-356.

46. Buchanan, J. M. The Demand and Supply of Public Goods. Chicago: Rand McNally, 1968.

47. World-Health-Organization. "Health for all in the 21st century - History," 2003.

48. Berman, P. A., Gwatkin, D. R., and Burger, S. E. "Community-based health workers: head start or false start towards health for all?," Social Science & Medicine 25 (1987): 443-59.

49. Sauerborn, R., Nougtara, A., and Diesfeld, H. J. "Low utilization of community health workers: results from a household interview survey in Burkina Faso," Social Science & Medicine (UK) 29(10) (1989): 1163-1174.

50. Nichter, M. A. "The primary health center as a social system: PHC, social status, and the issue of team-work in South Asia," Social Science & Medicine 23 (1986): 347-355.

51. Chabot, H. T. J., and Bremmers, J. "Government health services versus community: Conflict or harmony," Social Science & Medicine 26 (1988): 957-962.

52. OIE. "The role of private veterinarians and para-professionals in the provision of animal health services," OIE, 2003.