

SHOULD ANIMAL HEALTH SERVICES IN ETHIOPIA BE PRIVATIZED?

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I. INTRODUCTION

Although livestock play an essential role in the food production system and foreign earnings of Ethiopia, livestock productivity is low by international standards. Annual losses due to animal diseases are as high as 30 to 50 per cent of the total value of livestock products in part due to insufficient and ineffective veterinary services. In keeping with recent efforts to restructure the Ethiopian economy, veterinary services are being reorganized to encourage either privatization and/or cost-sharing where appropriate. The best way to improve these services requires addressing the delicate balance between the private and public intervention. The literature suggests that while privatization can trigger an increased demand for official veterinary drugs, and a decline in associated black market activities, the state still plays a key role in assuring that society as a whole acquires an optimal level of services. Preventive services for diseases with externalities are generally regarded as public goods, while clinical treatments are considered as private goods. However, in areas of poor infrastructure with predominantly indigenous (low productivity) animals there may be a need to fill the gap through cost recovery or subsidies. Moreover, the first private veterinarians may establish themselves in a well-off areas and may require incentives from the state to move into remote areas. The privatization of veterinary services cannot be undertaken as one broad strategy.

II. BACKGROUND AND JUSTIFICATION

Livestock are central to smallholder crop-livestock production systems, converting low quality plant biomass into high quality human food. Livestock food products constitute about 25 per cent of the Gross Domestic Production in Sub Saharan African (SSA) Countries. Draught power and manure account for another 8 per cent of GDP in SSA [Winrock International 1992]. Livestock provide draught power to crop activities and contribute to long term sustainability by providing manure, a principal source of fertilizer in rural Africa. Livestock also serve as insurance against risks, a store for savings and wealth, and a necessary dimension of many social functions. However, livestock production in SSA is constrained by several factors including nutrition and animal health services.

An effective animal health care system is one of the necessary preconditions for the improvement of livestock production. However, in spite of government attempts to control animal diseases, the quality and quantity of government-operated animal health services have deteriorated over the last two decades due to poor management and lack of resources [Addis Anteneh 1983, 1985; Leonard 1984; de Haan and Nissen 1985; Winrock International, 1991].

Efforts to restructure veterinary services are under way in many African countries. In line with the now familiar World Bank and IMF sponsored structural adjustment programme (SAP) packages introduced across the continent, the liberalization of the market for veterinary services is considered. The World Bank prescriptions in SSA usually include: increased liberalization of drug importation, improved distribution and administration; progressive privatization of veterinary services at professional veterinarian, intermediate and auxiliary staff and producer levels; increased cost recovery by government for those activities expected to remain in the public domain in the long term; and rationalization of the cost structure of government services and functions in the framework of the reforms [de Haan and Bekure 1989].

The issues involved in providing veterinary services must be viewed through the classic paradigm of public versus private goods. In theory, those services whose principal benefits accrue to individual livestock owners should be privatized while whose benefits accrue to society at large require state intervention. In practice, little attention has been paid to applying these familiar issues to the reform of veterinary services.

When we apply the private/public yardstick to veterinary services, however, many complexities arise. These complexities include the nature of disease transmission and treatment and social goals other than pure economic efficiency. As with measures to protect human health, many of the animal diseases have significant externalities and cannot be left to market forces. If such services were privatized, the socially optimal level of disease control may not be attained. The failure of some animal owners to get their animals vaccinated against a contagious disease could result in the resurgence of this transmittable disease, thereby jeopardizing the health and productivity of the other animal owner, and affect consumers as well [Umali et al. 1992]. However, some services with externalities could be purchased by livestock owners. It has been hypothesized that the higher the value of the animal and animal products, the more farmers are willing to pay for services with externalities [Mohammed 1994]. In this regard, the incentive and willingness of the livestock owners to spend resources on preventive or curative services are influenced by several factors including the nature of the disease (the threat of the disease and the associated economic losses). For livestock owners who have access to information, the risk of economic losses for some diseases is greater than for others. In this respect, if the disease is not threatening enough, a livestock owner may forgo curative or preventive services.

The tasks and the responsibilities of state services must be redefined, in some cases limited, while in others, must be reinforced. Private initiative must be promoted in

instances where the market can provide private services. Specifically, which services should be provided by the government, and which ones should be left to the private sector, and how both public and private services could most effectively be organized are crucial issues. The purpose of this paper is to review the recent experience of other countries with the reform of veterinary services and to analyze the extent of public and private provision of veterinary services for diseases which are economically important.

The content of the paper includes: empirical evidence from recent studies; an overview of the livestock sector and veterinary services in Ethiopia; an analysis of the epidemiological and economic characteristics of three major animal diseases in Ethiopia (rinderpest, trypanosomiasis, and tick and tick-borne diseases); and finally, conclusions and policy options for restructuring veterinary services in line with the New Economic Policy of Ethiopia designed along the structural adjustment programme (SAP).

III. SOME COUNTRY EXPERIENCES

An analysis of the policy issues surrounding veterinary services in Ethiopia must draw experience from other countries implementing SAP. Several studies note that government control of the importation and distribution of drugs usually results in the emergence of black markets. Several SSA countries have liberalized both the importation and distribution of veterinary drugs with the result that black markets have declined [de Haan and Bekure 1991]. In Central African Republic (CAR), for example, where drugs are available in official markets, the share of drugs purchased by farmers on the black market has fallen drastically [de Haan and Bekure 1991]. Furthermore, liberalization can increase purchases of veterinary drugs. The average consumption of drugs in countries with government monopoly was US\$0.14 per livestock unit per annum versus US\$0.46 in countries that had adopted a free trade policy [de Haan and Bekure 1991]. This indicates that market liberalization has encouraged the use of more drugs by livestock owners. There are, however, areas of veterinary services where the state manages better. For example, the Kenyan experience shows that preventive services work well when they are controlled by the state and supported by tax revenue [Leonard 1987].

The privatization of veterinary services may have different impacts on different categories of livestock owners. The experience of Cameroon indicates that the introduction of cost-recovery for curative services has hurt the poor livestock owners. This means producers who fell in that category were more likely to indicate that the policy has had a negative impact on their decision than wealthier livestock owners [Gros 1993]. In this situation, some policy options, such as partial cost-sharing or subsidies are required to raise the consumption of veterinary services to socially optimal levels.

On the issue of privatization of livestock services, there is a widespread pessimism regarding the effectiveness and financial viability of private veterinary services. This pessimism is associated with the ability of private practitioners to compete with the public

sector. The public sector is not in a position to meet the demand for veterinary services. However, in some cases, the sector contributes to the slow down of privatization by introducing subsidies. As discussed earlier, subsidies are not to be totally abused but they should not be a hindrance for the private sector. A study in Kenya suggests that private practices were very rare since private practitioners could not compete with the subsidized clinical services provided by the government. Therefore, only the large-scale commercial cattle, dairy retained the services of private veterinarians [Umali et al. 1992].

In the liberalization of the animal health services, the competition may arise not only between the private and the subsidized public sector but also among the private practitioners themselves. An important issue then is the role of professionals in liberalized market economy. By far the largest number of practitioners in Africa are not veterinarians but sub-professionals with non-degree training ranging from a few months to three years [Leonard 1993]. Sub-professionals perform basic tasks of veterinary services and are often willing to travel to remote areas and reach the farmers easily. In many African countries, professional veterinarians serve more as supervisors of sub-professionals than as practitioners [Gros 1993]. The major problem related to the sub-professionals in privatization is that since they have relatively less resources, they cannot compete with professionals who are in a better position to establish their own private practices. The veterinary staff survey in Cameroon suggests that sub-professionals appear to be ill-equipped to perform even the most basic functions.

In countries like, Ethiopia where infrastructure is not developed, privatization of veterinary services may cause a short term deficit in the supplies of the required services. From the study of the World Bank, it has been recommended that the involvement of the public sector in the distribution of drugs and services needs to support the private sector in areas with poor infrastructure [de Haan and Bekure 1991]. A study from Indonesia shows that private veterinary services require the involvement of the state or institutions to ensure optimal levels of services. In cases where the private sector could not meet the demand for the veterinary services, the deficit is commonly made up by university veterinarians who serve as consultants outside working hours [Umali et al. 1992]. This situation suggests that there is room for private practices since the supplies of drugs and veterinary personnel do not meet the demand.

IV. ANIMAL DISEASES AND STATUS OF VETERINARY SERVICES IN ETHIOPIA

Ethiopia has the largest livestock population in SSA, mainly located in the highlands (cool tropics) with species population estimated at 31 million cattle, 24 million sheep and 18 million goats [FAO 1992]. Livestock play an important role in the Ethiopian economy. In the highlands and mid-elevation areas (dega and woina dega), 90 per cent of the crop production is carried out by using draft power. In the lowland (kola) areas, about 60 per

cent of the total land of the country is occupied by semi nomadic groups who depend on livestock as primary sources of their livelihood [Solomon 1994]. Even excluding the value of draft power and manure, livestock account for nearly 40 per cent of the total agricultural Gross Domestic Production (GDP) of Ethiopia [Winrock International 1992]. Livestock are also sources of foreign earnings. Ethiopia is one of the few countries in SSA which has significant exports of live animals and also canned meat to neighbouring countries.

Although livestock are important resources for domestic consumption and foreign earnings, the country's meat and milk yields are among the lowest in SSA and animal mortality rates are among the highest. While the demand for animal products (meat and milk) has grown rapidly, livestock production has stagnated or even declined. This situation can be attributed in part to animal diseases and insufficient and ineffective coverage of animal health services. Annual losses due to animal diseases in Ethiopia are as high as 30-50 per cent of the total value of livestock production [FAO and The World Bank 1993]. Animal diseases reduce not only livestock productivity and production but also eventually affect the crop production because of decreased availability of animal power and manure. Thus, strategies to improve animal health services are increasingly important. Moreover, given that Ethiopia is an important exporter of livestock and livestock products, animal health certificates and meat inspection are required by the importing countries. In this regard, the improvement of animal health services are important not only to increase livestock production for domestic consumption but also to preserve the credibility of the country in the world livestock market.

The major livestock diseases reported in Ethiopia include rinderpest, trypanosomiasis, anthrax, contagious bovine pleura-pneumonia (CBPP), African Horse Sickness (AHS), small pox, foot and mouth disease (FMD), liver fluke, and tick and tick-born diseases [Langridge 1976; Ethiopian Ministry of Agriculture 1984]. The Department of Veterinary Services in the Ministry of Agriculture has been keeping records of disease outbreaks which have been reported by the administrative regions/zones. The cumulative disease outbreaks for the country and trends of morbidity rates² for the last three years are given in Table 1. The highest morbidity rate is observed due to AHS in 1992. The trends suggest that morbidity rates due to anthrax and FMD have increased from year to year. Morbidity rates due to AHS, CBPP and small pox fell in 1993 and then increased in 1994.

Table 1: Major Diseases in Ethiopia and Trends of Morbidity Rates³

Disease	Trends of Morbidity Rates (per cent)		
	1992	1993	1994
AHS	6.6	0.1	2.0
Anthrax	0.3	0.4	0.6
CBPP	0.2	0.1	0.7
FMD	0.8	1.4	1.6
Small pox	3.5	0.8	1.2
Rinderpest	0.5	0.2	NA

Source: Department of Veterinary Services, MOA, unpublished data, (1995).
NA - not available.

In urban and peri-urban dairy production systems, diseases of intensification that is, reproductive problems, internal parasites, young mortality and foot-rot are considered to be important [ILCA 1994]. These diseases were identified as important by specialized dairy farmers and Addis Ababa intra urban dairy farmers. Mastitis was identified as a major constraint by a wider group, including peri-urban dairy producers in secondary towns of the dairy belt.

Policies are important instruments to promote efficient production activities. However, inappropriate policies can do the opposite. The command economic system which lasted for almost two decades in Ethiopia has affected the livestock industry. Imports and exports of livestock inputs and outputs were controlled by the state. The provision of veterinary services was centralized and carried out by the Ministry of Agriculture (MOA). However, government veterinary services were inadequate. The delivery of veterinary services has been constrained by lack of resources and poor management leading to high transaction costs and staff disincentives. Inadequate infrastructure resulted in high transaction costs caused limited access of farmers to animal health services. Animal owners have relied not only on drugs from official markets but on traditional medicines and drugs from illegal (black) markets to a large extent because both the importation and distribution of veterinary drugs were controlled by the government.

Various donors have attempted to help the Ethiopian government in its efforts to address animal health issues. One example is the Fourth Livestock Development Project (FLDP), partly funded by the World Bank. In the first phase of this long-term program, constraints to improving smallholder animal production were addressed including health, nutrition and support services. The Pan African Rinderpest Campaign (PARC) set the target of vaccinating 80 per cent of the cattle population over two consecutive years. However, the execution of the project was reported to be slowed down by structural problems, unstable political environment, poor infrastructure and low staff motivation [FAO and World Bank 1993].

As already mentioned, there are various animal diseases reported in Ethiopia. However, in this study we give the epidemiological and economic characteristics of only three of the major diseases: rinderpest, trypanosomiasis, and tick and tick-borne diseases.

V. EPIDEMIOLOGICAL AND ECONOMIC CHARACTERISTICS OF DISEASES

Rinderpest

Rinderpest is a highly contagious disease of ruminants, particularly of cattle. It is transmitted by direct contact associated with the movements of animals. In endemic regions, mortality rates are about 10 per cent, and in newly infected regions they rise up to 90 per cent [Sere 1979]. The disease is controlled by vaccination. Owing to its epidemiological characteristics which link its prevalence to the production system, the disease has been easily controlled in Europe. However, in spite of widespread vaccination campaigns, it remains endemic in some nomadic areas of Africa.

Cognizant of its tremendous cost, African states, donor countries and agencies have waged an organized campaign to control rinderpest. Consequently, the Pan African Rinderpest Campaign (PARC) which is supported by the European Development Fund (EDF), FAO, OAU and the United Kingdom's Overseas Development Administration (ODA) was launched in 1986. PARC believes that mass vaccination and strengthening the privatization of veterinary services is the way to combat rinderpest in Africa. It has developed a mechanism for providing emergency funding to combat outbreaks of rinderpest that threaten to disrupt the orderly progress of eradication campaign. The PARC national coordination office in Ethiopia has tailored its vaccination campaign for endemic and sanitary cordon areas (Appendix 2). In Afar and western Ethiopia along the Sudanese border, the programme conducts blanket vaccinations to obtain a base level of herd immunity. To limit the highly probable spread of rinderpest in areas between the endemic and epidemic zones (sanitary cordon) where there is a high probability of rinderpest spread associated with the movements of animals, PARC focuses on the vaccination programme. In cases of the disease outbreak, a ring vaccination at a certain radius is conducted. The Ethiopian highlands are currently free from rinderpest and vaccinations are required only when outbreaks are reported. Some areas in the south, south-east and central highlands of Ethiopia are declared to be provisionally free from rinderpest.

Trends of vaccination coverage and the associated costs are given in Table 2. During the period 1988-92, almost 39 million animals were vaccinated. This includes a certain degree of double counting as some were vaccinated more than once. Almost 7.5 million Birr was spent for that vaccination coverage of which 57 per cent was financed by the Ethiopian government and 43 per cent by the EDF. However, this cost includes only operation costs, such as per diem and fuel but does not include the capital expenditure where EDF has the major share. An early study of the economic benefits of vaccinations

against rinderpest estimated both the economic losses prior to the programmes and the increased production through herd structure after the programme [Tremblay 1969]. By taking the percentage of cows in the herd structure and the percentages of calving rates of the cows, the value of the calves lost due to rinderpest were estimated. Animals that caught rinderpest but recovered were assumed to lose 50 kg of their body weight. Milk and meat production losses could be estimated in terms of money. The total losses due to rinderpest in the West African countries studied were estimated at US\$ 4 million. The quantified benefit from both productivity increases and an improved herd structure was estimated at 15 per cent or US\$ 27 million [Sere 1979]. In West Africa, at least the benefits were therefore almost 6 times greater than the costs.

Lack of information on herd structure and other parameters does not permit an estimate of the total economic losses in Ethiopia due to rinderpest. According to the information obtained from the PARC office, the current cost of vaccinating an animal which includes the vaccines and all other project costs is estimated to be US\$0.43. This estimation is low compared to the estimated average cost of US\$0.75 per animal for Africa.

Table 2: Trends of vaccination and costs for the campaign against rinderpest in Ethiopia

	1988	1989	1990	1991	1992	Total
No. of Animals Vaccinated(million)	3.13	17.8	8.14	5.5	4.2	38.77
Vaccination Expenditure (million Birr) and sources						
Government	1.19	0.98	0.52	0.49	1.09	4.27
EDF	0.19	0.78	0.92	0.81	0.49	3.19
Total	1.38	1.76	1.44	1.30	1.58	7.46

Source: PARC Coordination Office, Ethiopia (1993).

The vaccination programme against rinderpest is obviously a public good with externalities since the vaccination of an animal reduces the probability of other animals to catch the disease. Given the economic importance of this disease and the reluctance of smallholder farmers to confront it due to lack of information flow and resources, it is not possible to leave the vaccination programme to the market force. However, farmers with high value animals, access to markets and good information regarding the threat of the disease and the associated economic losses could purchase this public good. Indications are also that when there is an outbreak of the disease in sanitary cordon areas, livestock owners report to the nearby veterinary clinics and express their willingness to pay for the services delivered. Under such circumstances, vaccination against rinderpest has a public as well as a private component.

Trypanosomiasis

Trypanosomiasis is a parasitic disease caused by several species of the flagellate protozoa transmitted by tsetse flies. Ethiopia is reported to be one of the African countries which is most affected by trypanosomiasis [Langridge 1976; and MOA 1984]. It is estimated that 12 per cent of the 31 million cattle in Ethiopia are at the risk of trypanosomiasis [Mukhebi et al. 1994]. The disease is not contagious but has a high incidence in the south and southwest Ethiopia at altitudes below 2,000 meters above sea level (Appendix 3). The distribution of tsetse in Ethiopia has been rapidly spreading into agriculturally productive areas. A national tsetse survey conducted between 1971-76 estimated the total infested area to be approximately 98,000 km² [Langridge 1976]. However, since then, the infestation has expanded approximately from 150,000 to 200,000 km² [FAO and the World Bank 1993]. Three factors play a role in the extension of the disease to new areas: pushing livestock into the tsetse belt during the dry season for water and animal feed; movement of tsetse fly with moving objects (vehicles and other moving objects) from the tsetse belt to new areas; and adaptation of *Glossina* (tsetse flies) to new habitat [Tibebu Habtewold 1993].

The prevalence rates (at specific time) of bovine trypanosomiasis at different altitudes (four peasant associations, PAs) in Welaita are given in Table 3. The table indicates that the lower the altitude, the higher the prevalence rates are. The overall result shows that out of the 501 cattle examined, 60 are positive giving an average prevalence rate of 12 per cent.

The presence of tsetse flies greatly inhibits livestock production, denying farmers the benefits of milk, meat, draft power and manure. The economic cost of trypanosomiasis can be calculated as the sum of the value of product losses from mortality and morbidity, control and treatment costs.

ILRAD (1993b) has attempted to estimate the economic cost of an animal at the risk of trypanosomiasis. It has been estimated that the average economic cost of trypanosomiasis in Zimbabwe is about US\$7.60 per head of cattle at risk per annum. This cost is not known for Ethiopia where 3.7 million cattle (12 per cent of the total cattle population) are at risk of trypanosomiasis. If we apply Zimbabwe's average cost, the economic cost could be estimated at US\$28.1 million per annum.

Table 3: Prevalence of Bovine Trypanosomiasis at Different Altitudes in Welaita

Peasant Associations	Altitude (m.a.s.l.)	No. of cattle examined	No. of cattle positive	per cent of cattle positive (prevalence rate)
Fagena Mata	1000	90	24	26.7
Abella Foricho	1500	111	21	18.9
Humbolarena	1800	140	13	9.3
Kokate	2100	160	2	1.3
Overall		501	60	12.0

Source: Tibebe (1993), p. 41.

The high risk of trypanosomiasis has caused farmers to shift from cattle rearing to crop production and from animal traction to hand ploughing in the nomadic areas of southern Ethiopia [Mengesha 1986]. The control of tsetse continues to cost livestock owners, the government and donor agencies large sums of money in livestock productivity losses, deaths and control expenditure [Mukhebi et al. 1994]. In Ethiopia, the National Tsetse and Trypanosomiasis Investigation Centre (NTTIC) with the assistance of FAO and FLDP attempt to control the flies. Targets of coloured cloth with odour attractants (such as acetone and cow urine) impregnated with insecticides have been placed in four selected areas of Didessa Valley, Wellega [Slingenbergh 1992]. The flies die when they come in contact with the insecticide.

A preliminary estimation of the economic costs and benefits of tsetse control in the Didessa Valley was conducted by NTTIC. The cost of tsetse control by using the odour-baited target technique was estimated at US\$760 per km² (EB 4,788)⁴, as compared to US\$ 242 (EB 1,525) per year per km² for chemotherapy and chemoprophylaxis techniques. However, the latter approach needs to be repeated every year. The economic return in both cases is estimated to be US\$ 1,595 (EB 10,049) per year per km² [Slingenbergh 1992]⁵. Thus, it is economically justifiable to control the tsetse flies using the odour-baited target technique. The economic benefits of tsetse control depends on the rate at which the cleared areas are put to productive use. The estimation of the economic returns which is given above is also based on the assumption of full utilization of the livestock and crop production resources in the areas.

In the tsetse control program, an important issue is how the livestock owners could share the cost of controlling the tsetse flies. The International Livestock Centre for Africa (ILCA) with the collaboration of the International Livestock Research on Animal Disease (ILRAD) has been involved in research to investigate the cost of different techniques of tsetse control and farmers' willingness to pay for the control programme in Ghibe, 180 km west of Addis Ababa. A tsetse control trial was conducted using 500 targets in an area of 125 km² of the Ghibe valley. A sample of 859 households was compiled and stratified by

cattle ownership and residential location in order to investigate willingness to participate in the control program [Swallow 1994]. The results show that 59 per cent of the respondents volunteered both labour and money, 26 per cent volunteered only labour, 12 per cent volunteered only money and 3 per cent volunteered neither labour nor money. An econometric analysis indicated that information, cattle herd size and gender (male headship) increased the livestock owners' willingness to contribute to the programme. Livestock owners engaged in participatory process with external agencies providing capital, education and expert advice are more agreeable to contribute to control programme [Swallow 1994].

Control of the tsetse flies is primarily a public problem, but curing sick animals is a private one. Farmers use different sources of drugs including private shops, black markets and traditional medicines. In theory, livestock owners should be able to use public drug shops but access was limited due to the high transaction costs of bringing their animals to distant clinics for diagnosis before the drugs are sold to them. Instead, livestock owners purchase drugs at high prices from the nearby black market or use traditional medicine the quality of which is unknown, a phenomenon which greatly alarms the Ethiopian government [The Monitor 1994]. The flourishing black markets for drugs to cure trypanosomiasis indicates a potential demand for private practices in these areas.

As noted earlier, trypanosomiasis is not a contagious disease. However, because of the externalities of the tsetse control programme in the reduction of the risk of the economic losses associated with it, the control/eradication program needs to be carried out publicly. Nevertheless, the experience in Ghibe suggests that the participation of the local residents contributes to the success of tsetse control programs, and "community participation" is an important component to be considered in the policies towards the program. In this respect, tsetse control program has become a public as well as private good.

Tick and Tick-Borne Diseases

Of all external parasites, tick-borne diseases cause economic losses in livestock production in the world today [Sere 1979]. According to Sere (1979), the economic impact of ticks on livestock production can be divided into two types of effects: the direct effect of the tick burden itself and the effect of diseases transmitted by ticks and vectors. Little is known about the direct effects of ticks on livestock productivity and production. From the study conducted in Australia, [quoted in Sere 1979] it is reported that the direct effects of ticks on livestock include: 1) irritation from ticks causes licking and scratching, thus reducing feed intake, thus resulting in weight loss; 2) tick bites are subject to secondary infection, such as, streptotrichosis and screw worm attack, the first often leading to the loss of animal and the latter reducing the quality of hides. Experience from southern Africa suggests that there is a large difference (48 kg) in group mean-weight gain between heavily tick-infested and tick-free animals [Taylor and Plumb 1981]. Field trials in Kenya showed that animals dipped weekly gained an average of 78 gram per day more than undipped animals over a 30-week period [de castro et al. 1985a].

The major reasons for the prevalence of these diseases and the associated economic losses are the inadequacy and expense of cattle-dipping regimes. Tick and tick-borne disease control programmes have been the concern of governments. However, animal dipping is becoming the concern of individual livestock owners. Nevertheless, this programme requires public attention (provision of communal dips) because of the fact that individual livestock owners may fail to establish the necessary infrastructure.

The total amount of money spent by the Ethiopian government and donor agencies for different activities of controlling tick and tick-borne diseases is given in table 4. The table indicates that 1,278,000 US\$ was spent on the tick and tick-borne program of which 39 per cent was financed by the Ethiopian government and 61 per cent by donor agencies.

Table 4: Control and Monitoring Cost of Tick and Tick-Born Diseases

Activity/Project	Period	Donor agencies (US\$)	Ethiopian Government (US\$)	Total costs (US\$)
Disease survey	1986 - 89	580,000	422,000	1,002,000
Disease monitoring	1990 - 91	48,000	35,000	83,000
Bridging assistance in control	1990 - 92	150,000	43,000	193,000
Total		778,000	500,000	1,278,000

Source: PARC Ethiopia (1993).

The New Economic Policy and Veterinary Services

According to the new policy of Ethiopia which was published in 1993, the country has been decentralized into 14 regions. Consequently, the administration of veterinary services was also decentralized. Veterinary services are established in each region and services are provided through public veterinarians and animal health assistants. The recent staffing of veterinary services is given in Table 5. The table shows that the total number of practitioners include 324 veterinarians, 671 AHA, 1523 AHT and as well as 266 other categories of practitioners. These practitioners perform their tasks through government-established clinics and field offices the exact number of which is not well known. In general, the total number of veterinarians, veterinary assistants, vaccinators and scouts has significantly increased for the last few years. However, the operational budget for animal health is inadequate, the major share of the budget spent on personnel.

A distribution of clinics based on the old mapping of Ethiopia is illustrated in Appendix 1. The distribution map indicates that the number of clinics is not enough to meet the growing demand of livestock owners since large rural areas are far from any clinic. For instance, in North Shoa where the estimated livestock population is 1.6 million, there is only one standard clinic with laboratory facilities and six practitioners [Solomon Belete 1994].

Table 5: Regional Distribution of Veterinary Personnel (1993/94)

Regions	Qualifications*								
	1	2	3	4	5	6	7	8	Total
1	11	33			3	120	1		168
2	3	2	7			48			60
3	80	201		2	16	156	4	8	467
4	110	217		8	53	452	43		883
5	not reported								
6	3	9				116	1		129
Southern Ethiopia	93	135		1	21	437	22	8	717
12	5	11			2	22			40
13		2			2	1	1		6
14	3	13	5	17	8	8	9	3	66
Dire Dawa	8	12			2	111	5		138
TLDP	9	31				52	4	17	113
Total	324	671	5	28	107	1523	90	36	2784

*Qualifications of staff are categorized as follows:

- | | |
|-------------------------------|------------------------------|
| 1. Veterinarians | 5. Junior meat Inspector |
| 2. Animal health Assist.(AHA) | 6. Animal Health Tech. (AHT) |
| 3. Veterinarians (meat insp.) | 7. Laboratory Technician |
| 4. Senior meat Inspector | 8. Other Technicians |

Source: PARC phase III project.

In line with the New Economic Policy (SAP), the present government policy regarding veterinary services encourages privatization. However, existing private practices are facing monetary and institutional problems. As surveyed by the PARC coordination office, the major problems encountered by private clinic owners include [Solomon 1994]: shortage of funds for operating expenses; lack of veterinary equipment; lack of office space; and farmers' inability to pay the charges in some areas.

The main problems endured by pharmacy and drug shop owners are -- sales of drugs of unknown quality by illegal traders which dampen the sales outlets of licensed drug shops; importation of limited variety of drugs and disorganized distribution system; lack of financial capability to purchase sufficient drugs from distributors; unfair competition from subsidized government clinics in the sales of drugs; and lack of drugs for equine. Veterinary drug importers, such as: capital tied up in the importation of drugs is found to be very high; excessively long period for verification of imported drugs at the central laboratory; low level of foreign currency allowed at official exchange rate; scarcity of office and store facilities in urban areas; and difficulties with custom clearance of imported drugs.

In general, the major problem of private practices is lack of initial and operating capital. A survey was conducted (with some practitioners) during June-September 1994, and the number of practitioners who have expressed interest to start private practice include 24 DVMs and 31 AHAs and AHTs [Solomon Belete 1994]. Although some veterinarians desire to establish private veterinary services, the lack of resources and institutional problems have hindered them. To encourage private veterinary services, the Commission of the European Communities and the Transitional Government of Ethiopia have reached an agreement to assist practitioners establish their own private practices. In this regard, professional veterinarians who are privately operating will be assisted with the credit component for the acquisition of essential veterinary equipment and drugs under the PARC programme in Ethiopia [Solomon Belete 1994]. According to the loan arrangement, the major activities of the private set ups will be to treat sick animals, import and distribute veterinary equipment and drugs, vaccine and follow up the control of contagious diseases and inspection of livestock products. As indicated in Table 5, sub-professionals (AHA and AHTs) are the vast majority of practitioners. These practitioners are closer to the farmers since they are willing to travel to remote areas and reach the farmers. Therefore, credit schemes targeted to encourage privatization of veterinary services should not ignore these practitioners. Sub-professionals need to be provided with technical and financial assistance to establish private practices.

VI. CONCLUSIONS AND POLICY IMPLICATIONS

The broad rubric of veterinary services can be decomposed into preventive, curative and promotive services. Economic theory suggests that tsetse control and vaccination against contagious diseases are public goods since the benefits extend to the whole community, while curative services (diagnosis and treatment) for non-transmittable diseases are primarily private goods. The principles of privatization of veterinary services are basically associated with these definitions.

The experience of other countries attempting to reform veterinary services indicate that preventive services work better when managed by the state while privatization could be encouraged for curative services. On the other hand, however, privatization of curative

services has different impacts on different categories of livestock owners which means poor farmers, especially those who are in remote areas may not have access to necessary services. Experience also showed that liberalizing the importation and distribution of veterinary drugs increases the consumption of such drugs with a corresponding contraction in the black market. Regarding the veterinary personnel, while urban and peri-urban markets may attract well-equipped veterinarians, remote rural markets may not. In this situation, ill-equipped sub-professionals who perform basic but important veterinary tasks may be out of the market. These sub-professionals could, however, fill the service gaps in rural areas if provided with financial incentives.

The privatization of veterinary services cannot then be undertaken as one broad strategy but must be tailored to specific services. Given the importance of livestock for sustainable agricultural production, earning of foreign exchange and providing incomes to smallholder farmers, animal health policy must incorporate not only the need for economic efficiency but also the need for social equity and food security.

A well tailored combination of private and government services must be encouraged along the following lines:

1. Vaccination against contagious diseases, such as rinderpest, has very large public component because of the externalities. However, in some cases, the vaccination could be provided privately given the indications that where there is an outbreak of the disease, livestock owners report and express their willingness to pay for the services delivered. Similarly, tsetse control program is a public good but the experiment in Ghibe suggests that livestock owners are willing to share the costs of the tsetse control program given that they are provided with capital, education and technical advice. Thus, preventive services, such as vaccination against contagious diseases and tsetse control program have public and private components under certain circumstances.
2. Curative services for non-infectious diseases are entirely private goods, but in the case of infectious diseases, they may be public goods because of externalities. Thus, encourage privatization for curative services to the fullest extent possible and also consider cost recovery or subsidies for low income livestock owners as a form of welfare.
3. In areas where services could be provided privately, remove price subsidies that hamper private sector practices.
4. Liberalization of importation and distribution of drugs (with minimum transaction costs) with the role of the government in quality control.
5. Since sub-professionals are many in number, they can provide basic veterinary services, and could easily reach the farmers in remote areas, encourage them by providing with technical and financial support so that they establish their private practices.

6. Further research is required to understand the costs and benefits of controlling diseases and the current distribution of veterinary services as well as the capacity and willingness of potential users to pay for those services.
7. Further investigation is required to consider how animal health policy could be supportive to those members of farmers whose welfare depends on livestock and also the extent to which the state can afford it.

NOTES

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2. Morbidity rates are computed as the ratio of total number of cases to the total number of animals examined.
3. One of the major diseases, trypanosomiasis, is not included here.
4. In densely populated areas, the stocking density is up to 250 TLUs.
5. The estimation in local currency is based on the current exchange rate, that is, US\$1 = EB 6.30.

REFERENCES

- Addis A. (1983) 'Financing Animal Health Services in Some African Countries', LPU Working Paper No.1, ILCA.
- (1985) 'Financing Animal Health Services in Some Countries of East and Southern Africa', LPU Working Paper No. 6, ILCA.
- de Castro, J.J. et al. (1985a) 'Effects of Tick Intensification on Boran (*Bos indicus*) Cattle Immunised against Theileriosis in an Endemic Area of Kenya', Res. Vet. Sci., Vol. 39, pp. 279-288.
- de Haan, C., and Solomon B. (1991) 'Animal Health Services in Sub-Saharan Africa: Initial Experience with Alternative Approaches', ALPAN No.29, Addis Ababa, ILCA.
- Ephraim M. (1989) 'An Overview of Animal Health in Ethiopia', Proceedings of Second National Livestock Improvement Conference, 24-26 February, Addis Ababa.
- Department of Veterinary Services, MOA (1995) 'Regional Disease Prevalence Records', Unpublished Data, Addis Ababa, MOA.
- Feldman, A. (1980) Welfare Economics and Social Choice Theory, Boston: Kluwer Nijhoff Publishing.

- FAO and The World Bank (1993) Ethiopia: Livestock Sector Development Project, Rome, pub.
- FAO (1992) Production Yearbook 1992, Rome, FAO.
- Head, J. (1974) Public Goods and Public Welfare, North Carolina: Duke University Press.
- International Livestock Centre for Africa(ILCA) (1994) ILCA Annual Program Report on Urban and Peri-Urban Dairy Production, Addis Ababa, Ethiopia.
- International Livestock Research on Animal Diseases (ILRAD) (1993b) ILRAD Reports April 1993, Vol. 11, No. 2, Nairobi, ILRAD.
- Jahnke, H.E. (1976) Tsetse Flies and Livestock Development in East Africa, Munich: Weltforum Verlag.
- Gros, J.G (1993) 'The Search for "fair" Pricing Policy in the Private Delivery of Animal Health Services in Cameroon: A Case for Price Discrimination', Unpublished Essay, University of California.
- Langridge, B.W. (1976) 'Tsetse and Trypanosomiasis Survey of Ethiopia', Interim Report, Addis Ababa.
- Leonard, D.K. (1987) 'The Supply of Veterinary Services: Kenyan Lessons', Agricultural Administration, Vol. 26(4), p. 219-36.
- Leonard, D.K. (1990) 'Draft Research Proposal on the Organization of Animal Health Services in Africa' presented at the International Livestock Centre for Africa, University of California, Berkely.
- Leonard, K.D. (1993) 'Public Goods: Rivalness and Excludability and Externalities and Market Failure' in Alain de Janvry and Elisabeth Sadoulet, Rural Development Economics, A Text Book, chaps. 18 and 21, Berkeley: University of California.
- Mengesha F. (1986) 'Preliminary Trial on the Efficacy of Three Trypanocidal Drugs in Natural Infected Bovine', College of Veterinary Science, Addis Ababa University, Debrezeit.
- Ministry of Agriculture (MOA) (1984) 'Approach to Control of Trypanosomiasis with Reference to Settlement Areas', Addis Ababa, MOA.
- Mohammed M. (1994) 'The Demand for Alternative Provisions of Veterinary Services in Ethiopia: Policy Implications', Unpublished Research Proposal submitted to the University of California.
- Mukhebi, A.W. et al. (1994) 'Animal Disease Research For Food Security in Sub-Saharan Africa: The Case of Theileriosis and Trypanosomiasis in the Preferential Trade Area', Paper presented at the Symposium on Agricultural Policies and Food Security in Eastern Africa Region, May 18-29, Nairobi.
- PARC Ethiopia Coordination Office (1993) Final Report to Technical Advisor, Addis Ababa.
- PARC Ethiopia Coordination Office (1994), Phase III Project, Addis Ababa.
- Samuelson, P. (1954) 'The Pure Theory of Public Expenditure', Review of Economics and Statistics, Vol. 36, pp. 387-389.
- Sere, C. (1979) 'Towards an Economic Assessment of Veterinary Inputs in Tropical Africa', Working Document No. 1, Addis Ababa, ILCA.

- Solomon B. (1994) 'PARC Privatization of Animal Health Services: Sub-Program', Paper presented at the Eighth Annual Meeting of Ethiopian Veterinary Association (EVA), held at Addis Ababa, 5-7 October.
- Slingenbergh, J.H.W. (1992) 'Consolidation of Tsetse and Trypanosomiasis Control in the Upper Didessa Valley', Consultancy Report of Tsetse Control Specialist, Fourth Livestock Development Project, Addis Ababa, Ethiopia.
- Swallow, B.M. (1994) 'Using Contingent Valuation to Assess the Prospects for Community Participation in Public Goods Provision: The Case of Trypanosomiasis Control', Paper presented at the Rockefeller Foundation/ILCA Social Science Fellows Workshop, Addis Ababa, ILCA November 14-18.
- Taylor, R.J. and Plumb, I.R. (1981) 'The Effect of Natural Tick Infestation on various Blood Components and Livemass in the Bovine in South Africa', in Whitehead and G.B. Gibson, JD (eds.) Tick Biology and Control, p. 21-28, Grahamstown, Rhodes University.
- The Monitor (1994), No. 3. p. 2, Addis Ababa, Ethiopia.
- Tibebu H. (1993) 'Bovine Trypanosomiasis in Welaita: Prevalence and Assessment of Drug Efficacy', Unpublished Doctoral Thesis (M.D.), Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit.
- Tremblay, R.H. (1969) 'Economic Evaluation of the Rinderpest Eradication Campaign in West Africa', Report, USDA.
- Umali, Feder, G. and de Haan (1992) 'The Balance between Public and Private Sector Activities in the Delivery of Livestock Services', Discussion Paper No. 163, Washington, D.C., The World Bank.
- Winrock International (1992) 'Assessment of Animal Agriculture in Sub-Saharan Africa', Arkansas, Winrock International.
- World Bank (1987) 'Financing Health Services in Developing Countries: An Agenda for Reform, The World Bank Policy Study, Washington D.C., USA.