

**EAST AFRICA DAIRY DEVELOPMENT PROJECT
BASELINE SURVEYS REPORT**

REPORT 4

**LIVESTOCK DISEASE CHALLENGES AND GAPS IN
ANIMAL HEALTH SERVICE DELIVERY**



JUNE 2010



East Africa Dairy Development

In partnership with



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1 Introduction

Livestock contributes significantly to the welfare of smallholder farmers in developing countries through reduced vulnerability, assurance of food security and income (LID 1999; IFAD 2004). It is an important component in local economies at both national and farm household level, where cattle constitute the main livestock species kept by farmers. As elsewhere in these countries, the contribution of livestock to livelihoods in East Africa is constrained by poor health, inadequate nutrition, inappropriate genetics, and poor market access. More recently, animal health problems have once more been ranked by farmers among the top challenges to increased dairy productivity in Uganda, Kenya and Rwanda (EADD PRA Reports, 2008). Overcoming these challenges can assist poor livestock keepers escape from poverty and create wealth (Perry *et al.*, 2005). A major question however has been which mix of delivery systems (public and private) is optimal given the strengths, weaknesses and viability of different types of service providers. Depending on degree of private benefit, poor users have been shown to be willing and able to pay for services (IFAD 2004). These payments are critical in ensuring the user ownership of a given service delivery system and its sustainability.

Tick and tick-borne diseases (TTBDs) have over the years been considered the most important disease constraints in dairy production systems due to the relative higher morbidity (or sickness) and mortality rates attributed to them compared to other diseases. Important TTBDs in East Africa include East Coast Fever (ECF), Anaplasmosis, Babesiosis, Heart Water and tick burdens. Approximately 90% of Africa's estimated 200 million cattle are at risk of infection from TBDs (ASARECA, 2009), and the impacts on improved dairy breeds is usually higher. Other common health constraints include notifiable diseases, which on detection must be reported to the government authorities for official public measures of prevention and control to be taken. Notifiable diseases include Foot and Mouth Disease, Lumpy Skin Disease, Anthrax among others. In order to effectively contribute to poverty alleviation through livestock, it is important to enhance health and productivity of livestock and livestock products while preserving the environment. This calls for development or improvement and adoption of appropriate biotechnological tools for disease control.

It is widely recognised that following withdrawal of government support to provision of 'private good' services (e.g., clinical services) in the 1980's, the process of encouraging

business development services in the provision of such services in East Africa, whether through independent, privately-owned veterinary practices, or "out-sourcing" (contracting of private veterinarians by the public sector for delivery public good health services), has not resulted in optimal access by farmers to those services. Availability and use of such services depends on the level of farmers' market orientation which underlies not only his/her willingness to pay for services, but also their ability to pay. For public good services, difficulties such as inadequate drug supplies and their quality assurance, poor infrastructure, high costs of inputs and availability of health service providers continue to constrain the improvement of the dairy sector. And despite perceived increased benefits of employment and income opportunity from private services delivery, the private sector appears constrained by lack of capital or collateral, high operational costs and poor infrastructure (FARM Africa, 2003). Defining which services are viable where and taking measures to fill the gap has been a major challenge.

A household survey conducted in Uganda shows sub-optimal access and use of veterinary and extension advisory services (by only 30% of surveyed households) even in areas with high cattle population densities (Staal and Kaguongo, 2003). In Kenya, a survey conducted around the same time revealed relatively good access to public extension advisory services although farmers reported only a single visit annually (Waithaka *et.al*, 2002). These findings point to the need to expand both access and use to improve disease control.

This report describes the most recent findings generated by the East Africa Dairy Development Project on disease occurrence and access to health services as perceived by farmers and, based on that, provides an assessment of gaps in animal health service delivery in Uganda, Kenya and Rwanda. Further the report compares mortality rates, between young and adult animals. The aim is to establish a baseline for monitoring and to inform measures, especially BDS services, targeted at addressing the gaps. Information provided in this report could also be used to map disease "hot spots" within EADD sites, where disease burden is high. Information related to the data (surveyed sites and sample size) is provided in the EADD Baseline Report No 1.

2 MORBIDITY AND OUTCOME

2.1 Morbidity

About 90% (Uganda 91%, Rwanda 88% and Kenya 89%) of households with dairy cattle reported having had a health problem in their herd in the past year. Major diseases in the three countries, as perceived by farmers, include tick-borne (ECF and Anaplasmosis), notifiable diseases (Lumpy Skin Disease, Foot and Mouth Disease (FMD)) and other conditions that are often associated with poor herd health management (see Table 1). Overall, ECF and intestinal worms were the most common herd problems reported by 38.3% and 28.0% of households, respectively. Reported disease occurrence (as perceived by dairy farmers and cross-checking with animal health assistants during the survey) in the three countries and specific designated EADD hubs is presented in Table 2a, 2b and 2c.

Table 1: Percentage of households reporting common animal health problems in the last 12 months in Uganda, Rwanda and Kenya

	All dairy households		Uganda		Rwanda		Kenya	
	n=856	%	n=230	%	n=169	%	n=517	%
East Coast Fever	328	38.3	144	62.6	16	9.5	163	31.5
Intestinal worms	240	28.0	128	55.7	38	22.5	74	14.3
Foot and Mouth Disease	113	13.2	16	7.0	4	2.4	93	18.0
Diarrhoea	109	12.7	18	7.8	73	43.2	18	3.5
Trypanosomosis	109	12.7	60	26.1	18	10.7	31	6.0
Anaplasmosis	91	10.6	8	3.5	53	31.4	30	5.8
Mastitis	80	9.3	9	3.9	4	2.4	67	13.0
Lumpy skin disease	79	9.2	45	19.6	10	5.9	24	4.6
Tick borne/Burden	52	6.1	13	5.7	36	21.3	3	0.6

East Coast Fever was reported by majority of farmers as the most important disease in the herd in Uganda (63%) and Kenya (36%), while Diarrhoea was the commonly reported health problem in Rwanda (43%). Tables 2a, 2b and 2c show the percentage cattle keepers reporting diseases by each of the EADD hub.

Table 2a: Percentage of households reporting most frequent diseases by each EADD hub in last 12 months¹ in Uganda

Hub	Cattle Keepers (n)	% household								
		ECF	Intestinal worms	Trypano somosis	LSD	Diarr hoea	FMD	Tick burden	Mastitis	Anaplas mosis
Bbaale	40	87.5	57.5	12.5	32.5	0.0	10.0	10.0	0.0	0.0
Luwero	28	89.3	60.7	17.9	14.3	14.3	25.0	0.0	21.4	0.0
Masaka	31	25.8	29.0	9.7	3.2	3.2	6.5	12.9	3.2	6.5
Mukono	43	81.4	86.0	41.9	11.6	9.3	0.0	2.3	0.0	4.7
Kakooge	52	55.8	55.8	42.3	9.6	15.4	1.9	1.9	0.0	5.8
Bumanya	36	33.3	36.1	19.4	47.2	2.8	5.6	8.3	5.6	2.8
Total	230	62.6	55.7	26.1	19.6	7.8	7.0	5.7	3.9	3.5

ECF and intestinal worms were reported as the most common health problems, in Uganda (reported by 63% and 56% respectively of the total cattle keepers) (see Table 2a). Bbaale (88%) and Luwero (89%) had the highest number of cattle keepers reporting ECF. On the other hand, the highest cases of intestinal worms, were reported from Mukono (86% of the cattle keepers). Typanosomosis was reported by about one quarter of the cattle keepers, with the highest number of cases from Mukono and Kakooge (42%). Lumpy skin disease is also a common health problem in Uganda; particularly in Bumanya (reported by 47% of cattle keepers). Of the notifiable diseases, FMD was the most commonly reported disease in Luwero by 25% of the cattle keepers and 10% in Bbaale.

Table 2b: Percentage of households reporting most frequent diseases by each EADD hub in last 12 months in Rwanda

Rwanda	Cattle keepers (n)	% household								
		Diarrh oea	Anapla smosis	Intestina l worms	Tick burden	Trypanos omosis	ECF	LSD	FMD	Mastitis
Bwisanga	43	48.8	39.5	37.2	16.3	7.0	7.0	4.7	0.0	2.3
Kabarore	40	42.5	40.0	27.5	25.0	10.0	10.0	10.0	2.5	2.5
Mbare	53	37.7	22.6	11.3	15.1	17.0	15.1	7.5	5.7	0.0
Nyagihanga	33	45.5	27.3	18.2	33.3	6.1	3.0	0.0	0.0	6.1
Total	169	43.2	32.0	23.1	21.3	10.7	9.5	5.9	2.4	2.4

¹ The total may not add up to 100% because in some instances farmers mentioned more than one disease while in others farmers did not mention any disease.

Diarrhoea and Anaplasmosis were reported as the most common animal health problems in Rwanda, reported by 43% and 32% of the cattle keepers, respectively (see Table 2b) . The highest cases of diarrhoea were reported in Bwisanga (49%), while Anaplasmosis was highest reported in Kabarore (40%). Unlike in Uganda, ECF was reported by very few cattle keepers in Rwanda (9%). Intestinal worms and tick burden are also common health problems in Rwanda, reported by 23% and 21% respectively.

Table 2c: Percentage of households reporting most frequent diseases by each EADD hub in last 12 months in Kenya

Kenya	Cattle keeper s (n)	% household								
		ECF	FMD	Intestinal worms	Mastiti s	Anaplas mosis	Trypanos omosis	LSD	Diarr hoea	Tick burden
Kabiyet	70	74.3	45.7	12.9	37.1	2.9	0.0	4.3	12.9	0.0
Metkei	71	47.9	35.2	21.1	4.2	1.4	2.8	1.4	1.4	0.0
Siongiroi	69	50.7	29.0	27.5	8.7	14.5	11.6	8.7	1.4	0.0
Siaya	43	20.9	2.3	46.5	9.3	18.6	48.8	16.3	9.3	0.0
Soy	67	11.9	13.4	10.4	13.4	1.5	0.0	3.0	0.0	4.5
Kandara	64	7.8	3.1	4.7	17.2	4.7	0.0	6.3	0.0	0.0
Kaptumo	73	27.4	5.5	1.4	11.0	6.8	0.0	1.4	4.1	0.0
Total	457	35.7	20.4	16.2	14.7	6.6	6.8	5.3	3.9	0.7

Most frequent diseases in Kenya were reported to be EFC (36%) and Foot and Mouth Disease (FMD) (20%) (see Table 2c above). Kabiyet reported the highest cases of EFC (74%) as well as FMD (46%). ECF is also common in Metkei and Siongiroi reported by about half of the total cattle keepers in the two villages. Intestinal worms is an important health problem in Siaya (reported by 47% of cattle keepers), as well as Trypanosomosis (49%). More households in Kabiyet (37.1%) reported mastitis than any other hub in Kenya.

Looking at the scenario in Kenya 10 years ago, majority of the farmers reported intestinal worms as the most common animal health problem; 22% of the total cattle keepers (see Table 2d below). However, in Nandi, where most of the EADD sites are located, ECF dominated among the reported diseases; reported by 52% of the interviewed cattle keepers in that district. FMD and Anaplasmosis were also noted to be important diseases western Kenya.

Table 2d: Percentage of households reporting most frequent diseases by each EADD hub in last 10 years in Kenya

District	Cattle keepers	% household									
		Intestinal worms	ECF	Anaplasmosis	FMD	Pneumonia	Diarrhoea	Mastitis	LSD	Tick burden/ Tick borne	Calf mortality
Bungoma	80	14	23	18	34	10	15	8	1	10	1
Kakamega	133	13	10	11	13	20	16	2	4	0	2
Kisii	191	35	15	16	6	4	3	4	4	1	0
Nandi	103	9	52	9	8	2	8	12	9	0	4
Nyamira	164	16	18	23	5	5	3	9	5	1	0
Rachuonyo	104	10	9	21	15	7	10	2	4	3	0
Vihiga	237	35	8	13	5	12	8	5	1	4	1
Total	1012	22	17	16	10	9	8	6	4	2	1

Source: SDP data (1994-1998)

2.2 Frequency of occurrence of Common Health Problems per farm

Now looking at actual occurrence among farmers reporting these diseases, in all three countries, tick burden, intestinal worms, ECF and Trypanosomosis were reported to occur more repeatedly (reflecting higher crude incidence rate per year) than other health problems (Table 3). Occurrences are defined as number of events per farm in the last 12 months. Ugandan farmers appear to suffer higher crude TTBDs incidence rates than Kenya and Rwanda.

Table 3: Frequency of disease events per farm and by country in the last 12 months (number of dairy farmers)

Disease	Overall		Uganda		Rwanda		Kenya	
	n	Freq	n	Freq	n	Freq	n	Freq
East Coast Fever	323	3.0	144	4.5	16	2.3	163	1.7
Intestinal worms	240	4.4	128	6.3	38	1.8	74	2.3
Foot and Mouth Disease	113	1.2	16	2.1	4	1.0	93	1.1
Diarrhoea	109	2.8	18	7.8	73	1.9	18	1.6
Trypanosomosis	109	3.5	60	4.9	18	1.9	31	1.6
Anaplasmosis	91	1.6	8	3.1	53	1.5	30	1.4
Mastitis	80	1.4	9	1.2	4	1.3	67	1.4
Lumpy skin disease	79	2.9	45	3.3	10	4.5	24	1.5
Tick borne/Burden	52	8.1	13	11.1	36	7.4	3	2.7

2.3 Disease Outcome

Majority of affected herds were reported to have survived from the diseases mentioned (Figure 1). Among the most common animal health problems, those diseases reported by households as resulting in most deaths included ECF (29.4%), Anaplasmosis (15.4%), Trypanosomosis (12.8%) and FMD (10.6%) .Few sick animals were reported to have been slaughtered.

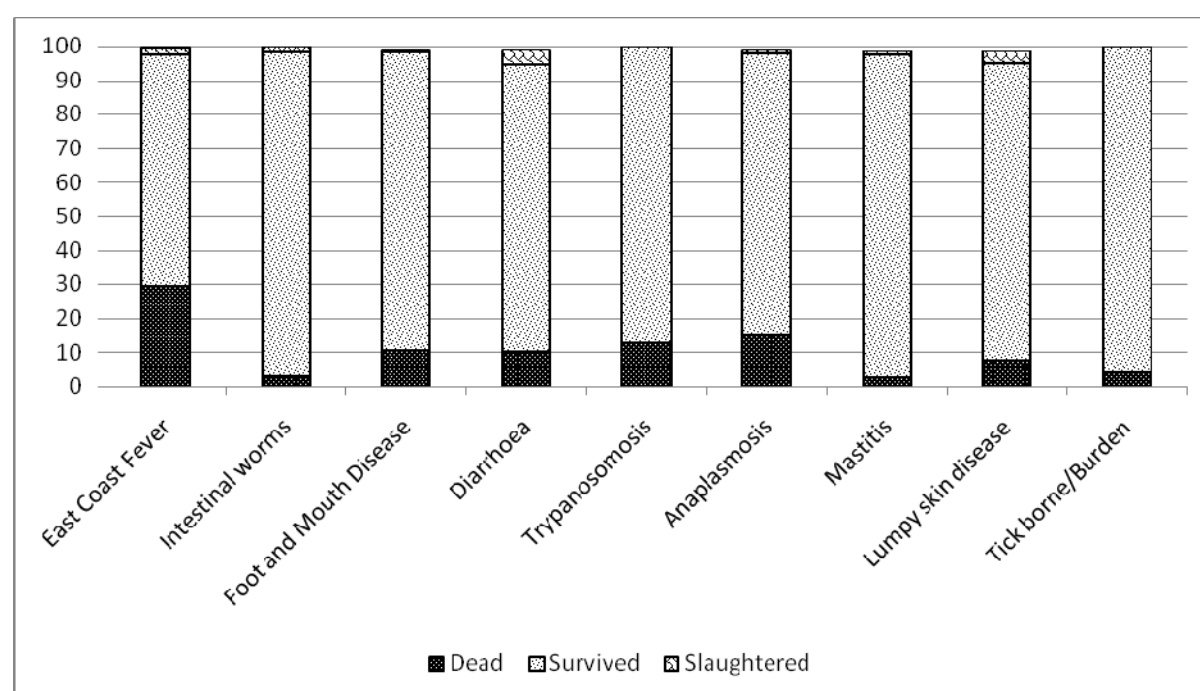


Figure 1: Outcome of the most common animal health problems in Uganda, Rwanda and Kenya in the last 12 months²

Table 4 gives farmer perceptions of diseases outcomes by country. In Uganda, out of 230 dairy households interviewed, the most deadly diseases were reported as FMD (25% of cases) and ECF (22.2% of cases), while in Kenya, where 457 dairy households were interviewed, most deaths were reported as arising from ECF (37.4% of cases) by households reporting disease.

² Percentage outcome of some diseases may not add up to 100% as some farms reported both death and survival of some animals to those diseases. Such combined outcomes were not included in the calculation.

Table 4: Outcome of common animal health problems in the last 12 months

Country		n	Dead ³ (%)	Survived (%)	Slaughtered (%)
Uganda	EFC	144	22.2	72.9	4.2
	Intestinal worms	128	3.1	94.5	2.3
	Diarrhoea	18	16.7	66.7	16.7
	FMD	16	25.0	68.8	0.0
	Trypanosomosis	60	13.3	86.7	0.0
	Lumpy skin disease	45	6.7	86.7	4.4
	Mastitis	9	0.0	88.9	0.0
	Tick burden	13	0.0	100.0	0.0
	Anaplasmosis	8	25.0	62.5	12.5
Rwanda	Diarrhoea	73	4.1	91.8	2.7
	Anaplasmosis	53	11.3	86.8	0.0
	Intestinal worms	38	0.0	100.0	0.0
	Trypanosomosis	18	5.6	94.4	0.0
	EFC	16	12.5	87.5	0.0
	Lumpy skin disease	10	10.0	90.0	0.0
	FMD	4	25.0	75.0	0.0
	Tick burden	36	2.8	97.2	0.0
	Mastitis	4	0.0	100.0	0.0
Kenya	EFC	163	37.4	62.0	0.6
	FMD	93	7.5	91.4	1.1
	Intestinal worms	74	4.1	94.6	1.4
	Mastitis	67	3.0	95.5	1.5
	Anaplasmosis	30	20.0	80.0	0.0
	Trypanosomosis	31	16.1	83.9	0.0
	Lumpy skin disease	24	8.3	87.5	4.2
	tick burdrn	3	33.3	66.7	0.0
	Diarrhoea	18	27.8	72.2	0.0

Out of the 169 surveyed dairy farmers in Rwanda, most deaths (from the diseases mentioned) reported by affected households in the past year were associated with FMD (25%) and ECF (12.5%). About 6 (9.6%) death cases related to Anaplasmosis were reported in Rwanda

³ Indicator of crude fatality rate at herd level

2.4 Cattle mortality rates

This sub-section goes to an in-depth analysis that looks at the death outcome cases as a result of disease infection by hub, as well as mortality rates, comparing the rates between young and adult animals within a period of 12 months to the survey date. Table 5 adds to the information given in Table 4 by showing percentage number of farmers reporting diseases associated with highest mortality rates by hub.

Table 5: Percentage number of farmers who reported death as outcome of various diseases in the last 12months⁴.

	<u>ECF</u>		<u>Anaplasmosis</u>		<u>FMD</u>		<u>Diarrhoea</u>		<u>Trypanosomosis</u>		<u>Intestinal worms</u>		<u>Mastitis</u>		<u>LSD</u>		<u>Tick burden</u>	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Uganda	144	22.2	8	25.0	16	25.0	18	16.7	60	13.3	128	3.1	9	0.0	45	6.7	13	0.0
Bbaale	35	17.1	0	0.0	4	25.0	0	0.0	5	0.0	23	0.0	0	0.0	13	7.7	4	0.0
Luwero	25	16.0	0	0.0	7	0.0	4	0.0	5	0.0	17	0.0	6	0.0	4	0.0	0	0.0
Masaka	8	12.5	2	0.0	2	50.0	1	0.0	3	0.0	9	0.0	1	0.0	1	0.0	4	0.0
Mukono	35	11.4	2	0.0	0	0.0	4	75.0	18	5.6	37	2.7	0	0.0	5	0.0	1	0.0
Kakooge	29	55.2	3	66.7	1	100.0	8	0.0	22	22.7	29	6.9	0	0.0	5	0.0	1	0.0
Bumanya	12	8.3	1	0.0	2	50.0	1	0.0	7	28.6	13	7.7	2	0.0	17	11.8	3	0.0
Rwanda	16	12.5	54	11.1	4	25.0	73	4.1	18	5.6	39	0.0	4	0.0	10	10.0	36	2.8
Bwisanga	3	0.0	17	5.9	0	0.0	21	0.0	3	0.0	16	0.0	1	0.0	2	0.0	7	0.0
Kabarore	4	50.0	16	18.8	1	0.0	17	0.0	4	0.0	11	0.0	1	0.0	4	25.0	10	0.0
Mbare	8	0.0	12	8.3	3	33.3	20	15.0	9	11.1	6	0.0	0	0.0	4	0.0	8	12.5
Nyagihanga	1	0.0	9	11.1	0	0.0	15	0.0	2	0.0	6	0.0	2	0.0	0	0.0	11	0.0
Kenya	163	37.4	30	20.0	93	7.5	18	27.8	31	16.1	74	4.1	67	3.0	24	8.3	3	33.3
Kabiyet	52	26.9	2	0.0	32	3.1	9	11.1	0	0.0	9	11.1	26	3.8	3	33.3	0	0.0
Metkei	34	50.0	1	0.0	25	12.0	1	0.0	2	0.0	15	6.7	3	0.0	1	0.0	0	0.0
Siongiroi	35	37.1	10	20.0	20	5.0	1	100.0	8	25.0	19	5.3	6	0.0	6	0.0	0	0.0
Siaya	9	77.8	8	37.5	1	0.0	4	25.0	21	14.3	20	0.0	4	0.0	7	0.0	0	0.0
Soy	8	25.0	1	0.0	9	11.1	0	0.0	0	0.0	7	0.0	9	11.1	2	0.0	3	33.3
Kandara	5	20.0	3	0.0	2	50.0	0	0.0	0	0.0	3	0.0	11	0.0	4	25.0	0	0.0
Kaptumo	20	35.0	5	20.0	4	0.0	3	66.7	0	0.0	1	0.0	8	0.0	1	0.0	0	0.0
Total	323	29.4	92	15.2	113	10.6	109	10.1	109	12.8	241	2.9	80	2.5	79	7.6	52	3.8

⁴ Indicator of crude fatality rate at herd level

Note: n represents the number of households who reported cases of the disease in question

Across the hubs, Siaya reported the highest death cases from ECF in Kenya (78% of total infections), while Kakooze reported the highest in Uganda (55%). Anaplasmosis resulted to the highest percentage of death cases in Kabarore among the hubs in Rwanda (19%), while in Uganda and Kenya it was highly fatal in Kakooze, causing death to the 2 out of the three cases of infection reported and Siaya (38% deaths of total infections) respectively. A few death incidences from Foot and mouth (FMD) infection were reported from Kenya (reported by 7 households), with the highest number of death cases reported from Metkei (3 cases). Diarrhoea is also an important disease especially in Kenya, where it was reported to have caused death in 5 (28%) households. High percentage of deaths from ECF infections in Siaya is also confirmed by Otieno *et.al.*,(2006), whose study indicated presence of high tick challenge and EFC infection rates in the district. Lack of money, poor information/ knowledge and low safety efficacy of existing prevention measures explains the low utilisation of tick control measures in this district and hence high number of cattle deaths (IFAD, 2004).

The study goes further to look at the mortality rates of cattle from diseases. Mortality rate in this study is defined as number of dead animals within a period of one year. This rate is computed as follows:

$$\text{Adult Mortality rate} = \frac{\text{Number of dead animals}}{\text{Average number of animals at risk (NAR)}}$$

$$\text{Calf mortality rate} = \frac{\text{Number of calves dead}}{\text{Current Number of calves + withdrawn calves}}$$

Where:

-Average number of animals at risk (NAR) = (Initial herd size+ Current herd)/2

-Initial herd size = Current herd size- Herd Entries (purchases, births) + Herd exits (Sold, deaths)

-Withdrawn calves=Dead calves + sold calves

Table 6 below presents calf mortality rates, differentiating the rates between exotic and local breeds among the cattle keepers by hub. Also presented in this Table is the number of calves that were reported to have died per village. The analysis excludes households who didn't own cattle before the last 12months of the survey date. Kenya reported the highest calf mortality rate, for both genotype categories: 3.3% exotic calf and 3.5% for local breeds. The highest

calf mortality rate among the exotic calves was reported in Siongiroi in Kenya (10%), while the highest rate among the local breed of calves was reported in Masaka, Uganda (10.7%).

Table 6: Calf mortality rates as a result of disease infection

Village	Exotic calves			Local calves		
	Exotic Cattle keepers	No. of dead exotic calves	Average exotic calf mortality rate	Local Cattle keepers	No. of dead local calves	Average local calf mortality rate
Uganda	57	3	0.9	203	22	2.9
Bbaale	14	3	3.8	33	3	1.0
Luwero	4	0	0.0	26	5	7.4
Masaka	8	0	0.0	25	5	10.7
Mukono	24	0	0.0	33	1	0.8
Kakooge	6	0	0.0	51	8	1.6
Bumanya	1	0	0.0	35	0	0.0
Rwanda	71	0	0	153	1	0.2
Bwisanga	16	0	0	35	0	0.0
Kabarore	17	0	0	38	0	0.0
Mbare	32	0	0	49	1	0.7
Nyagihanga	6	0	0	31	0	0.0
Kenya	329	21	3.3	168	15	3.5
Kabiyet	70	5	2.2	1	0	0.0
Metkei	38	7	6.8	35	3	2.6
Siongiroi	35	5	10.0	41	5	3.9
Siaya	7	0	0.0	41	5	7.3
Soy	63	0	0.0	20	0	0.0
Kandara	63	2	3.2	1	0	0.0
Kaptumo	53	2	2.2	29	2	1.3

Looking at adult animals' mortality rate, Uganda recorded the highest average among exotic adult animals (8.6%), while Kenya reported the highest rate among the local breed (3.4%) (see Table 7). Among the hubs, Bumanya in Uganda reported the highest rate among the exotic breed of cattle (50%), while Siaya, in Kenya reported the highest among local breeds (8.3%). This situation in Siaya could be related to ECF disease which was reported to have caused death to over half of the infection cases that were reported in this hub (see Table 5).

Table 7: Adult animals' mortality rates over the last 12 months

	Exotic adult animals			Local adult animals		
	Exotic Cattle keepers	No. of dead exotic adult	Average exotic adult mortality rate	Local Cattle keepers	No. of dead local adult	Average local adult mortality rate
Uganda	57	19	8.6	203	42	1.9
Bbaale	14	4	1.1	33	11	1.9
Luwero	4	1	10.0	26	2	0.3
Masaka	8	1	0.0	25	1	0.2
Mukono	24	9	15.6	33	1	0.9
Kakooge	6	3	1.7	51	22	2.3
Bumanya	1	1	50.0	35	5	4.6
Rwanda	71	11	2.4	153	18	0.9
Bwisanga	16	0	0.0	35	1	1.1
Kabarore	17	3	4.0	38	3	0.5
Mbare	32	8	3.3	49	12	1.3
Nyagihanga	6	0	0.0	31	2	0.3
Kenya	329	69	4.9	168	26	3.4
Kabiyet	70	9	1.5	1	0	0.0
Metkei	38	12	7.6	35	3	1.7
Siongiroi	35	10	4.2	41	8	2.7
Siaya	7	1	0.0	41	10	8.3
Soy	63	23	9.9	20	2	2.2
Kandara	63	5	5.2	1	0	0.0
Kaptumo	53	9	2.1	29	3	0.7

Table 8 shows age-specific incidences of mortality of cattle in Western Kenya, 10 years ago. The highest infection (172) and death (109) incidences of ECF was observed among adult animals. A similar scenario was observed with the rest of the diseases. There were no cases of ECF, pneumonia, FMD and LSD diagnosed among less than 1 year old calves.

Table 8: Age-specific incidences of death from diseases in Western Kenya

Age category (Yrs)	<u>ECF</u>		<u>Anaplasmosis</u>		<u>Pneumonia</u>		<u>FMD</u>		<u>LSD</u>		<u>Diarrhoea</u>	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
<0.5	0		1	0	0		0		0		1	0
0.5 to <1	0		0		0		0		0		0	0
1 to <2	0		1	1	1	1	2	1	1	1	0	0
>2	172	109	156	47	88	22	99	32	7	17	79	19

Source: SDP data (1994-1998)

3 DISEASE PREVENTIVE MEASURES AND PARTICIPATION OF ANIMAL HEALTH SERVICE PROVIDERS

3.1 Overview

Most households in the three countries reported having carried out preventive measures against various animal health problems. Top of the list were measures taken against intestinal worms (90% of dairy farmers) and tick borne diseases (90%) in the past year (Table 9)⁵. A relatively high proportion of farmers (63.3%) also reported having vaccinated their cattle against the notifiable diseases in the same period. Uganda however, had the least farmers (37.4%) among the three countries reporting vaccinations. The accuracy of these data may be verified using for example vaccination campaigns records or statements by animal health service providers.

Table 9: Percentage households practising routine management practices and curative treatment in the last 12 months

Country	Dairy households (n)	Anthelmintics (%)	Vaccination (%)	Tick control (%)	Curative (%)
Uganda	230	91.3	37.4	97.0	77.8
Rwanda	169	84.0	71.0	86.4	50.3
Kenya	457	91.5	73.5	87.7	56.0
Overall	856	90.0	63.3	90.0	60.7

3.2 Preventative measures

3.2.1 Tick control

Ticks and tick-borne diseases (TBDs) are some of the most significant and serious constraints to the improvement of livestock production in Africa. The TTBDs affect production in various ways, such as growth rate, milk production, fertility, the value of hides and mortality. The major TBDs in East Africa include; East Coast Fever (ECF), anaplasmosis, babesiosis, heart water and black Quarter. Use of acaricides remains the most prevalent method of tick control in

⁵ It is important to note that farmers tend to report higher compliance in undertaking disease control measures in a cross-section survey like this one. These figures should therefore be cross-checked through subsequent monitoring.

East Africa. Other strategies include feeding in non-infested pastures and also the remotely used method of hand picking. This section looks at the incidences of tick control and the common methods utilized in the EADD sites.

3.2.1.1 Frequency of tick control

EADD baseline survey seek to find out the number of times farmers control tick within the project sites. The statistics of frequency of control are presented in Table 10 below. Of interest here is that farmers practicing intensive systems, were reported to control tick less times than those practising extensive system of cattle management. A good example is Kandara hub in Kenya where an average of 16 times of tick control per year was reported. This could be explained by the fact that, cattle in the extensive system are more exposed to tick infections during free grazing unlike in the intensive system where cattle movement is controlled.

Table 10: Frequency of tick control for the last 12 months

Country/ Village	N	Min	Median	Mean	Max	Sd
Uganda	221	1	48	35	104	21
Bbaale	39	2	52	44	104	19
Luwero	28	1	48	42	56	16
Masaka	28	1	7.5	13	52	15
Mukono	40	1	48	40	96	20
Kakooge	50	2	52	49	56	10
Bumanya	36	1	10	11	52	9
Rwanda	142	1	48	34	144	30
Bwisanga	32	1	37.5	34	108	34
Kabarore	38	1	48	44	144	31
Mbare	50	1	48	33	104	28
Nyagihanga	22	1	8.5	19	54	21
Kenya	399	1	40	34	104	19
Kabiyet	66	1	52	46	104	14
Metkei	70	1	48	36	52	14
Siongiroi	68	1	26	36	52	14
Siaya	34	1	4	10	48	14
Soy	64	1	48	32	72	21
Kandara	24	1	4	12	64	15
Kaptumo	73	1	48	39	96	16

Kakooge in Uganda, a pastoralist dominated area, reported the highest frequency of tick control of about 52 times per year, translating to weekly tick control. A median of over 10 in

most of the hubs indicates that, well over half of the cattle keepers controlled tick at least once in a month.

3.2.1.2 Methods of tick control

Table 11 shows the number and percentage households using different methods of tick control. Use of acaricides is outstanding in all the three countries, used by 92%, 76% and 89% of total cattle keepers in Uganda, Rwanda and Kenya respectively. Controlled grazing is practiced by a few farmers in all the countries, but predominant in Rwanda (reported by 14% of the cattle keepers). About 16% of the cattle keeping in Rwanda practice hand picking, this however a rare practice in Uganda and Kenya.

Table 11: Percentage farmers using acaricides and frequency of use in the last 12 months

Village	Cattle keepers	Acaricides		Controlled grazing		Hand picking	
		n	% ⁶	n	%	n	%
Uganda	230	212	92	21	9	11	5
Bbaale	40	39	98	4	10	3	8
Luwero	28	22	79	8	29	0	0
Masaka	31	29	94	0	0	0	0
Mukono	43	39	91	0	0	3	7
Kakooge	52	49	94	9	17	0	0
Bumanya	36	34	94	0	0	5	14
Rwanda	169	129	76	23	14	27	16
Bwisanga	43	26	60	7	16	8	19
Kabarore	40	35	88	3	8	6	15
Mbare	53	44	81	12	23	9	17
Nyagihanga	33	24	73	1	3	4	12
Kenya	457	408	89	21	5	16	4
Kabiyet	70	67	96	4	6		0
Metkei	71	70	99	1	1	2	3
Siongiroi	69	69	100	1	1		0
Siaya	43	33	77	3	7	6	14
Soy	67	67	91	5	7	2	3
Kandara	64	30	47	7	11	6	9
Kaptumo	73	72	99	0	0	0	0

⁶ Note: the percentage of different methods used doesn't add up to 100% since some farmers used more than one method

3.2.2 Other disease preventive and treatment measures

3.2.2.1 Vaccination

The extensive system of cattle rearing exposes animals to high risk of transboundary diseases due to uncontrolled movement. This system dominates among the livestock keepers in Sub-Saharan Africa. To reduce the risk of infection from these diseases, farmers must use disease preventive measures such as vaccination. Table 12 below shows the number of farmers who reported to have vaccinated their cattle and the frequency of vaccination (number of times per year) within the EADD project hubs.

Table 12: Number of farmers vaccinating cattle and frequency of vaccination in the last 12 months

Country/ Village	Cattle keepers	No. of cattle keepers using vaccination	Frequency	
			Median	Mean
Uganda	230	86	1	1.3
Bbaale	40	5	1	1.4
Luwero	28	11	1	1.1
Masaka	31	13	1	1.5
Mukono	43	14	1	1.4
Kakooge	52	25	1	1.1
Bumanya	36	18	1	1.2
Rwanda	169	120	1	1.5
Bwisanga	43	32	1	1.4
Kabarore	40	29	2	2
Mbare	53	43	1	1.3
Nyagihanga	33	16	1	1.1
Kenya	457	336	1	1.4
Kabiyet	70	61	1	1.3
Metkei	71	59	1	1.2
Siongiroi	69	61	1	1.4
Siaya	43	12	1	1.2
Soy	67	57	1	1.5
Kandara	64	42	1	1.7
Kaptumo	73	44	1	1.3

Vaccination was reported to be least common in Uganda, where less than half of the cattle keepers were reported to have vaccinated their animals in the last 12 months. Overall Rwanda reported the largest average number of times of vaccination (1.5 times). Comparing across hubs, Kabarore in Rwanda reported the most times (2), while Luwero (Uganda) and Nyagihanga (Rwanda) reported the least number of vaccination.

3.2.2.2 Anthelmintics (dewormers)

Anthelmintic is a chemical substance that expels or destroys gastro-intestinal worms. Anthelmintics essentially kill worms by either starving them to death or paralyzing them. Because it is practically impossible to keep cattle, even adults, completely worm free, it is important to routinely deworm the animals. Cattle reared extensively are more exposed to worm infestation as compared to those under intensive management. Well over 90% of the cattle keepers were reported to have dewormed their cattle over the last 12 months. On average farmers in the three countries dewormed their cattle two times in the year Table 13 below shows the number of cattle keepers reported to have used anthelmintics and frequency of use in the last 12 months by hub.

Table 13: Number of farmers deworming cattle and frequency of deworming in the last 12 months

Country/ Village	Cattle keepers	No. of cattle keepers deworming	Frequency	
			Median	Mean
Uganda	230	210	2	2.5
Bbaale	40	34	2	1.9
Luwero	28	25	2	1.8
Masaka	31	27	2	2.3
Mukono	43	39	3	4.3
Kakooge	52	50	2	1.9
Bumanya	36	35	2	2.4
Rwanda	169	142	2	2.0
Bwisanga	43	37	2	1.9
Kabarore	40	35	2	1.9
Mbare	53	50	2	2.1
Nyagihanga	33	20	1.5	1.8
Kenya	457	418	2	2.5
Kabiyet	70	68	2	2.5
Metkei	71	71	2	2.5
Siongiroi	69	68	2	2.3
Siaya	43	26	2	3.1
Soy	67	59	2	2.5
Kandara	64	56	2	2.5
Kaptumo	73	70	2	2.5

3.2.2.3 Curative treatment

Respondents were also asked to provide information on curative treatment that was administered to their animals over the last 12 months to the date of the survey (Table 14).

Over 60% of the cattle keepers were reported to have treated their animals. Looking at frequency of animal treatment, Uganda reported the highest average of about 7.5 times while Kenya reported the least (2.2times). Bbaale (Uganda) had the largest number of cases of curative treatment across the hubs (20times) in that year. This could be explained by the high number of EFC cases reported in this hub (see Table 5).

Table 14: Number of farmers carrying out curative treatment and frequency of the treatment in the last 12months

Country/ Villages	Cattle keepers	Number of farmers using curative treatment	Frequency	
			Median	Mean
Uganda	230	179	4	7.5
Bbaale	40	28	10	19.9
Luwero	28	27	2	2.9
Masaka	31	10	1.5	1.5
Mukono	43	34	3	3.9
Kakooge	52	49	6	7.8
Bumanya	36	31	6	5.3
Rwanda	169	85	2	3.5
Bwisanga	43	22	1	3.9
Kabarore	40	21	2	2.6
Mbare	53	30	2	4.6
Nyagihanga	33	12	1.5	1.8
Kenya	457	256	2	2.2
Kabiyet	70	63	3	3.1
Metkei	71	34	1	1.5
Siongiroi	69	50	2	2.2
Siaya	43	33	2	2.8
Soy	67	23	1	1.7
Kandara	64	20	1	1.6
Kaptumo	73	33	1	1.5

3.2 Animal health service delivery

Public animal health service providers employed by the government played a major role in vaccinations as reported by about 89% of the households while private veterinarians played the lead role, as indicated by 37.4% of the households, in curative services (Table 15). Consistent with other surveys (Waithaka *et al.*, 2002) farmers, at times with the assistance of neighbours, also treated their own cattle with (25%) or without (11.5%) professional advice (Table 15). Farmers also dewormed and controlled ticks in the herd on their own, but mainly

with professional advice. These results point out the need for projects like EADD to offer innovative solutions, for example guidelines explaining circumstances under which advice from a professional should be sought.

Table 15: Percentage households using various veterinary services in Uganda, Rwanda and Kenya in the last 12 months

Type of Service provider	Animal Health Service			
	Deworming (n=770)	Vaccination (n=542)	Tick control (n=770)	Curative treatment (n=520)
Government/Community provider	10.6	89.3	21.6	24.0
Cooperative/Project Veterinarian	1.9	0.9	2.2	2.3
Private provider	12.6	3.0	1.0	37.3
Self/Neighbour with professional advice	52.6	5.5	50.6	25.0
Self/Neighbour with no professional advice	22.7	0.9	24.0	11.5
Traditional Herbalist	0.0	0.0	0.0	0.2

Breakdown by country shows that vaccination of livestock was carried out by public (government) service providers in all the countries and minimal participation by private practitioners (Figure 2). Most households in Kenya (58.2%) reported using private veterinarians for clinical services in the past year (Figure 2). On the contrary, most households in Uganda and Rwanda reported treatment by themselves with (as reported by 39.0% and 40.0% of the households respectively) or without (as reported by 14.0% and 31.8% of the households respectively) professional advice.

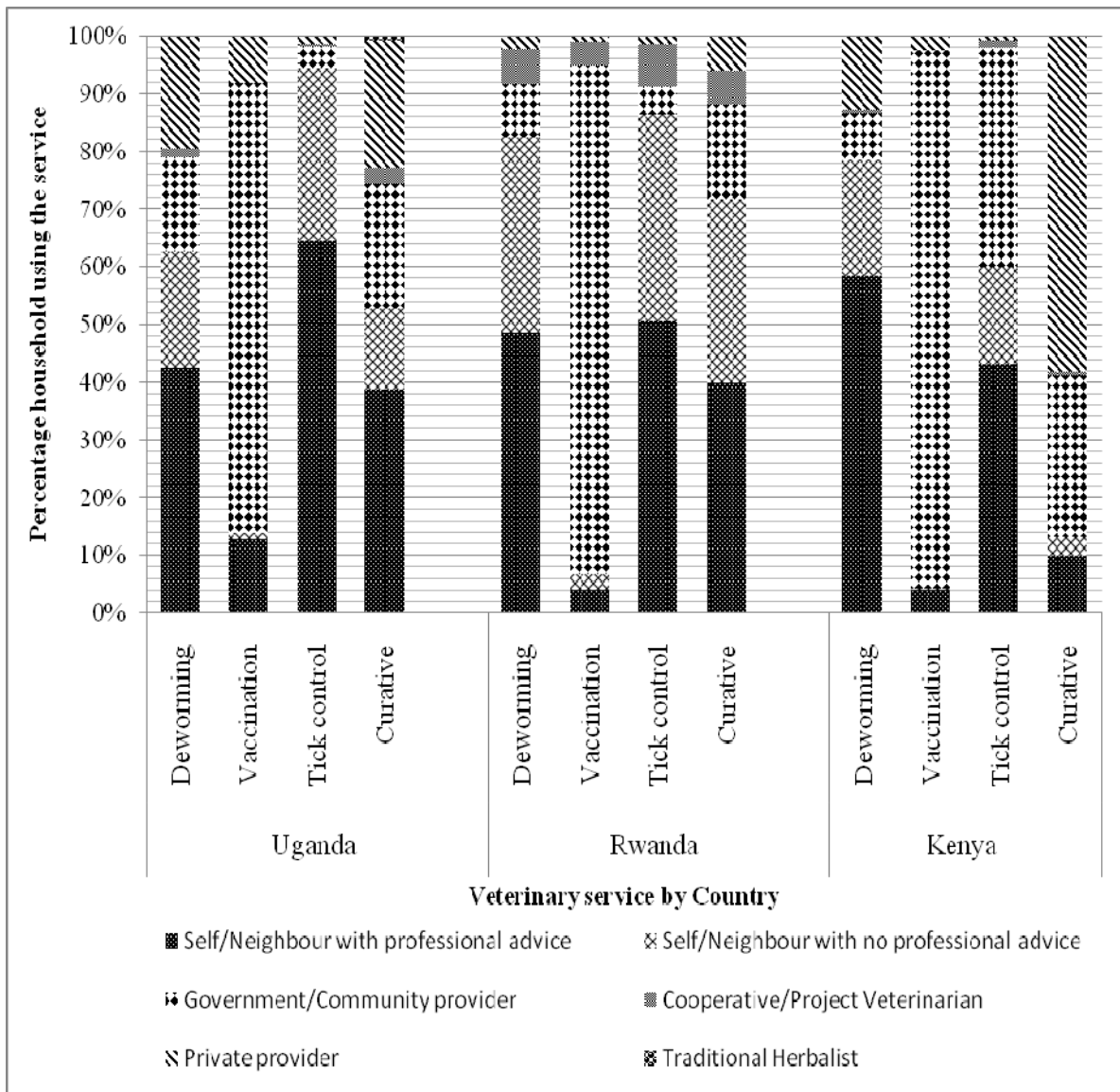


Figure 2: Proportion of households indicating Source of Veterinary Service by country in last 12 months

Across all the hubs in Uganda, most tick and intestinal worm control was performed by farmer with professional advice (Table 16). In half of the hubs in Uganda (Bbaale, Luwero Kakooze), most farmers reported to have treated their own cattle in the past year, while private practitioners were reported to be most active in treating animals among households in Masaka Municipality (80%) and Buikwe (52.9%) (see Table 16a).

In Rwanda, all services (except vaccination) were mainly carried out by individual farmers with professional advice in most of the hubs (Table 16b).

In Kenya, most farmers reported to have sought the services of the private practitioners for the treatment of their animals except in Soy where government or community service

providers dominated in offering curative treatment (Table 16c). De-worming was done by the farmers themselves with professional advice in five of the hubs (Kabiyet, Metkei, Siongiroi, Soy and Kandara). Government service providers in Kenya also played a key role in tick control in Kabiyet and Siongiroi.

Vaccination services were mainly offered by the government animal health providers in all the three countries, although a proportion of farmers in some hubs also reported to vaccinate their own animals with or with no professional advice. In Uganda however, farmers might perceive some private service providers as government officials and hence a high percentage of services indicated to be received from the government animal health providers. This was noted during the baseline survey feedback workshop where the EADD team on ground noted that there were more private practitioners offering these services as well as AI services compared to government officials. Some of them are retired government workers who are still perceived as so by the farmers. The grey cells (Tables 16a, 16b and 16c) highlight the most sourced type of service provider for the routine management practices and curative treatments in each of the hubs.

Table 16 : Percentage of dairy farmers reporting having used animal health services by type of service providers and hub in the past 12 months
16a) Uganda

	Bbaale	Luwero	Masaka	Mukono	Kakooge	Bumanya
Vaccination	n=5	n=11	n=13	n=14	n=25	n=18
Self/Neighbour with professional advice	20.0	0.0	0.0	21.4	24.0	5.6
Self/Neighbour with no professional advice	0.0	0.0	0.0	7.1	0.0	0.0
Government/Community provider	80.0	90.9	92.3	57.1	64.0	94.4
Cooperative/Project Veterinarian	0.0	0.0	0.0	0.0	0.0	0.0
Private provider	0.0	9.1	7.7	14.3	12.0	0.0
Deworming	n=34	n=25	n=27	n=39	n=50	n=35
Self/Neighbour with professional advice	26.5	44.0	40.7	12.8	84.0	34.3
Self/Neighbour with no professional advice	64.7	40.0	3.7	0.0	10.0	11.4
Government/Community provider	8.8	4.0	11.1	25.6	4.0	45.7
Cooperative/Project Veterinarian	0.0	4.0	3.7	2.6	0.0	0.0
Private provider	2.9	8.0	40.7	59.0	2.0	8.6
Tick control	n=39	n=28	n=29	n=41	n=50	n=36
Self/Neighbour with professional advice	30.8	50.0	51.7	82.9	90.0	63.9
Self/Neighbour with no professional advice	69.2	50.0	44.8	9.8	8.0	11.1
Government/Community provider	0.0	0.0	3.4	0.0	2.0	16.7
Cooperative/Project Veterinarian	0.0	0.0	0.0	0.0	0.0	2.8
Private provider	0.0	0.0	0.0	2.4	0.0	5.6
Curative treatment	n=28	n=27	n=10	n=34	n=49	n=31
Self/Neighbour with professional advice	21.4	48.1	10.0	8.8	89.8	9.7
Self/Neighbour with no professional advice	64.3	3.7	0.0	0.0	8.2	6.5
Government/Community provider	10.7	11.1	0.0	32.4	2.0	67.7
Cooperative/Project Veterinarian	0.0	11.1	0.0	2.9	0.0	3.2
Private provider	7.1	25.9	80.0	52.9	2.0	12.9
Traditional Herbalist	0.0	0.0	10.0	0.0	0.0	0.0

16b) Rwanda

	Bwisanga n=32	Kabarore n=29	Mbare n=43	Nyagihanga n=16
Vaccination				
Self/Neighbour with professional advice	9.4	6.9	0.0	0.0
Self/Neighbour with no professional advice	3.1	0.0	4.7	0.0
Government/Community provider	78.1	89.7	93.0	87.5
Cooperative/Project Veterinarian	6.3	3.4	2.3	6.3
Private provider	0.0	0.0	0.0	6.3
	Bwisanga (n=37)	Kabarore n=35	Mbare n=50	Nyagihanga n=20
Deworming				
Self/Neighbour with professional advice	35.1	54.3	58.0	45.0
Self/Neighbour with no professional advice	56.8	25.7	24.0	35.0
Government/Community provider	5.4	2.9	12.0	20.0
Cooperative/Project Veterinarian	2.7	11.4	8.0	0.0
Private provider	0.0	5.7	2.0	0.0
	Bwisanga n=33	Kabarore n=39	Mbare n=50	Nyagihanga n=24
Tick control				
Self/Neighbour with professional advice	51.5	56.4	52.0	41.7
Self/Neighbour with no professional advice	45.5	33.3	24.0	54.2
Government/Community provider	3.0	0.0	10.0	4.2
Cooperative/Project Veterinarian	0.0	7.7	16.0	0.0
Private provider	0.0	2.6	2.0	0.0
	Bwisanga n=22	Kabarore n=21	Mbare n=30	Nyagihanga n=12
Curative treatment				
Self/Neighbour with professional advice	40.9	47.6	40.0	25.0
Self/Neighbour with no professional advice	31.8	38.1	23.3	41.7
Government/Community provider	13.6	9.5	23.3	16.7
Cooperative/Project Veterinarian	0.0	4.8	13.3	0.0
Private provider	13.6	0.0	0.0	16.7
Traditional Herbalist	0.0	0.0	0.0	0.0

16c) Kenya

	Kabiyet	Metkei	Siongiroi	Siaya	Soy	Kandara	Kaptumo
Vaccination	n=61	n=59	n=61	n=12	n=57	n=42	n=44
Self/Neighbour with professional advice	6.6	10.2	3.3	0.0	1.8	0.0	2.3
Self/Neighbour with no professional advice	0.0	0.0	0.0	0.0	0.0	0.0	2.3
Government/Community provider	88.5	91.5	95.1	100.0	96.5	88.1	95.5
Cooperative/Project Veterinarian	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Private provider	1.6	0.0	1.6	0.0	1.8	11.9	0.0
Deworming	n=68	n=71	n=68	n=26	n=59	n=56	n=70
Self/Neighbour with professional advice	83.8	87.3	39.7	30.8	67.8	42.9	38.6
Self/Neighbour with no professional advice	8.8	8.5	19.1	0.0	11.9	30.4	50.0
Government/Community provider	0.0	1.4	25.0	11.5	6.8	8.9	5.7
Cooperative/Project Veterinarian	0.0	0.0	1.5	3.8	1.7	0.0	0.0
Private provider	7.4	2.8	16.2	53.8	11.9	17.9	5.7
Tick control	n=68	n=70	n=68	n=34	n=64	n=24	n=73
Self/Neighbour with professional advice	23.5	80.0	29.4	67.6	50.0	45.8	19.2
Self/Neighbour with no professional advice	1.5	11.4	7.4	14.7	7.8	45.8	42.5
Government/Community provider	72.1	8.6	58.8	11.8	34.4	8.3	38.4
Cooperative/Project Veterinarian	0.0	0.0	1.5	0.0	6.3	0.0	0.0
Private provider	0.0	0.0	0.0	5.9	1.6	0.0	0.0
Curative treatment	n=63	n=34	n=50	n=33	n=23	n=20	n=33
Self/Neighbour with professional advice	4.8	29.4	4.0	6.1	21.7	15.0	3.0
Self/Neighbour with no professional advice	0.0	0.0	12.0	0.0	0.0	0.0	6.1
Government/Community provider	7.9	5.9	34.0	30.3	52.2	35.0	57.6
Cooperative/Project Veterinarian	0.0	0.0	0.0	6.1	0.0	0.0	0.0
Private provider	87.3	64.7	50.0	57.6	26.1	55.0	33.3

4 ACCESS TO LIVESTOCK EXTENSION ADVISORY SERVICES

Most households in the three countries reported access to extension advisory services. The public sources were reported as the most accessible in all the hubs except in Masaka, Uganda and Kabarore in Rwanda (Table 17). Uganda reported an average of three visits per household by public extension workers while farmers in Kenya and Rwanda reported an average of one visit in the last one year. Farmers around half of the hubs in Uganda (Luwero, Masaka and Mukono) and one hub in Kenya (Siaya) reported good access to private extension advisory services (Table 17). Farmers in Uganda reported an average of five visits per household while those in Kenya and Rwanda reported two and one visit(s) per household, respectively. In Uganda, services by non-governmental organizations (NGOs) or project extension advisory services were more popular in Luwero where 42.9% of farmers reported accessibility. About 15.5% and 30.4% of the respondents in Metkei and Siongiroi hubs respectively in Kenya reported accessibility of livestock extension services from NGOs and or projects.

Table 17: Proportion of dairy keeping households reporting access to extension advisory services and average household visits by Hub in the last 12 months.

Country/ village	Cattle keepers	% hhs accessing extension services	Government		NGO/Project		Private practioners		Cooperatives		Others	
			%	Average visits per household	%	Average visits per household	%	Average visits per household	%	Average visits per household	%	Average visits per household
Uganda	230	89	73	2.7	11.3	3.5	45.2	5.3	0.4	2	0.0	0.0
Bbaale	40	80	80	2.4	0.0	0.0	7.5	4.5	0.0	0	0.0	0.0
Luwero	28	96	71	0.8	42.9	1.9	89.3	1.7	0.0	0	0.0	0.0
Masaka	31	81	48	1.8	6.5	13.0	58.1	2.6	0.0	0	0.0	0.0
Mukono	43	100	72	4.6	7.0	4.7	76.7	8.6	0.0	0	0.0	0.0
Kakooge	52	87	83	1.6	15.4	1.1	15.4	2.3	1.9	2	0.0	0.0
Bumanya	36	89	75	4.5	2.8	12.0	47.2	6.5	0.0	0	0.0	0.0
Rwanda	169	57	44	0.8	6.5	0.8	13.6	0.6	9.5	0.4	3.0	0.0
Bwisanga	43	60	40	0.8	2.3	1.0	20.9	0.4	0.0	0	0.0	0.0
Kabarore	40	50	43	0.7	7.5	0.0	12.5	0.5	7.5	0.5	0.0	0.0
Mbare	53	68	58	0.9	9.4	1.2	11.3	0.8	24.5	0.4	9.4	0.0
Nyagihanga	33	42	30	0.7	6.1	0.5	9.1	1.0	0.0	0.0	0.0	0.0
Kenya	457	77	70	0.8	9.8	1.7	28.4	1.7	4.6	3.2	0.9	2.7
Kabiyet	70	97	91	0.3	2.9	0.5	28.6	3.4	0.0	0.0	1.4	1.0
Metkei	71	77	77	2.2	15.5	1.3	14.1	0.8	5.6	3.0	1.4	0.0
Siongiroi	69	83	81	0.7	30.4	0.9	23.2	1.1	11.6	1.0	0.0	0.0
Siaya	43	79	72	1.4	2.3	24.0	58.1	3.3	0.0	0.0	0.0	0.0
Soy	67	78	58	0.6	4.5	1.0	35.8	1.7	4.5	12.3	0.0	0.0
Kandara	64	66	56	0.4	6.3	2.3	28.1	0.3	9.4	1.3	1.6	6.0
Kaptumo	73	58	52	0.4	4.1	0.3	23.3	0.1	0.0	0.0	1.4	1.0

5 DISCUSSION

Reports of disease frequencies and practices obtained from farmers are subject to biases of misdiagnoses of health problems and farmer perceptions. Despite these limitations, there are obvious similarities and differences in the information obtained between countries and designated EADD hubs regarding reported disease occurrence and access and use of various public and private services that warrant some discussion.

East Coast Fever was by far the most commonly reported disease in terms of impact through morbidity (over 35% of households) and mortality (29 % of households). The next most important tick-borne disease mentioned as associated with high morbidity and mortality was Anaplasmosis. FMD and Trypanosomosis were also associated with relatively high morbidity by more than 10% of households. Though mentioned as common, intestinal worms and diarrhoea were not commonly associated with the adverse outcome of death. A significant difference in mortality rates between young and adult animals and across different cattle genotypes was observed. Of interest is that, while mortality rate among exotic calves is lower than that of local calves, among the adult animals the reverse is true. Higher mortality rates among adult exotic breeds were reported as compared to adult local breeds of cattle.

The quality and relative impacts of the alternative health and extension advisory services accessed and used by farmers needs to be monitored and subjected to more analysis. For example, farmers in Kenya report significantly higher access and use of private clinical services while farmers in the other countries report higher reliance on treating their own animals with or without professional advice. It is not clear what level of access and use of various kinds of services would be optimal given the various circumstances. This is an area that could be explored by EADD and participating countries to draw lessons from each other.

Farmers in Uganda and Kenya reported good access to livestock extension advisory services provided by government service providers though these were limited to only one or two visits per year. The reported satisfaction may be related to perceptions of having adequate knowledge or on-going governments' effort to promote extension advisory service through programs like the National Agricultural Advisory Services (NAADS) in Uganda and National Agricultural and

Livestock Extension Program (NALEP) in Kenya. Of interest is the evolution of private extension advisory services in some places, given that previously many small-scale farmers have been reluctant to pay for such services.

Opportunities for promoting optimal and viable health service related BDS around the DFBAs by various cadres of private health service providers, whether para-veterinarians or veterinarians needs to be further explored. As this is done, given the EADD goal of impacting the poor, special consideration needs to be given to access to private services around hubs with poorer groups or poor market access where private services may not be viable. As a first step, data gathered on current animal health service provision in the market will be triangulated with household survey data on use and accessibility of various BDS service providers as a basis for further recommendations for promoting interventions in animal health service delivery.

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