

# Potential of Information and Communication Technologies in Promoting Access to Livestock Information: Perceptions of Urban Livestock Keepers in Tanzania

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## ABSTRACT

*A study was conducted to investigate the extent of use of Information and Communication Technologies (ICTs) by urban livestock keepers. This paper discusses the perceptions of small scale livestock keepers towards the use of different types of ICTs in accessing livestock information. Mixed method approach was used whereby quantitative and qualitative data was gathered. The findings of this study revealed that most of the respondents had a positive opinion towards the use of ICTs and it was concluded that urban livestock keepers perceived ICTs as important tools for accessing livestock information. The study recommended for improvement of tele-communications services through relevant bodies in order to facilitate more access to information through use of ICTs. Information networking among urban livestock keepers and the introduction of livestock information centers were also recommended for enhanced access to livestock information.*

*Keywords: Developing Countries, Information Access, Livestock Information, Perceptions, Tanzania, Urban Agriculture, Urban Development, Urban Livestock Keeping*

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## INTRODUCTION

The management of information in recent years has been made easier due to several advances in Information and Communication Technologies (ICTs). There has been an enormous amount of information that is being generated and this information need to be organized, stored and

disseminated in such a way that the information is secure, and easy to retrieve. The various types of information that are being generated also need to be accessed by all targeted individuals so that these individuals can benefit from the information. This process of information handling and dissemination has been made possible through various ICTs. Information and Communication

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Technology (ICT) can generally be defined as the application of modern technology in creation, management and use of information (Teraro and Braun, 2009). Greenberg (2005) also defines ICT as any electronic means of capturing, processing, storing and disseminating information. According to May *et al* (2007), ICT can be thought of as an integrated system that incorporates the technology and infrastructure required to store, manipulate, deliver and transmit information, the legal and economic institutions required to regulate ICT access and usage, and the social and inter-personal structures which allow information to be shared, facilitate access to the ICT infrastructure, and through which innovation takes place.

Globally, ICTs have been used in various sectors including banking, education, health-care, governance and agriculture. CTA (2009) reports that in Africa, ICTs have a very great potential in enhancing access to agricultural information hence improving the agricultural sector. According to Munyua (2008), ICTs can be effective means of disseminating to communities huge amounts of relevant information on markets, technology, prices, successful experiences, credit facilities, government services and policies, weather, crop, livestock and natural resource protection. Modern ICTs could play a major role in communicating knowledge and information to agricultural communities, delivering education modules, accessing inputs, markets and market prices, credit, conducting business, facilitating networking and strengthening partnerships, scaling up inter-linkages of development interventions and increasing agricultural productivity. Media such as the Internet, web-based means, mobile telephony and computer-mediated networks among others are being used in a number of initiatives in Africa to provide development solutions. Various studies have indicated that ICTs have been used for accessing agricultural information in some East African countries including Kenya and Uganda (Ferris, 2004; Kiplagat, 2009; Gantt and Cantor, 2010; (Karamagi and Nalumansi, 2009). But to what extent are these ICTs used by urban and peri-urban livestock keepers in

Tanzania and what are their perceptions on the usefulness of these ICTs? This is the major point of discussion in this paper.

## STATEMENT OF THE PROBLEM

In Tanzania there is still no clear evidence on how ICTs such as mobile phones, radio, television and the Internet help the urban and peri-urban livestock keepers to access livestock information. Despite the relatively well developed ICT infrastructure in the urban areas, urban livestock keepers still lack adequate information on livestock keeping practices (CIRAD, 2009). This is because they mostly rely on advice services as sources of information which are usually insufficient (Gakuru *et al*, 2009). Lack of timely information is well known to be the largest constraint on small-scale agricultural production, a sector that provides livelihood for 70-80% of Africa's population. The lack of information leads to poor husbandry practices, which in turn leads to poor production. Other information-related problems that face the livestock sector in Tanzania include; poor husbandry practices (e.g. poor nutrition of the animals, poor housing and unhygienic conditions), poor disease control measures and lack of markets for the livestock products. This situation could probably be improved by making use of ICTs to get the required information on time, hence solve some of the information-related problems the livestock keepers face in livestock keeping. According to Souter *et al* (2005), there is little scientific evidence in specific urban communities about the ways in which individuals and communities exploit access to ICTs and the impact they have on livelihoods in urban communities. A study by Chilimo (2009) reported that, despite the strong belief in the role of ICTs for socio-economic development, clear evidence on how ICTs can be used to achieve this purpose in the Tanzanian context is still lacking. This research therefore investigated the extent of use of ICTs by urban livestock keepers and thus contributes to knowledge on how these ICTs are used in accessing livestock

information and thereby improving the livestock keeping practices in urban and peri-urban areas of Tanzania.

## OBJECTIVES

The main objective of this study was to investigate the extent to which ICTs were used among urban and peri-urban livestock keepers in Kinondoni and Morogoro urban Districts and the factors that influenced the use of ICTs, in order to improve their use in accessing livestock information. Among several specific objectives of this study, one was to establish the perceptions of livestock keepers on the usage of different types of ICTs in accessing livestock information. In this paper, the findings of this specific objective will be discussed.

## LITERATURE REVIEW

### Different ICTs and Their Potential in Promoting the Growth of Agriculture in Africa

#### *Radio and Television*

For many African farmers, the only source of information outside the community is the radio. Radio sets are relatively inexpensive and can be used in remote areas where electricity supplies are unreliable or even non-existent. Local radio also gives farmers a voice, enabling them to share their knowledge and experiences, and to acquire practical information that they can use to improve their livelihoods. Traditionally, radio has been a one-way communication medium, where programme makers deliver information to their listeners. But in recent years the number of radio stations across Africa has grown rapidly (there are now more than 300 stations in Mali, 120 in Ghana and over 150 in Uganda) and new information technologies have become more accessible, providing many possibilities for developing more interactive, two-way radio communication for farmers (Rao, 2009).

In Africa, there are initiatives that deal with information dissemination to farmers, an example of such initiative is the African Farm Radio Research Initiative (AFRRI) whereby broadcasters make programmes with information that is useful to farmers, and give farmers a chance to provide feedback on programme content (Munyua, 2008). According to Greenberg (2005), radio is unique in that it is relatively inexpensive to set up, it is estimated that more than 50% of all households in developing countries have ready access to radio receivers, receiving broadcasts does not require literacy, and it can use indigenous languages even if the population served is small. The cost of receiver batteries is its major limitation. Local radio can be an effective tool in community building, particularly for those who live in rural and sparsely populated areas. It has also proven effective at disseminating information about livelihoods (market prices, weather forecasts, healthcare, education and potential disasters). Although more costly to implement and less accessible to the poor, television can have similar characteristics to the radio. Its major limitations are availability of receivers, electrical power and coverage.

#### *Mobile Phones*

In many parts of the developing world, mobile telephone communications are now widely available and can be accessed at modest costs (Greenberg, 2005). Nowadays, mobile phones have become the clear technology of choice for communication. SMS in particular has become an extremely important way to send and receive information. Farmers are now far better placed to receive accurate market information on their mobile phone. They can also communicate with other farmers more easily, making it feasible for them to set up cooperatives that can explore new markets and sell their products to bigger buyers (CTA, 2009). With the Enhancing Access to Agricultural Information project, which targets rural women farmers in northern Uganda, the organization uses SMS in combination with a number of other technolo-

gies and media including a website, community radio broadcasts and an information centre, the Kubere Information Centre. The project uses this range of technologies to deliver agricultural information to women farmers to help them improve productivity, as well as to provide regular, up-to-date market data to enable them to reach new buyers and thus increase their incomes (Achora and Ngolobe, 2009).

### **Internet**

World over, the Internet, e-mail, web-sites and web-based applications are becoming increasingly important for sharing and disseminating agricultural information and knowledge, marketing of goods and services and for trading purposes. Munyua (2008) further reports that DrumNet in Kenya is developing a web-based system to facilitate small-scale farmers to access information, markets, credit, inputs and some trading transactions while Tradenet.biz in West Africa, Foodnet in East and Central Africa, KACE in Kenya and MACE in Malawi have developed electronic trading platforms. The Web's enormous amount of information and knowledge does not correspond to the needs of the majority of the population. Different countries have different needs and a diversity of cultures and problems that need specific approaches, especially in developing countries. There is therefore a need to invent and multiply mini-networks, small geographical webs or local community networks to make the Web really wide and useful for the majority of the people in the world (Girard, 2003). Internet-based communications and particularly e-mail serve similar purposes to those discussed for the telephone. The high cost of communications and the lack of skills is a major barrier to wide use, in addition to unreliable electrical power (Greenberg, 2005).

### **The ICT Environment in Tanzania**

The Tanzania ICT Policy of 2003 states that Tanzania has made a remarkable progress in deploying ICT; access of technologies such as Internet, computers, satellite, radios and mobile

phone has been growing fast in the past 10 years in Tanzania (URT, 2003). Despite the rapid improvements, Tanzania's ICT environment is still somewhat challenged. Gillwald (2005) has reported that ICT is concentrated in Dar es Salaam, the commercial capital with little deployment or access in other urban centers or in rural Tanzania. About 10 percent of Tanzanians own mobile phone, 17 percent of Dar es Salaam population, 10 percent of other urban areas, and 4 percent of rural population. According to Isamuyo (2006), the telephone services were very unreliable in 1990s in Tanzania. The fixed telephone provided by Tanzania Telecommunication Company (TTCL) gave services in capital cities and had a slow expansion. Mutagahywa *et al* (2006) states that the Government of Tanzania introduced liberalization of the Telecommunications Sector in 1994 following the dissolution of the then Tanzania Posts and Telecommunications Corporation (TP&TC) into two independent bodies namely; Tanzania Telecommunication Company (TTCL) and Tanzania Postal Corporation. Later in 2003 the Tanzania Communications Regulatory Authority (TCRA) was established which merged the Tanzania Communications Commission and the Tanzania Broadcasting Commission. TCRA (2008) opines that the availability and accessibility of telephone service has improved significantly in both urban and rural areas resulting into increase in penetration from less than 1% in 1990's to over 30% by December, 2008.

According to Swarts and Wachira (2010), Tanzania accounts for 5% of the mobile phone users in Africa and is ranked fourth after Nigeria, South Africa and Kenya. The domestic fixed-line telephone network is less than one connection per 100 persons while the mobile-cellular service, aided by multiple providers, is increasing. Like most of the African countries, Tanzania has recorded exponential growth in mobile phones while the growth in fixed lines has been minimal in comparison. The Director General of TCRA (Prof. John S. Nkhoma) reported that; "We (Tanzania) have experienced high growth of numbers of connected telephone subscribers from 300,237 in the year 2000 to

over 20 Million subscribers today, most of whom are young and live in urban areas. There are over 50 Postal/Courier Service providers compared to 13 in the year 2000. We have 60 Radio Stations and 20 Television Stations currently operating compared to 14 and 10 stations in the year 2000 respectively.” (Majira Newspaper (2011), Calandro *et al* (2010)). Based on Tanzania Communication Regulatory Authority (TCRA), the Internet industry in Tanzania is believed to have experienced an exponential growth in recent years. The industry has expanded and changed rapidly since the introduction of Converged Licensing Framework (CLF) in 2005 that took advantage of advances in technology, number and types of services provided in the market and growth of Internet usage. The number of Internet users in Tanzania is said to have increased from 5% in 2005 to 11% by June 2010. A rapid technological change in electronic communication including usage of mobile handsets for Internet access is another factor which has contributed to the registered increase of Internet penetration in Tanzania (TCRA, 2010). Access of Internet services including emails and peer to peer communication has been widened in urban areas through the introduction of Internet cafes (Isamuyo, 2006). A recent study conducted by Tanzania Business Times shows that thousands of people flock into the Internet cafes everyday to surf the Internet and read their e-mails. As a result of the growing demand of these services, Internet cafes have been mushrooming all over the country (Shoki, 2010). Shoki further reports that, there are more than 300 Internet cafes in Dar es Salaam alone and at least 20 in Zanzibar. This can be evidenced by the increase in the number of Internet cafes especially in Dar es Salaam as well as other urban areas like Mwanza, Mbeya, Arusha, Tanga and Dodoma (TCRA, 2010). Business process re-engineering is also picking up whereby many organizations have computerized their financial information systems, human resources information systems, academic information systems, and library information systems just a few to mention.

According to Mutagahywa *et al* (2006), such remarkable improvements in ICT result from significant government reforms in the following areas: formation of Legal and regulatory framework, telecommunication sector liberalization, the emerging of private sector in ICT, partial Privatization of National Telecommunication Company (TTCL), removal of all taxes and duties on computers and peripherals, issuing of licenses to private data and services operators, establishment of Rural Community Telecentres in Tanzania and establishment of communications Converged Licensing Framework (i.e. converging Telecommunication and Broadcasting) opportunities that Tanzania can exploit towards meeting the Vision 2025. In addition, the advent of the information society offers increased scope for ICTs to be used to uplifting the agricultural sector and thus address and enhance livelihoods (Stienen *et al*, 2007).

### **Uses and Limitations of Different ICTs in Tanzania**

In Tanzania, radio broadcasting is the main way of information delivery and source of entertainments that has succeeded to reach more than 85% of the Tanzanians. Approximately 90% of the television broadcasting services is available in big cities (Dar es Salaam, Mwanza, and Arusha); people in small towns have to use satellite dishes to receive television signals, which prevent a large number of people accessing the service due to high initial cost. The situation is worse for people living in rural areas as they lack off grid electricity and enough financial power to use other sources of energy like solar panels. Recently, Tanzania national television station (now TBC one) has started a program of building towers for television broadcasting in every region (some regions are ready) with the intention of providing terrestrial local coverage, this effort is expected to raise the number of people accessing television services although much has to be done in rural areas (Isamuyo, 2006). According to the Tanzania Communications Regulatory Authority (TCRA), Digital Terrestrial Television (DTT) (or digital ter-

restrial transmission) refers to the terrestrial broadcasting of television in a digital format. Currently, terrestrial broadcasting in most African countries is in an analogue format. But more and more countries (including Tanzania) are in the process of planning and implementing migration from analogue to digital broadcasting. The main reason for the migration is to release valuable spectrum which can be used for other services. Spectrum is scarce, and hence making more efficient use of the spectrum available is necessary if more telecommunications and broadcasting services are to be made available on a terrestrial basis (TCRA, 2013).

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Isamuyo (2006) states one of the limitations of Internet use in Tanzania as the use of English in most web contents, which is a language of elite in Tanzania. Currently, about 70 per cent of all Internet content is in English and only 12 languages out of the world's 6,000 or so accounts for about 98 per cent of the total web content.

Swahili language, which constitutes over 80 per cent of the local media and public information contents in Tanzania, is not among the 12 languages. In other words, Swahili is among more than 5,900 world languages, which constitutes only two per cent of the Internet content. Isamuyo (2006) further narrates that Swahili is the official national language of 122 tribes of Tanzania, and over 95 percent of the population can only speak, read and write in either Swahili or tribal languages and hence cannot comprehend most of the contents in the Internet even if they get access to it. ICT projects in Tanzania also face the common problem of low capacity and costly Internet connectivity. Today, TCRA has licensed less than a dozen companies to provide public data communication services including Internet bandwidth. Many Internet Service Providers (ISPs) in Tanzania still rely on Public Switched Telephone Network (PSTN), VSAT and Microwave networks to provide Internet services (Materu-Behitse and Diyamett, 2010). According to the current National ICT Policy of Tanzania, these data operators have isolated initiatives of connecting their Points-of-Presence (PoPs) to the global Internet backbone. As a result, Tanzania lacks cheaper and high capacity connections to the global Internet (Centre for Science, Development and Media Studies, 2008).

## RESEARCH METHODOLOGY

### Study Area, Research Design and Sampling Procedures

The study was conducted in urban and peri-urban areas of Morogoro urban and Kinondoni districts in Tanzania. These two districts were selected purposively whereby Kinondoni was selected because of the relatively well developed ICT infrastructure and the many livestock keepers (3,513) compared to Ilala (2,156) and Temeke (2,587), (URT, 2004b; URT, 2004c; URT, 2004d). Morogoro urban was selected because it is more urbanized, hence more developed in terms of ICT infrastructure compared to other districts in Morogoro region. A

mixed method research design was adopted whereby a combination of quantitative and qualitative research methods was used. In this study, quantitative data was gathered using questionnaires in order to quantify the findings in terms of frequencies and percentages. Qualitative data on the other hand, was gathered using interviews and observations in order to confirm the findings obtained from quantitative data. The rationale for using a mixed method approach, (also referred to as multi-method, convergence or integrated method) is based on its major advantage of neutralizing or cancelling the biases of a single method (Creswell, 2003; Glazier and Powel, 1992). A combination of two non-probability sampling techniques was used in selecting the sample; purposive and snowball sampling techniques. The purposive (judgmental) method of non-probability sampling was used because it enabled the researcher to select cases that best answered the research questions in order to meet the objectives of the research. Apart from purposive sampling technique, snowball sampling technique was also used to select the respondents that were used in the study. According to Saunders *et al*, (2007), this is a method of non-probability sampling design commonly used when it is difficult to identify members of the desired population. Snowball sampling requires one to make contact with one or two cases to identify further cases. The new cases are asked to identify further new cases (and so on) until the required sample size is obtained. In this case, one extension officer was selected from each of the selected wards. The extension officers then directed the researcher to the first few livestock keepers who in turn led the researcher to identify the rest of the livestock keepers. In this study a sample size of 272 respondents was engaged out of 300 respondents who had been selected. This was because some of the respondents were not present in the field at the time of data collection. Tabachnick and Fidell (2007) suggest a sample size of  $N > 50 + 8m$  for multivariate data analysis (where  $N$  is the sample size and  $m$  is the number of independent variables) and  $N > 104 + m$  for testing individual predictors. This study had a total of

10 independent variables including; age, sex, education, occupation, experience, information needs, effectiveness of information sources, perceptions of ICT use, gaps in ICT use and strategies for improvement (i.e., each specific objective stands for one independent variable in addition to the respondents' characteristics). Therefore, the minimal sample size would be 114 (obtained from the formula;  $N > 104 + m$ , where  $N = 300$  and  $m = 10$ ). Thus a sample size of 300 respondents was deemed sufficient for this study.

### **Data Collection Methods, Instruments and Analysis**

Survey is the method that was used for data collection in this study. Both primary and secondary data was collected using various methods of data collection. Primary data was collected using questionnaires, observations and in-depth interviews, while secondary data was gathered from various sources including; government websites, government surveys (e.g. population censuses), media (e.g. television and radio), various publications (e.g. books, journals and CD-ROMS) and the Internet. A combination of various data collection instruments was used in order to increase the reliability of the data including questionnaire schedules, interviews guide and observations check list. The collected data was systematically organized, coded, recorded and analyzed. Statistical Package for Social Sciences (SPSS) was used to analyze quantitative data while content analysis was used to analyze qualitative data. In analyzing the quantitative data, both univariate and bivariate analyses were done. In this study, bivariate analysis was conducted on some of the variables to determine how they were related, for example, use of different ICTs in relation to the perceptions on the ICTs, etc. The results from these bivariate analyses have been presented in form of contingency tables. In analyzing qualitative data, content analysis was used in which data that was collected from in-depth interviews and observations was studied and interpreted

Table 1. Types of ICTs used by urban livestock keepers.  $N=152$  (Kinondoni),  $N=102$  (Morogoro urban),  $N=254$  (Overall)

Type of ICT Used	Kinondoni		Morogoro Urban		Overall	
	Freq.	%	Freq.	%	Freq.	%
Mobile phone	141	92.8	93	91.2	234	92.1
Television	37	24.3	30	29.4	67	24.6
Radio	19	12.5	36	35.3	55	21.7
Internet	5	3.3	1	1.0	6	2.4

Source: Field survey, 2011

in order to establish meaningful patterns, trends and relationships from the information gathered.

## RESULTS AND DISCUSSION

### Use of Different Types of ICTs in Accessing Livestock Information

The livestock keepers were asked to mention the different types of ICTs that they used to access livestock information. Findings revealed that different types of ICTs were mentioned by the livestock keepers including radio, television, mobile phone and the Internet. Most livestock keepers used at least one of the ICTs while some used more than one type of ICT and very few livestock keepers used all types of ICTs to access livestock information. These ICTs were used at different levels by respondents in each of the two districts. Table 1 shows the number of respondents who used each of the ICTs in the two districts.

These results indicate that mobile phone were used by most (234) of the livestock keepers (92.1%). It shows that respondents in Kinondoni (92.8%) used mobile phones slightly more than respondents in Morogoro urban (91.2%). Another type of ICT that was mentioned by the respondents was television 67 (24.4%). This was watched more by respondents in Morogoro urban (29.4%) compared to the respondents in Kinondoni (24.3%). Radio was also mentioned more by respondents in Morogoro urban (35.3%) compared to the respondents in Kinondoni (12.5%). Internet was used by

the least; 6 (2.4%) number of respondents. Respondents who used the Internet were more in Kinondoni 5 (3.3%) than in Morogoro urban district 1 (1.0%).

Adejo and Haruna (2010) classified ICTs into conventional ICTs (radio, television) and contemporary ICTs (telephones, computer/internet). These results mean that mobile phone and the Internet (contemporary ICTs) are used more by respondents in Kinondoni compared to radio and television (Conventional ICTs) which are used more by respondents in Morogoro urban districts. This could probably be due to the fact that respondents in Dar es Salaam are busier with other economic activities hence they may be lacking time to watch television and listen to radio livestock programmes. The livestock keepers in Kinondoni District may also be ignorant on the importance of the livestock programmes or they may not have been aware of the livestock programmes in the radio and television. The well-developed ICT infrastructure in Kinondoni may be the reason as to why mobile phones and the Internet are used more by respondents in Kinondoni. The livestock keepers explained how they used different types of ICTs in accessing livestock information, the usefulness of each of the ICTs in livestock keeping and reasons why they did not use some or all of the ICTs. The following section will discuss how different types of ICTs are used by urban livestock keepers to access livestock information and the perceptions of the livestock keepers on each of the ICTs. The reasons as to why some types of ICTs are not



Table 2. Radio programmes listened to by urban livestock keepers

Radio Programme		Frequency of Listening					
		Frequently		Less Frequently		Never Watched	
		Freq.	%	Freq.	%	Freq.	%
Mfugaji wa kisasa	N= 41	18	43.9	21	51.2	2	4.9
PADEP	N= 19	3	15.8	8	42.1	8	42.1
Inuka	N= 12	1	8.3	6	50.0	5	41.7

Source: Field survey, 2011

used by some of the respondents to access livestock information are also discussed.

### USE OF RADIO IN ACCESSING LIVESTOCK INFORMATION

The respondents were asked to explain how they used their radios to access livestock information. First they were asked to mention any livestock keeping programmes that they knew and the frequency of listening to these programmes. Various radio programmes were mentioned. The radio programmes included; 'Mfugaji wa Kisasa' (TBC Taifa), which was watched by 41 out of 55 (74.5%) of the respondents, 'PADEP' (TBC Taifa) which was watched by 19 out of 55 (34.5%) of the respondents and 'Inuka' (Radio Free Africa) which was watched by 12 out of 55 (21.8%) of the respondents. Among the radio programmes that were mentioned, it was established that the 'Mfugaji wa Kisasa' programme was watched frequently by only 18 out of 41 (43.9%) respondents, the 'PADEP' programme was frequently watched by only 3 out of 19 (15.8%) respondents and the 'inuka' programme was frequently watched by only 1 out of 12 (8.3%) respondents. The respondents who had watched the programmes less frequently were more (i.e., 51.2% for 'mfugaji wa kisasa', 42.1% for PADEP and 50.0% for Inuka) than those who had watched the programmes frequently. Those respondents who had never watched some of these programmes were also relatively many (i.e., 42.1% for PADEP and 41.7% for Inuka) compared to those who had watched the programmes frequently. Table 2

shows the different radio programmes that were listened to by the livestock keepers and the frequency of listening to each of the programmes.

From these results, it is observed that these radio programmes are not watched frequently by the livestock keepers. Most of these programmes are watched less frequently and some of them have never been watched by the respondents. This could have been because of lack of awareness of the existence of such programmes, lack of time to listen to the programmes and lack of interest or ignorance on the importance of such programmes in livestock keeping. As a policy implication, the broadcasting media should ensure that the radio programmes are beneficial to the intended audience and should take the necessary measures to improve the programmes so that the intended audience benefits from the programmes. A similar policy implication was stated by Nazari and Abu (2010) who suggested that since the radio plays a more important role in public education, producers should be familiar with the latest and newest programme structures to be able to meet the needs of people by employing appealing methods.

### Perceptions of Livestock Keepers on the Usefulness of Radio

The respondents who listened to radio programmes on livestock keeping were then asked whether the programmes provided any useful information on livestock keeping. Findings in Table 3 show that a total of 27 out of 55 respondents (49.1%) agreed that the programmes were very useful while 24 (43.6%) said that they

Table 3. Usefulness of radio programmes on livestock keeping.  $N=254$ 

Usefulness of Radio Programmes on Livestock Keeping		Listening to Livestock Keeping Programmes in the Radio			Total
		Yes	No	Not Applicable	
Very useful	Count	27	0	0	27
	%	(49.1%)	(.0%)	(.0%)	(10.6%)
Satisfactory	Count	24	0	0	24
	%	(43.6%)	(.0%)	(.0%)	(9.4%)
Not useful	Count	1	1	0	2
	%	(1.8%)	(.5%)	(.0%)	(.8%)
Not applicable	Count	3	189	9	201
	%	(5.5%)	(99.5%)	(100.0%)	(79.1%)
Total	Count	55	190	9	254
	%	(100.0%)	(100.0%)	(100.0%)	(100.0%)

Source: Field survey, 2011

were satisfactory. Very few (1.8%) respondents said the programmes were not useful at all and a total of 201 out 254 respondents (79.1%) did not respond to the question and these were labeled as “Not applicable”.

The respondents were then asked to explain why the radio programmes were useful, satisfactory or not useful. The results in Table 4 show that 27 respondents (100%) admitted that the radio programmes were very useful because they offered a lot of advice on animal husbandry practices. Some of these respondents admitted that they had exercised what they had learnt from the programmes and they had benefited by improving their animal husbandry practices. Although the radio programmes were said to be useful by most of the respondents who answered the question, some of the respondents (33.3%) said that the programmes were satisfactory because the programmes offered insufficient technical advice. Another 12 out of 24 respondents (50.0%) complained that the programmes were satisfactory because they had no enough time of listening to radio and following up the programmes due to their tight schedules. Very few of these respondents (8.3%) complained that the radio programmes

were biased to only some few animals and therefore not all the livestock keepers were benefitting from the programmes.

These results are an indication that radio programmes on livestock keeping are very important to the livestock keepers despite the fact that only a few livestock keepers accessed the programmes. The radio programmes are useful because some of the livestock keepers admitted that they could benefit from the programmes despite the fact that time was a limitation to listening the programmes. This means that the radio programmes could be very beneficial to the livestock keepers if only the programmes could be accessed by many or all the livestock keepers. These programmes could lead to access of relevant information which could help the livestock keepers improve their practice hence increase their income and reduce poverty. If these programmes were advertised and their broadcasting schedules improved, more livestock keepers could benefit from the programmes. The broadcasting media and the programme producers are therefore responsible in ensuring that more livestock programmes are introduced and the programmes are advertised frequently in order to increase the awareness

Table 4. Perceptions of livestock keepers on the radio programmes. N=254

Perceptions on Livestock Keeping Radio Programmes		Usefulness of Radio Programmes in Livestock Keeping				Total
		Very Useful	Satisfactory	Not Useful	Not Applicable	
A lot of advice	Count	27	2	0	0	29
	%	(100.0%)	(8.3%)	(.0%)	(.0%)	(11.4%)
Insufficient technical advice	Count	0	8	0	0	8
	%	(.0%)	(33.3%)	(.0%)	(.0%)	(3.1%)
Lack enough time	Count	0	12	1	0	13
	%	(.0%)	(50.0%)	(50.0%)	(.0%)	(5.1%)
Radio programmes are biased	Count	0	2	0	6	8
	%	(.0%)	(8.3%)	(.0%)	(3.0%)	(3.1%)
Not applicable	Count	0	0	1	195	196
	%	(.0%)	(.0%)	(50.0%)	(97.0%)	(77.2%)
Total	Count	27	24	2	201	254
	%	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)

Source: Field survey, 2011

of the livestock keepers on the existence and importance of these programmes. Yahaya and Badiru (2002) also recommended that more effort should be made in advertisement of the radio programmes for more access to relevant agricultural information.

## USE OF TELEVISION IN ACCESSING LIVESTOCK INFORMATION

The respondents were asked to mention the livestock keeping television programmes that they watched. 67 out of 254 respondents watched different livestock television programmes including; 'Mfugaji wa Kisasa' (TBC one) which was watched by 33 out of 67 (49.3%) respondents, PADEP which was watched by 30 out of 67 (44.8%), 'Kilimo cha Kisasa' (StarTV)

Table 5. Television programmes watched by urban livestock keepers

Television Programme		Frequency of Watching Television Programmes					
		Frequently		Less Frequently		Never Watched	
		Freq.	%	Freq.	%	Freq.	%
Mfugaji wa kisasa	N= 33	19	57.6	13	39.4	1	3.0
PADEP	N= 30	20	66.7	9	30.0	1	3.3
Kilimo cha kisasa	N= 9	7	77.8	2	22.2	0	0.0
SUA TV	N= 2	2	100	-	-	0	0.0

Source: Field survey, 2011

Table 6. Usefulness of television programmes. N=254

Usefulness of TV Programmes on Livestock Keeping		Watching Livestock Programmes on Television			Total
		Yes	No	Not applicable	
Very useful	Count	46	0	0	46
	%	(68.7%)	(.0%)	(.0%)	(18.1%)
Satisfactory	Count	18	0	0	18
	%	(26.9%)	(.0%)	(.0%)	(7.1%)
Not useful	Count	1	0	1	2
	%	(1.5%)	(.0%)	(9.1%)	(.8%)
Not applicable	Count	2	176	10	188
	%	(3.0%)	(100.0%)	(90.9%)	(74.0%)
Total	Count	67	176	11	254
	%	(100.0%)	(100.0%)	(100.0%)	(100.0%)

Source: Field survey, 2011

which was mentioned by 9 out of 67 (13.4%) of the respondents and SUA TV programmes that were mentioned by 2 out of 67 (3.0%) of the respondents. These respondents were then asked to indicate the frequency of watching each of the television programmes. The findings are presented in Table 5.

Results in Table 5 indicate that 'mfugaji wa kisasa' (TBC one) programme was watched frequently by 19 out of 33 respondents (57.6%), PADEP was watched frequently by 30 out of 30 (66.7%) and 'Kilimo cha Kisasa' programme was watched frequently by 7 out of 9 (77.8%) respondents. These television programmes had been watched less frequently by 39.4% respondents for 'Mfugaji wa Kisasa', 30.0% for PADEP and 22.2% for 'Kilimo cha Kisasa'. The SUA TV programmes had been watched only by the respondents in Morogoro and not those in Kinondoni because SUA TV is a local channel in Morogoro and could only be seen by Morogoro residents. These results show that urban livestock keepers access livestock information through television programmes more than they do for radio programmes.

### Perceptions of Livestock Keepers on the Usefulness of Television

The respondents were then asked on the usefulness of the television programmes on their practice of livestock keeping. The findings shown in Table 6 indicate that out of 67 respondents who watched the television programmes, 46 (68.7%) respondents admitted that the programmes were very useful. 18 out of 67 (26.9%) respondents said that the programmes were satisfactory and one out of 67 (1.5%) respondents replied that the programmes were not useful. These results are an indication that television livestock programmes are very useful to the urban livestock keepers because the livestock keepers gain knowledge from the programmes.

The respondents were asked to explain their answers and as shown in Table 7, 44 out of 46 respondents (95.7%) admitted that the television programmes were very useful because they offered a lot of technical advice to the livestock keepers and one out of the 46 respondents (2.2%) said that the programmes were important because the lessons were by demonstrations hence they were easily understood. Some of the respondents (18 out of 254) claimed that the programmes were satisfactory. The results show that 11 out of 18 of these

Table 7. Perceptions on the usefulness of television livestock keeping programmes. N=254

Perceptions on Livestock Keeping TV Programmes		Usefulness of TV Programmes on Livestock Keeping				Total
		Very Useful	Satisfactory	Not Useful	Not Applicable	
I get a lot of technical advice	Count	44	0	0	1	45
	%	(95.7%)	(.0%)	(.0%)	(.5%)	(17.7%)
Lessons are by demonstrations	Count	1	0	0	0	1
	%	(2.2%)	(.0%)	(.0%)	(.0%)	(.4%)
No frequent follow ups	Count	1	11	1	0	13
	%	(2.2%)	(61.1%)	(50.0%)	(.0%)	(5.1%)
No time to watch the programmes	Count	0	4	0	4	8
	%	(.0%)	(22.2%)	(.0%)	(2.1%)	(3.1%)
Show complicated techniques	Count	0	3	0	0	3
	%	(.0%)	(16.7%)	(.0%)	(.0%)	(1.2%)
Not applicable	Count	0	0	1	183	184
	%	(.0%)	(.0%)	950.0%	(97.3%)	(72.4%)
Total	Count	46	18	2	188	254
	%	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)

Source: Field survey, 2011

respondents (61.1%) explained that the television programmes were satisfactory because the respondents had no frequent follow-ups of the programmes. Four out of 18 respondents (22.2%) said that the programmes were satisfactory because the respondents had no time to watch the programmes. Some few (three out of 18) respondents (16.7%) claimed that the programmes were satisfactory because they showed complicated and expensive equipment hence they could not be applied in our environment. Very few (two out of 254) respondents complained that the television programmes were not useful at all. These respondents claimed that they lacked time to frequently follow-up the programmes hence they did not benefit from them.

From the results above, it may be concluded that though the television programmes were said to be very useful by the majority of the respondents, these programmes were not watched by many livestock keepers because of limited time to watch the programmes. This is

also a policy implication for the relevant bodies to increase the number of livestock programmes and the frequency of broadcasting so that many livestock keepers are able to watch and follow-up the programmes.

## USE OF MOBILE PHONE IN ACCESSING LIVESTOCK INFORMATION

The respondents were also asked to mention how they used their mobile phones and the frequency in each use. It was found out that the respondents used their mobile phones in different ways. Results in Table 8 show that out of the 234 respondents who used mobile phones to access livestock information, 210 (89.7%) respondents used their mobile phones for calling or communicating with veterinary/extension officers. 121 out of 234 (51.7%) of the respondents used their mobile phones to exchange ideas or communicate with clients. 79 out of 234 (39.8%) of the respondents used

Table 8. Uses of mobile phones by urban livestock keepers

Uses of Mobile Phone		Frequency of Use of Mobile Phone					
		Frequently		Less Frequently		Least Frequently	
		Freq.	%	Freq.	%	Freq.	%
Calling extension officers	N= 210	200	95.2	4	1.9	6	2.9
Communication with clients	N=121	101	83.5	13	10.7	7	5.8
Communication with fellows	N= 79	51	64.6	17	21.5	9	11.4
Buying feeds	N= 10	10	100	-	-	-	-
Buying chicks	N=5	5	100	-	-	-	-

Source: Field survey, 2011

their mobile phones to communicate with fellow livestock keepers, while 5 out of 234 (5.1%) respondents used their mobile phones in availing chicks and the remaining 10 out of 234 (4.3%) secured feeds through their mobile phones.

These results are an indication that many livestock keepers use their mobile phones in different ways in their livestock keeping practice. Urban livestock keepers benefit from their mobile phones in that they can easily get relevant information or advice from veterinarians or extension officers. Urban livestock keepers are also able to communicate with their clients and exchange ideas with their fellow livestock keepers. The livestock keepers can also get chicks and feeds by using their mobile phones whereby they can call and press orders, which mean their needs are met through their mobile phones. These respondents were then asked to state the frequency of each use of their mobile phones and the findings are shown in Table 8.

As presented in Table 8, it was found out that 200 out of 210 (95.2%) respondents frequently used their mobile phones to communicate with veterinary or extension officers. This was followed by 101 out of 121 (83.5%) of the respondents who frequently used their mobile phones to communicate with their clients and 51 out of 79 (64.6%) respondents who frequently used their mobile phones to communicate with their fellow livestock keepers. Other respondents used their mobile phones frequently in securing chicks and feeds. Mobile phones were used less frequently by a few respondents to

communicate with extension officers (1.9%), to communicate with clients (10.7%) and to communicate with fellow livestock keepers (21.5%). This is an indication that mobile phones are very important to urban livestock keepers in many ways that have been discussed. This result implies that most urban livestock keepers can hardly do without mobile phones in their livestock keeping practice.

### Perceptions of Livestock Keepers on Use of Mobile Phones

The respondents who used mobile phones were asked whether the mobile phones were important to them in their livestock keeping practice. They were also asked to explain the reasons why they thought the mobile phones were useful or not useful. The findings presented in Table 9 indicate that all 234 respondents (100%) who used mobile phones in accessing livestock information agreed that the mobile phone was important to them. 1 out of 10 (10%) respondents who did not use mobile phones to access livestock information said that mobile phone was not important in the livestock keeping practice while 19 out of 254 (7.5%) respondents did not respond to the question. The respondents were then asked to give reasons why they thought mobile phones were important to them. 199 out of 234 respondents (85.0%) admitted that mobile phones enabled them to communicate easily with veterinarians, extension officers, clients and their fellow livestock keepers. 22

Table 9. Importance of mobile phones in accessing livestock information. N=234

Explanation for Importance of Mobile Phone in Livestock Keeping		Importance of Mobile Phone in Livestock Keeping			Total
		Yes	No	Not Applicable	
Easy communication	Count	199	0	0	199
	%	(85.0%)	(.0%)	(.0%)	(78.3%)
Easy availability of feeds, chicks and markets	Count	22	0	0	22
	%	(9.4%)	(.0%)	(.0%)	(8.7%)
Quick solving of problems	Count	10	0	2	12
	%	(4.3%)	(.0%)	(10.5%)	(4.7%)
Save time and cost	Count	3	0	0	3
	%	(1.3%)	(.0%)	(.0%)	(1.2%)
Not applicable	Count	0	1	17	18
	%	(.0%)	(100.0%)	(89.5%)	(7.1%)
Total	Count	234	1	19	254
	%	(100.0%)	(100.0%)	(100.0%)	(100.0%)

Source: Field survey, 2011

out of 234 respondents (9.4%) said that mobile phones enabled them to secure feeds, chicks and markets easily. 10 out of 234 respondents (4.3%) said that mobile phones enabled them to solve their livestock keeping related problems quickly and 3 out of 234 respondents (1.3%) explained that mobile phones enabled them save time and costs.

## USE OF INTERNET IN ACCESSING LIVESTOCK INFORMATION

The Internet was used by only 6 out of 254 of the respondents (2.4%) to access livestock information. Out of the 6 respondents who used the Internet, only 1 (16.7%) respondent used the Internet to send and receive e-mails with livestock information. All the 6 respondents (100%) used the Internet to search for relevant information on livestock keeping and there were no respondents who used the Internet

Table 10. Uses of Internet in accessing livestock information

Internet Uses		Frequency of Use					
		Frequently		Less Frequently		Least Frequently	
		Freq.	%	Freq.	%	Freq.	%
Searching	N= 6	4	66.7	2	33.3	0	0.0
E-mail	N= 1	1	100	-	-	0	0.0
Sharing	N= 6	-	-	-	-	0	0.0

Source: Field survey, 2011

Table 11. Reasons for not using the Internet. N=238

Reason	Frequency	Percentage (%)
Lack of computer skills	205	86.1
Lack of Internet skills	14	5.9
Lack of interest to use the Internet	14	5.9
Lack of time	9	3.8
Long distances to Internet facilities	7	2.9
Lack of relevant websites	3	1.3
The Internet is not useful	1	0.4
Expensive Internet services	1	0.4

Source: Field survey, 2011

to share ideas on livestock keeping with colleagues. Results presented in Table 10 shows that 1 respondent frequently used the Internet to exchange e-mails with extension officers. 4 out of 6 (66.7%) used the Internet frequently to search for relevant information and 2 out of 6 (33.3%) used the Internet less frequently to search for relevant information on livestock keeping.

From these results, it may be concluded that Internet users are very few compared to users of other ICTs. The low usage of the Internet is contributed to a large extent by lack of computer and Internet skills among the livestock keepers. The Internet however is a very good source of a lot and diverse amount of livestock information if only the IT skills are imparted to the livestock keepers to enable them use the Internet and access the information.

### Perceptions of Livestock Keepers on Use of the Internet

Findings from this study have revealed that all respondents who used the Internet admitted that it was very useful in providing relevant information. The respondents who did not use the Internet were asked to give their reasons why they did not use the Internet. Table 11 shows that 205 out of 238 (86.1%) of these respondents did not use the Internet because they did not have the computer skills. These were followed by 14 out of 238 (5.9%) of the

respondents who had the computer skills but did not have the knowledge to use the Internet. Other 14 respondents (5.9%) had no interest of using the Internet to search for relevant livestock information though they had the Internet skills. Other reasons that were given by the respondents were; lack of time to use the Internet (3.8%), long distances to the Internet cafés' (2.9%), expensive Internet services (0.4%), ignorance of the usefulness of the Internet (0.4%) and lack of relevant websites to access livestock information (1.3%). These findings are supported by Greenberg (2005) who also states some of the reasons of not using the Internet as high cost of communications and the lack of skills as a major barrier to wide use, in addition to unreliable electrical power.

Responses from interviews revealed that most of the extension officers neither had the basic computer skills nor did they have the necessary skills to use the Internet. Most of the extension officers had no e-mail addresses neither did they use the Internet to search for relevant livestock information. A few of the extension officers with Internet skills only used the Internet to exchange e-mails with friends. Observations from this study revealed that there were no computers in almost all government offices for extension officers (except for one office in Morogoro- Bigwa Ward) and the computer was not connected to the Internet. The extension officers had to go out of their



Table 12. Reasons for not using ICTs in livestock keeping. N=254

Reasons for Not Using ICTs in Livestock Keeping		Use of ICTs in Accessing Livestock Information		Total
		Yes	No	
I use experience in livestock keeping	Count	4	2	6
	%	(1.7%)	(13.3%)	(2.4%)
I am close to extension services	Count	0	3	3
	%	(.0%)	(20.0%)	(1.2%)
I don't find ICTs useful	Count	3	3	6
	%	(1.3%)	(20.0%)	(2.4%)
I have a few livestock	Count	0	5	5
	%	(.0%)	(33.3%)	(2.0%)
Not applicable	Count	232	2	234
	%	(97.1%)	(13.3%)	(92.1%)
Total	Count	239	15	254
	%	(100.0%)	(100.0%)	(100.0%)

Source: Field survey, 2011

offices get the Internet services. Observations also revealed that there were a few Internet cafés most of which were located far from the livestock keepers.

### Reasons for Not Using Any ICTs to Access Livestock Information

In this study, it was found out that there were 15 out of 254 respondents (5.9%) who did not use ICTs at all to access livestock information but rather, they used the ICTs for other purposes like entertainment, news and social networking. These respondents were asked to give reasons as to why they did not use any of the ICTs to access livestock information as shown in Table 12. One of the reasons given by two out of 15 of the respondents (13.3%) who did not use ICTs at all was that they used experience more in livestock keeping because they had kept livestock for a long time (10-20 years) hence had gained a lot of experience. Another reason for not using any of the ICTs was that some of these livestock keepers (20%) were close to extension or veterinary services thus they did not see the need of using ICTs because they

could get all the advice and help they needed easily. Other respondents (20%) said that they did not use ICTs in livestock keeping because they did not find them useful. Some of these respondents (33.3%) said that they did not use ICTs because they had very few livestock that they did not see the need of using ICTs.

Some of the respondents who used ICTs did not benefit from them in accessing livestock information. Four out of 239 respondents (1.7%) gave the reason that they had enough experience of keeping livestock, thus they did not need ICTs in accessing livestock information. Another reason given by 1.3% of these respondents was that they did not find the ICTs useful in getting access to livestock information. This could be explained as ignorance on the importance of ICTs in delivering relevant livestock information. This is because the respondents who used ICTs to access livestock information were found to be more knowledgeable and aware of better livestock management practices (due to learning new skills and ideas from ICTs) than those who relied on experience. These results indicate that very few livestock keepers did not use any ICTs in accessing livestock information as opposed to

the majority who used at least one of the ICTs. Some of the respondents who did not use any of the ICTs were either close to extension services where they could easily get information or had very few livestock (beginners) hence did not use the ICTs; this could be due to unawareness of the importance of ICTs in accessing livestock information. Other livestock keepers did not use ICTs to access livestock information claiming that they had kept livestock all their lifetime hence they used experience and they did not need ICTs to get any information. ICTs could enable these livestock keepers to learn new practices and ideas that could help to improve the livestock keeping practice. This is because the livestock keepers who used ICTs to access livestock information admitted learning a lot of new experiences that had improved their husbandry practices compared to the livestock keepers who claimed that they did not use ICTs.

In conducting the interviews, the extension officers were asked on the ICTs that they used in getting access to and disseminating livestock information. Results revealed that, many extension officers used most of these ICTs including mobile phones, radio and television. All the extension officers admitted having used mobile phones to communicate with the livestock keepers. Mobile phones were used more frequently compared to other types of ICTs. Radio and television were used less frequently by most of the extension officers due to lack of time to follow up the livestock programmes. The Internet was used by very few extension officers, the majority of the extension officers never used the Internet and the reasons given were lack of computer skills, lack of knowledge on how to use the Internet and lack of time to access the Internet. During in-depth interviews, when asked on their perceptions on the importance of ICTs, all the extension officers admitted that the ICTs were important because they enabled easy communication. Most extension officers said that mobile phones saved both time and cost. They also admitted that they learnt a lot from livestock programmes on radio and were able to see physically and learn from television livestock programmes. The extension officers

were also asked whether they preferred ICTs over other information sources. A few extension officers preferred using ICTs alone saying that they were easier, cheaper and faster than other sources. Some of the extension officers argued that ICTs were better than other sources of information (i.e. face to face dialogues and letters/memos) because they served many livestock keepers at the same time (this applied to ICTs like radio, television and the Internet). One extension officer from Kinondoni District (Mbweni Ward) was quoted saying that;

*With ICTs, many livestock keepers can be reached at the same time*

Nevertheless, most of extension officers preferred using a combination of both ICTs and other sources (e.g. face to face dialogues). The most common reason that was cited is quoted below;

*ICTs alone are not sufficient in delivering information since not everything can be done over the phone.*

Thus, the extension officers preferred integrating ICTs with other sources of information to increase efficiency of access to and delivery of information.

Observations in this study revealed that almost all respondents owned radio, television and mobile phones. Very few respondents did not own some of these ICTs e.g. television due to lack of electricity in their houses but most of them owned radio and mobile phone. The researcher observed some of the extension officers using their mobile phones to communicate with the livestock keepers to set appointments on when to meet. This was a confirmation of the answers given by the extension officers on the use of ICTs. Another observation made by the researcher was the absence of Internet cafés in some areas. It was also observed that in most of the areas the Internet services were very far from the livestock keepers. This was also a confirmation of the answers given by some

respondents that Internet services were located far; the reason given for less use of Internet by some respondents.

## RECOMMENDATIONS

Several recommendations emanated from the findings of this study; some of which were given by the livestock keepers on how to improve the use of ICTs in accessing livestock information. Other recommendations have been brought forward by the researcher (from observations) as means to increase networking among the urban livestock keepers and improve access and usage of information among them in order to improve the urban livestock keeping practice. One of the recommendations is for the broadcasting media to increase the frequency of broadcasting relevant livestock programmes. These radio and television programmes should be advertised frequently to increase the awareness of the livestock keepers on the existence of the programmes. The programmes should also be improved in order to include simple and affordable techniques that are relevant to our environment so that the knowledge obtained from the programmes is applied by all the livestock keepers. The programmes should also be sustainable to enable the livestock keepers to continue learning and benefitting from the programmes. The livestock keepers should also be sensitized through extension services to use radio and television to access livestock information. Community radio and television that are specifically for livestock keepers should be introduced. These will be very useful for the livestock keepers who will learn and benefit from the programmes.

Another recommendation is to enhance the use of mobile phones and Internet to access livestock information. This could be possible by reducing the costs of using mobile phone and Internet services so that all livestock keepers are able to use them. Relevant bodies (e.g. TCRA) in collaboration with mobile phone service providers in Tanzania (e.g. Vodacom, Airtel, Tigo and Zantel) and Internet service providers

should take into consideration the possibility of starting up ICT projects in urban areas to help specific urban communities gain easy access to information (as in rural areas). This can be through sending relevant short messages to the urban farmers especially on availability of markets and current market prices of various livestock products on demand in urban areas like meat, milk and eggs. These projects will enable the urban farmers to access relevant information through their mobile phones at cheaper prices. Relevant websites on livestock keeping should also be introduced and advertised so that the livestock keepers are aware of them. These websites should be in Swahili language to enable many livestock keepers to benefit from them. The ICT projects can also provide computer and Internet skills to the farmers and extension officers; this will promote use of the Internet to access livestock information.

Information networking among urban livestock keepers is a very important pre-requisite for easy information access and usage among them. This study therefore recommends that urban livestock keepers should form small organizations in their areas (through supervision by the government extension officer); this will enable the extension/veterinary services to easily reach many livestock keepers and the livestock keepers will benefit from the extension services. Farmer organizations will enable the livestock keepers cooperate, share information and get treatment or vaccines in case of disease outbreaks; this will lead to control of many animal diseases. Organizations will also help the livestock keepers get and share grazing areas in which the livestock keepers can graze their animals together in one area rather than each livestock keeper grazing his animals on his own. The availability of these grazing areas can be facilitated by the relevant authorities by setting aside grazing areas for urban livestock keepers, as an issue which currently is a big problem. Through these organizations, the livestock keepers can also benefit from seminars or meetings through which they can get a lot of information that will help them in their activities. Formation of organizations can

also enable the livestock keepers to get markets for their products and secure loans that will enable them improve their activities.

In addition, this study also recommends that information centres that provide relevant information on farming should be introduced in urban areas (in addition to public libraries). These information centres can help the urban farmers to easily get all the relevant information that they need. The presence of these information centres can enable the livestock keepers access a lot of information without having to go to the libraries which are located far from most of the livestock keepers. The information centres can also enable the livestock keepers to access print information sources that have been revealed to be scarce from the finding of this study.

## CONCLUSION

From the study, it may be concluded that urban livestock keepers in Kinondoni and Morogoro urban districts in Tanzania use different types of ICTs at varying extents to access information on livestock keeping. This is because urban livestock keepers need information which is usually insufficient because of various limitations of the information sources used. Mobile phone is used by the majority of livestock keepers, radio and television are used by a few livestock keepers to access livestock information (though they are commonly used for other social purposes) and the Internet is used by very few livestock keepers to search for relevant information on livestock keeping. The livestock keepers who use ICTs to access livestock information admit that ICTs are important tools of communication because they enable them get information on different issues concerning livestock keeping, despite the many challenges that they face. Relevant telecommunication authorities, stakeholders and service providers in urban areas should therefore improve ICT facilities and infrastructure in order to facilitate and enhance use of ICTs in accessing livestock information

for improved livestock keeping practices in urban and peri-urban areas.

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