

## **Availability and usage of ICTs and e-resources by livestock researchers in Tanzania: Challenges and ways forward**

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### **ABSTRACT**

A study was conducted to investigate the accessibility and use of e-resources in Tanzania. The methodology adopted for the study was survey in which questionnaires, interviews and observations were used in collection of the data. A total of 50 respondents participated in the study. The study revealed that livestock research institutes in Tanzania had very few e-resources for their researchers. It was concluded that most livestock researchers were not aware of most of the e-resources available hence they could not access and use them effectively in their research work. The researchers recommended for improvement of internet connectivity to enable efficient information searching from the internet.

**Key words:** *ICTs; E-Resources; Developing countries; Tanzania*

### **INTRODUCTION**

Information and Communication Technologies (ICTs) can be defined as the techniques, methods and tools used to access information and to communicate with others. The term refers to electronic and computer based technologies. These are the technologies whereby the information is accessed and used in electronic format through the use of computers. Tanzania like many other developing countries is adopting the use of ICTs in almost all sectors of economy including the Livestock sector. This is because information and communication is a very crucial asset in all economic sectors of development in a particular country. Tumsifu (2002) has reported that, this technology has not gained the same momentum in Africa compared to other developing countries in its use and application; the African countries have been described as lagging behind in their adoption and use of ICTs.

The application of ICTs, particularly computer technology for information handling is increasingly important in Tanzania. Kapange (2002) had reported that, ICTs are crucial in facilitating communication and access to information for agricultural and rural development. Since agriculture is the national priority sector, it is one of the potentially beneficial areas for the application of ICTs for economic transformation. The development of networks and use of low-cost ICTs will enhance timely access to accurate and reliable information. Agriculture in Tanzania contributes significantly to the Gross Domestic Product (GDP), export earnings and employs the vast majority of the working population. 70% of the export earnings are from the agricultural sector, which provides employment to about 80% of the Tanzanian population (Mlambiti and Isinika, 1999). However, there are many constraints that hamper agricultural development, some of which include; poor farming techniques, poor transportation, diseases, unreliable market and poor ICT infrastructure. The poor ICT infrastructure greatly affects all areas of agricultural development, including training, extension services, marketing, documentation and dissemination of related information.

This paper discusses the status of ICTs and e-resources in livestock research institutes, availability of ICTs and e-resources, access and usage of electronic resources (e-resources), challenges and ways forward towards the use of the ICTs and e-resources. Livestock researchers have their own information needs which determine the sources of information they use. This influences their information seeking behaviour especially in electronic environments and their attitudes towards the use of ICTs. Siatri, (1998) suggested that, narrowing the focus of the study provided a better understanding of the information tools used by the particular group of scientists and a more detailed and accurate profile of the users leading to an in-depth understanding of the information seeking process.

## **OBJECTIVES**

### **General objective**

To investigate the extent to which livestock research institutions facilitate access and use of electronic information by livestock researchers in Tanzania.

### **Specific objectives**

1. To investigate the role of livestock research institutes in facilitating access and use of e-resources.
2. To identify the electronic sources of information accessed by the livestock researchers.
3. To determine the information literacy skills of Tanzanian livestock researchers.
4. To determine the perceptions/attitudes of livestock researchers concerning the importance of electronic sources of information in research.
5. To recommend on how to improve accessibility and use of electronic sources of information.

### **Significance of the research**

This research is important because of the following reasons:

1. The research leads to increased knowledge on how livestock researchers in Tanzania access and use electronic information.
2. It also exposes the electronic sources of information available in livestock research institutions.
3. It results into increased understanding on the information seeking skills of livestock researchers In Tanzania.
4. The study also contributes to increased literature in the field.

## **RESEARCH METHODOLOGY**

### **Description of the study area**

The study was conducted in Dar es Salaam, Morogoro and Dodoma regions of Tanzania. Tanzania is located in Eastern Africa between longitude 29° and 41° East. Latitude 10° and 12° South. Tanzania is the biggest of the East Africa countries (i.e. Kenya, Uganda and Tanzania), (URT, 2005). Dodoma Region lies at 4° to 7° latitude South and 35° – 37° longitude East. It is a region centrally positioned in Tanzania and is bordered by four regions namely: Manyara in the

North, Morogoro in the East, Iringa in the South and Singida in the West. Dar es Salaam is located at 6°48' South, 39°17' East. The city is situated on a massive natural harbour on the Eastern Indian Ocean coast of Africa. Administratively, Dar es Salaam is broken into 3 districts: Ilala, Kinondoni, and Temeke, (Wikipedia, 2007). Morogoro Region lies between latitude 5° 58" and 10° 0" to the South of the Equator and longitude 35° 25" and 35° 30" to the East. It is bordered by seven other Regions. Arusha and Tanga regions to the North, the Coast Region to the East, Dodoma and Iringa to the West, and Ruvuma and Lindi to the South. The Region is administratively divided into 6 districts: Mvomero, Kilosa, Kilombero, Ulanga, Morogoro Urban and Morogoro Rural, (URT, 1997).

## **Research design**

Questionnaires were designed and distributed to a number of researchers in the selected research institutes. The purpose was to collect evidence concerning the use of electronic information resources and the patterns of different practices used by the researchers to retrieve the required information. The analysis and critical evaluation of the data drew an overall picture of the use of electronic information resources and patterns of information skills of the researchers.

Qualitative information required was obtained from in-depth interviews of some of the providers of information (Information professionals) in these research institutes together with a few livestock researchers. The interviews attempted to identify the factors which are liable to affect the accessibility and use of electronic information by livestock researchers such as the availability of the resources in the institutions. Observations were also made by the researcher during the interviews in order to capture some additional information that were not revealed by the questionnaires and the interviews.

The use of questionnaires, interviews and observations provided the grounds for thorough and constant comparisons of the data. Additionally the engagement of different research methods sought to assist towards the validity and reliability of the findings.

## **Sample size and sampling techniques**

In order to get the size of the population for this study, the researcher visited the website for the Ministry of Livestock Development (MLD). From the website, it was found out that there were 11 livestock research institutes in Tanzania. Apart from livestock research institutions under the Ministry of Livestock Development, research was also carried out by higher learning institutions such as the Sokoine University of Agriculture (URT, 2006).

Three livestock research institutions were selected by non-probability sampling technique (purposive sampling). This is the deliberate selection of sample units that conform to some pre-determined criteria, based on the judgment of the researcher (Kaltan, 1983). Purposive sampling was used because the researcher was forced to deliberately choose only the research institutes with many researchers and those close to the researcher, due to the limitation of time and funds. From the population, the sample size that was selected comprised of 45 respondents. The selected livestock research institutions were;

- i. Sokoine University of Agriculture (SUA)
- ii. Animal Diseases Research Institute (ADRI), currently known as the Central Veterinary Laboratory (CVL)
- iii. National Livestock Research Institute (NLRI)

Sokoine University of Agriculture has been included in this study because the University conducted research in livestock and it contains the largest number of livestock researchers compared to all the other livestock research institutes in Tanzania. SUA also has an automated library with many e-resources for livestock researchers. ADRI and NLRI were selected because they were the National Livestock Research Institutes; hence they were expected to have various e-resources for the researchers and also they had many livestock researchers compared to the other livestock research institutes in Tanzania. All the three research institutes were also selected because they participated in the Programme for Enhancement of Research Information (PERI).

### **Data collection**

Survey was the method used for data collection; this includes the use of questionnaires and interviews in obtaining data from a large number of respondents chosen by some form of sampling (Singleton *et al*, 1993). A combination of data collection instruments was used in order to increase the reliability of the data including questionnaires, interviews and observations. These are described in details below.

### **Questionnaires**

A total of 45 self-administered questionnaires were answered by the selected livestock researchers.

### **Interviews**

Apart from the 45 respondents that were given questionnaires, five respondents were interviewed. The researcher conducted face-to-face interviews with some of the researchers and a few information professionals because of the absence of information professionals in some of the institutes at the time of data collection. The respondents involved in the interviews were two information professionals (Librarians/Documentalists) and three researchers as follows:

- i. Animal Diseases Research Institute (ADRI) – two researchers
- ii. National Livestock Research Institute (NLRI) – one researcher and one information professional (Documentalist)
- iii. Sokoine University of Agriculture (SUA) – one information professional (Librarian and researcher)

These respondents provided information on the availability of electronic resources for the livestock researchers in their institutes and the role played by their institutes in ensuring that electronic resources were available and accessed by the livestock researchers. They also provided information on their perceived importance of the e-resources for their research work. In addition, they provided recommendations on the improvement of the accessibility of the e-resources. The use of interviews assisted the researcher in filling the gaps which were observed in the questionnaires such as the e-resources that were available in these research institutes and whether they were accessed by the researchers. These items were not properly answered in the questionnaires.

### **Observations**

These were done by the researcher when collecting the data, in order to capture any other additional information that was not revealed by the questionnaires and the interviews. Observations that were made in this study included; presence of a modern library for accessing e-resources in the institute, availability of the internet, presence of computers, and presence of CD-ROMs in the libraries. The researcher also observed the speed of the internet and the usage of the internet by researchers and the types of CD-ROMs that were available in these research institutes.

### **Data analysis**

The collected data was organized in order to remove errors that were present. It was classified, coded and analyzed. The Statistical Package for Social Sciences (SPSS) was used in analyzing quantitative data collected through questionnaires and content analysis was used in analyzing qualitative data from interviews and observations.

## **RESULTS AND DISCUSSIONS**

### **Current status of ICTs and e-resources for livestock research in Tanzania**

ICTs are very important because they enable the accessibility and use of e-resources. Without ICTs like computers and the internet, e-resources cannot be accessed and used even if the livestock researchers possess the basic computer skills. The ICT infrastructure in Tanzanian livestock research institutes needs to be improved in order to enable the livestock researchers to access and use the e-resources effectively. A study by Tumsifu (2002) investigated the access and use of ICTs in agricultural research institutes in Tanzania. The results indicated that, almost all the researchers from the selected institutes had TEEAL (The Essential Electronic Agricultural Library). This observation could be as a result of the supply of the facility to the surveyed institutes by the Information Documentation Unit (IDU) of the Ministry of Agriculture and Food Security. Findings revealed that, most of the researchers were using TEEAL only because of its free availability. Other databases, for example, CAB abstracts, FAOSTAT and AGROS were used by very few researchers because they had them as personal property or they used them while pursuing their studies. Hence access and use of these resources was affected by unavailability and lack of awareness of the researchers. Websites, directories and subject gateways could also be used in accessing and communicating information among scientists. The study revealed that among the researchers, only 29% used agricultural websites and subject gateways, while 70% did not know what they were and therefore did not use them, probably due to lack of awareness of their existence.

The access and use of e-resources by livestock researchers in Tanzania is determined by the fact that these resources are available in the livestock research institutes. In many developing countries, the acquisition of e-resources has been a problem. This is mainly caused by lack of funds, poor technical know how and lack of appropriate ICT policies (Tumsifu, 2002). The meager funds allocated to information in the developing countries indicate the extent of their commitment and that the importance of information is far from the mind of planners, policy makers and the government in general (Mwinyimbegu (1989), Backer (1993) and Mambo (1998)).

This study identified that each institution surveyed had quite a number of computers some of which were connected to the Internet. Several institutions such as Sokoine University of Agriculture (SUA) had almost all computers connected to the Local Area Network (LAN); hence access to the Internet was much more assured. Livestock researchers were able to gain access to computers allocated to members of staff although full access was not possible due to a limited

number of Power Computers (PCs). Due to limited budgets, most institutions had fewer PCs in good working conditions, many being old and outdated. In addition, the internet bandwidth has been a problem in most institutions.

### **Availability of e-resources in livestock research institutes**

Results from this study have revealed that, some libraries in the livestock research institutes in Tanzania were making efforts to ensure that various e-resources were made available for their researchers through the PERI programme, though this was not among the priorities of these institutes. Unfortunately, some of the livestock research institutes had no e-resources for their researchers except the internet. This had been confirmed by the response of some of the researchers whereby 42.2% (19 researchers) said that no e-resources were provided by their institutes. In order for the livestock researchers to get current research information, livestock research institutes must ensure that various e-resources are available in the institutes and that these resources are accessed and used by the livestock researchers.

The study have also revealed that 66.7% of the respondents (30 researchers) have admitted having CD-ROMS in their livestock research institutes while 15 researchers (33.3%) said they have no CD-ROMS at all in their institutions. The researchers in the institutes with no CD-ROMS solely depended on the internet to search for electronic sources of information. It was also found out that, some of the researchers in the institutes with CD-ROMS depended more on the internet to search for information rather than using the CD-ROMS that were available in their institutions, this was because most of the researchers were neither sensitized nor trained on the availability and use of the e-resources.

When interviewed on the availability of e-resources, some of the respondents said that the CD-ROM available was outdated thus they preferred using the internet, while others responded that there was limited access to most e-resources because the institute was not subscribed to these resources. A researcher in one of the institutions said that there were no e-resources in their institute except the internet while a librarian from another institution replied that internet connectivity was not reliable hence it affected how accessed and used the e-resources.

Observations in different research institutes revealed that most researchers had computers in their offices hence each researcher used his/her own computer to search for e-resources. One institution (SUA) had a common computer lab which could be used by the researchers to access e-resources in addition to the personal computers of the researchers in their offices, but most researchers preferred accessing the e-resources from their offices. However, the researchers in such institutes were faced with difficulties in accessing the e-resources through the internet because of poor internet connectivity which was as a result of slow bandwidth.

### **The e-resources accessed and used by the livestock researchers**

Despite poor state of ICTs in many livestock institutions, the study found that researchers were able to access and use a number of electronic resources. These included various CD-ROMS, subject gateways, local and international databases and the internet. The results also revealed that 48.9% livestock researchers in Tanzania used the internet as their main source of electronic information. This was revealed in the Animal Diseases Research Institute (ADRI) where there were no other e-resources than the internet. They depended much on the internet for more current information. However, many researchers (66.7%) in livestock research institutes were aware of few CD-ROMS although only a few researchers (22.2%) frequently used these CD-ROMS for their research work. Furthermore the study revealed that efforts were underway to

replenish ICT facilities in order to enable researchers' access to electronic resources more effectively.

In some of the institutes which had CD-ROMS, only the researchers with IL training seemed to be aware of the available CD-ROMS. 42.2% of the livestock researchers had only a few CD-ROMs in their institutions such as TEEAL which was used as an e-resource, though some researchers complained that it was not up-to-date. They also depended much on the internet for more current information. Other CD-ROMS known and accessed by the respondents included; CAB abstracts (13.3%), Silverplatter (2.2%) and Agricola (2.2%). The CD-ROMs that were mentioned by the livestock researchers are indicated in Table 1.

**Table 1: CD-ROMS accessed by livestock researchers**

N = 45

Type of CD-ROM	Frequency	Percentage (%)
TEEAL	19	42.2
CAB Abstracts	6	13.3
Agricola	1	2.2
Silverplatter	1	2.2

*Source: Field survey, 2007*

When interviewed, most of the researchers were aware of only a few e-resources while most of the e-resources were not known by the researchers. Observations also revealed that, there were some other CD-ROMS that were available in some of the livestock research institutes, but most of the livestock researchers were not aware of them hence they had very limited use by the researchers. These included;

- VETCD
- Animal Health and Production Compendium (AHPC)
- Tropical Forages
- Integrated principles of Zoology
- The livestock, Environment and Development Digital Library,
- Anatomia canis
- LEISA magazine
- British Society of Animal Science (BSAS): Proceedings of the annual BSAS meeting
- Meat symposium
- Parasitology
- Renewable Natural Resources Strategy.

Research institutes have a big role in ensuring that the researchers are aware of the e-resources that are available so that these resources are effectively used by the researchers (Thong and Yap, 1995). Most of the CD-ROMs that are mentioned above are not yet known by the researchers, neither are they used due to lack of sensitization on the availability and use of the resources. The livestock researchers need to be made aware of the availability of e-resources in their institutions and they should be given the necessary skills on how to access and use the e-resources that are provided by their institutions.

## **CHALLENGES OF ICTs AND E-RESOURCES USAGE BY LIVESTOCK RESEARCHERS**

### **Poor ICT infrastructure**

Most of the institutes have internet connectivity but the researchers are not satisfied with its speed of which most of the times it is very slow and unreliable due to low bandwidth. Although most livestock researchers in the surveyed institutes were found to have computers in their offices, the researchers were faced with difficulties in accessing the electronic information resources (e-resources) through the internet because of poor internet connectivity which was as a result of slow bandwidth. Since internet connectivity was a problem in the surveyed livestock research institutes, only 48.9% of the livestock researchers in these institutes used it and this affected the use of e-resources by livestock researchers in these research institutes. Other reasons contributing to poor ICT infrastructure in Tanzania are unreliable electricity power supply



in most parts of the country and high internet connectivity costs. The poor ICT infrastructure resulted in limited usage of e-resources by livestock researchers in Tanzania. Lwoga (2006) reported that, the current status of ICT in Tanzanian agricultural research institutes is very poor. The poor ICT infrastructure in Tanzania is determined by the inadequate internet connectivity that exists in most of the agricultural research institutes.

#### **Lack of awareness on electronic information resources (e-resources)**

There are many e-resources that can be used by livestock researchers for their research work. These can be; CD-ROMS, subject gateways, the internet, local and international databases. The studies revealed that, majority of the livestock researchers (55.6%) were aware of these e-resources. Despite the fact that there were many e-resources for livestock researchers, the remaining 44.4% of researchers lacked knowledge on the availability of these resources and hence they did not use them in their research work. Nevertheless, a few livestock researchers were aware of some of the subject gateways like AGORA (24.4%), HINARI (11.1%), Medline (4.4%), INFORM (6.7%), OARE (6.7%) Tanzania Development gateway (4.4%), Africa Journals Online (4.4%) and INGENTA (2.2%) which they used to search for information for their research work. These results are indicated in Table 2.

**Table 2:** Awareness of livestock researchers on subject gateways and databases

N = 45

<b>Subject gateway</b>	<b>Frequency</b>	<b>Percentage (%)</b>
AGORA	11	24.4
HINARI	5	11.1
Medline	2	4.4
Inform	3	6.7
Cochrane Library	0	0
Ingenta	1	2.2
OARE	3	6.7
Tanzania Development gateway	2	4.4
Tanzania Online	2	4.4
Health and wellness resource centre	0	0

*Source: Field survey, 2007*

#### **Unavailability of e-resources**

Various e-resources must be made available in order for the livestock researchers to get current research information to carry out the research activities. Results from this study revealed that, some libraries in the livestock research institutes in Tanzania were making efforts to ensure that various e-resources were made available for their researchers through the Programme for Enhanced Research Information (PERI), even though this was not among the priorities of these institutes. Unfortunately, some of the livestock research institutes (42.2%) had no e-resources for their researchers except for the internet. The study found out that 33.3% of livestock research institutes had no CD-ROMS at all. The researchers in these institutes solely depended on the internet to search for electronic sources of information. It was also found out that, even some of the researchers in the institutes depended more on the internet to search for information rather than using the CD-ROMS that were available by the institutions. This was because most of the researchers were neither sensitized nor trained on the availability and use of the CD-ROMS.

### **Limited Information Literacy (IL) training opportunities**

Information Literacy (IL) is the ability to realize the need for information, ability to identify sources of information, locate, search, access, analyze, evaluate and use information. It is geared towards attaining a competence in the use of library and computer technologies (Aina, 2004). Livestock researchers need to attend IL training so that they can access and effectively use the various e-resources in their field of research. Results from the surveyed livestock research institutes revealed that, only 40% of the researchers had attended IL training while the remaining 60% of the livestock researchers did not attend any IL training. A few researchers had IL training when they were students in universities and a few others underwent the training out of their own efforts. The respondents cited many reasons as to why they have not attended any training on information literacy. One of the reasons cited by the respondents was that, there were limited opportunities for IL training (15.6%). 26.7% said that their institutes did not provide them with any IL training opportunities. While 6.7% complained of lack of awareness on IL training opportunities, a few respondents (4.4%) complained of lack of funds in their institutes. This is the reason as to why many livestock researchers do not have the necessary skills of searching for electronic sources of information. Lack of awareness on the e-resources also contributed to poor accessibility and use of the e-resources.

### **Perception towards use of e-resources**

Though most of the livestock researchers in Tanzania had limited use of electronic information sources, the results revealed that all the researchers admitted that these resources were very important for their research work. This was revealed by all the respondents, when they were asked whether the e-resources are important for their research or not. Availability of current and up-to-date information (62.22%), Easy access and use of e-resources (48.89%), reliable and relevant information (33.33%) fast to get the required information hence it saves time (24.44%), and convenient for the users (20.0%) were some of the perceived reasons for the above trend. This is indicated in Table 3.

**Table 3:** *Perceived importance of electronic sources of information in livestock research*

N= 45

<b>Perceived importance</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Up-to-date information	28	62.22
Easy access and use	22	48.89
Relevant information	15	33.33
Saves time	11	24.44
Convenience	9	20.0

*Source: Field survey, 2007*

### **WAYS OF IMPROVING ACCESS AND USE OF ICTs AND E-RESOURCES**

The researchers were asked to put forward some recommendations at improving the accessibility of e-resources in their institutes. The following are the recommendations that were put forward.

### **Improve internet connectivity**

Most of the livestock researchers in Tanzania rely on the internet to search for e-resources, but unfortunately the internet connectivity is not reliable enough. These institutions should therefore help the researchers by improving the internet connectivity through increasing the internet speed so that it is faster and reliable. This will ultimately enable the researchers to access the e-resources hence making the livestock researchers more knowledgeable and in turn contribute to production of more quality research work for the development of the country. 44.44% of the livestock researchers recommended for sustainable internet connectivity as a means of improving accessibility of e-resources. The Internet provides an opportunity and infrastructure for publishing and distributing all types of information in various formats in the shortest possible time and at the lowest cost (Tumsifu, 2002).

### **Provide IL training opportunities**

Another recommendation that was put forward was the provision of IL training to the livestock researchers; this was cited by 16 of the respondents (35.56%). These livestock researchers recommended that their institutes should give them the opportunities to attend to IL training so that they can be aware of other e-resources that were important for their research work and be able to effectively search and use a wider range of electronic information sources. As observed by Aina (2004), many large libraries, especially university and research libraries, emphasize the need for users to acquire skills that will enable them search for information independently on any aspect of knowledge using both traditional and electronic methods of accessing information. IL training is geared towards attaining a competence in use of library and computer technologies. Apart from increasing the awareness of livestock researchers on the available e-resources, IL training also imparts the researchers with the skills on different sources of information, techniques on how to search for information, different search engines, evaluation of the information and ethical use of the information. Livestock researchers in Tanzania should attend IL training in order to gain more skills on information search and hence use the skills to access and use various e-resources.

### **Increase e-resources**

14 of the researchers (31.11%) with no other e-resources except the internet requested their institutes to consider e-resources as one of the priorities of the institute and make more e-resources available to them so that they can be more efficient in their research work. Large *et al* (1999) has reported that, a vast number of electronic information resources are available, some of which are highly structured and compiled by professionals. These resources can be accessed via online search service, via Online Public Access Catalogue (OPAC), via a CD-ROM database or via the internet.

### **Subscribe to more e-resources**

Another recommendation by 11 researchers (24.44%) was that their institutes should make the e-resources available to them by subscribing to a range of e-resources that could not be accessed without subscription. Livestock researchers in Tanzania can only access and use e-resources if the resources are made available to them by their respective livestock research institutions. This is because most of the international databases need usernames and passwords in order to access them and these researchers cannot afford to pay for the annual subscription fees on their

own, they need support from their institutes. The institutes can therefore help the researchers through payment of the subscription fees so that the researchers can access more e-resources.

### **Increase ICT facilities**

ICT facilities such as computers and the internet are very important for researchers. Researchers in this era of information cannot produce quality research without these technologies of Information and Communication. More powered and up-to-date computers should be introduced in livestock research institutes to enable the researchers to access and use the e-resources more effectively for the production of more quality research. Three respondents (6.67%) recommended for an increase of more powered computers in their research institutes. In order to access the internet, one needs a computer with a fast modem and an internet service provider; the computer has to be installed with web browser software (Aina, 2004).

### **Create awareness on e-resources**

Livestock researchers in Tanzania need to be aware of various e-resources in order to use them effectively and hence improve their research work. This can be achieved if the livestock researchers are encouraged to attend to IL training so that they are made aware of the resources and how to access and use them. Researchers who are information literate are aware of a wider range of e-resources and they are able to search and effectively use the e-resources.

### **Sensitize usage of e-resources**

Livestock researchers need to be sensitized on the use of e-resources, though most of them were aware of the importance of e-resources in research. The sensitization will increase the awareness of the researchers on the e-resources that they need for their research work and how to access and use them, because most of the researchers are not aware of the e-resources in their field of research. If sensitized, the livestock researchers will be aware of all the e- resources in their field and this will lead to effective use of the resources since most of them are under utilized.

The recommendations discussed above are summarized in Table 4 below.

**Table 4:** Recommendations of the livestock researchers on how to improve accessibility of electronic sources of information

N= 45

<b>Recommendation</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Sustainable internet connectivity	20	44.44
IL training	16	35.56
More e-resources	14	31.11
Subscription to e-resources	11	24.44
More powered computers	3	6.67

Source: Field survey, 2007

## CONCLUSION

From this study, it is obvious that livestock researchers in Tanzania are now adapting to the use of ICTs in their research work, but unfortunately, their institutions are faced with various problems related to ICTs including poor internet connectivity and unavailability of e-resources. Livestock researchers have admitted that the e-resources are very important for their research work since they save their time and they are easy to access and use in addition to getting current research information, which makes the ICTs very important in the development of the livestock sector in Tanzania. Through the ICTs, livestock researchers can access and use e-resources that are very important for their research work and this will result into production of quality livestock research that will help in the development of the livestock sector. Through ICTs, research results can be disseminated to all the stakeholders in the livestock sector hence improving the status of livestock production in Tanzania.

Livestock research institutes have a great role to play in improving the ICT facilities in their institutes and ensuring that their researchers can access and use various e-resources so that the researchers can do their research work more effectively for the development of the livestock sector in the country.

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