ABSTRACT

Purpose: This study aimed to determine the socioeconomic characteristics of small-scale farmers that have an impact on their access to high-value livestock markets in Greater Giyani Local Municipality (GGLM) and make recommendations for improving their access.

Theoretical reference: Many studies conducted indicate that high-value livestock market access by small-scale farmers requires a Consideration of global trends in the economic transformation that have a direct bearing on the current small-scale market access situation from a holistic standpoint, which is influenced by the socioeconomic status of livestock farmers.

Method: The study adopted a quantitative research approach and employed clustered proportional random sampling. Two hundred and fifteen (215) Greater Giyani Local Municipality livestock small-scale farmers were randomly selected.

Results and conclusion: The study revealed that the majority of the small-scale livestock farmers in the GGLM were male (62.8%) and elderly people (above 65 years) (45.1%). The study further revealed that the majority (67.9%) of the livestock farmers in the GGLM had no formal education. Youth participation in livestock farming was disappointing (12.1%). Inferential statistical analysis revealed that young adults and elderly small-scale livestock farmers were all significant and had a direct influence on access to high-value markets. Farmers will be encouraged to enrol on an adult learning center and youth will be encouraged to participate in livestock farming.

Research implication: Based on the results of previous research, fewer youth are usually participating in farming when compared with older farmers.

Originality/value: The study revealed that socioeconomic characteristics play a vital role on access to high-value livestock markets. However previous study has not covered much on the role of socioeconomic status.

Keywords: greater giyani local municipality, high-value market, livestock farmers, socioeconomic characteristic.

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CARACTERÍSTICAS SOCIOECONÔMICAS DOS PEQUENOS CRIADORES DE GADO NO ACESSO AOS MERCADOS DE GADO DE ALTO VALOR NO MUNICÍPIO DA GRANDE GIYANI, PROVÍNCIA DE LIMPOPO, ÁFRICA DO SUL

RESUMO

Objetivo: Este estudo teve como objetivo determinar as características socioeconômicas dos pequenos agricultores que têm impacto no seu acesso aos mercados de gado de alto valor no município local da Grande Giyani (GGLM) e formular recomendações para melhorar o seu acesso.

Referência teórica: muitos estudos realizados indicam que o acesso ao mercado de gado de alto valor por pequenos agricultores requer uma consideração das tendências globais na transformação econômica que têm um impacto direto na atual situação de acesso ao mercado de pequena escala de um ponto de vista holístico, que é influência pelo status socioeconômico dos criadores de gado.

Método: O estudo adotou uma abordagem de pesquisa quantitativa e empregou amostragem aleatória proporcional agrupada. Duzentos e quinze (215) fazendeiros de pequena escala foram selecionados aleatoriamente.

Resultados e conclusão: O estudo revelou que a maioria dos pequenos produtores pecuários da GGLM eram homens (62,8%) e idosos (acima de 65 anos) (45,1%). O estudo revelou ainda que a maioria (67,9%) dos pecuaristas da GLM não tinha educação formal. A participação dos jovens na pecuária foi decepcionante (12,1%). Análises estatísticas inferenciais revelaram que jovens adultos e idosos pequenos produtores pecuários eram todos significativos e tinham uma influência direta no acesso a mercados de alto valor. Os agricultores serão incentivados a inscrever-se em centros de educação de adultos e os jovens serão incentivados a participar na pecuária.

Implicação da investigação: Com base nos resultados de investigações anteriores, os jovens participam menos frequentemente na agricultura do que os agricultores mais velhos.

Originalidade/valor: O estudo revelou que as características socioeconômicas desempenham um papel vital no acesso ao mercado de gado de alto valor. No entanto, o estudo anterior não cobre muito sobre o papel que o status socioeconômico.

Palavras-chave: município local de Giyani Maior, mercado de alto valor, pecuarista, característica socioeconômica.

1 INTRODUCTION

The main forms of land use in the Greater Giyani Local Municipality (GGLM) are the building of human settlements, recreation, and the practising of agriculture, such as keeping livestock and growing vegetables, as well as other crops (Phethi & Gumbo,
The Greater Giyani Local Municipality Integrated Development Plan (GGLM IDP, 2020/2021) identified agriculture as the main land use in the Greater Giyani.

The provision of water can be a source of significant difficulty for developing nations to the extent that some regions only receive water for a limited amount of time each day or on a limited number of days each week (Mmbadi, 2019). There are over one billion people who make their living in the fishing, farming, and logging industries, all of which are in danger due to the lack of available freshwater. The lack of available water prevents the cultivation of cash crops in Greater Giyani, although there is sufficient land for such production (GGLM IDP, 2020/2021).

The areas that are now known as South Africa's former homelands continue to have some of the highest rates of unemployment and poverty in the country (Olofsson, 2020). The author goes on to say that national policy has favoured agricultural development as the driving force for rural development by focusing on linking small-scale to national and global commodity chains of specific agricultural commodities that are deemed to have the highest potential for growth and employment.

(Brahma & Subrahmanyam, 2023) states that the traditional knowledge system has been a precious scope to facilitate in the national resources. Furthermore they stated that a proper channelizing the community people’s ability can improvise the standards of living because it is the community who knows the best to use them as a source of livelihood.

2 THEORETICAL FRAMEWORK

One of the most crucial steps in the process of agricultural growth and development is the marketing of agricultural products (Al-Kubaisy & Lafta, 2021). They went on to say that marketing reality showed that due to adopting old and primitive methods, a high percentage of crops is lost annually during the production stages in general and marketing stages in particular until the product reaches the final consumer. Al-Kubaisy and Lafta (2021) stated that this was because there was a high percentage of crops lost annually due to the adoption of old and primitive methods. Al-Kubaisy and Lafta (2021) shared that there is a lack of agricultural extension services that provide the knowledge and skills about how to produce crops, how to prepare crops for consumption, and the most effective methods for marketing agricultural products.
The Marketing of Agricultural Products Act (No. 47 of 1996), amongst others, aims to increase market access for all participants and enhance the viability of the agricultural sector. It replaced the Marketing Act of 1968 and brought about the deregulation of the South African agricultural industry. The act authorises levies on agricultural products, increased market access for all market participants, efficient marketing of agricultural products, and optimisation of agricultural export earnings (Naggugija et al., 2020).

Awazi et al. (2019) suggested that market access by small-scale farmers requires a consideration of global trends in the economic transformation that have a direct bearing on the current small-scale market access situation from a holistic standpoint. Awazi et al. (2019) further argued that the forces of globalisation and industrialization in agriculture have prompted new approaches to the agro-food sector organisation. Vertical coordination of food supply chains has attracted much attention.

Small-scale farmers continue to find it difficult to transition to a commercial food system as they struggle to meet the quality and safety standards set by food processors, large retailers, wholesale buyers, and exporters while being constrained by limited support services provided by governments as a result of policy reforms, market liberalisation and fiscal and governance issues (Bienabe et al., 2018).

Access to accurate agricultural information is important for enhancing productivity and market access to farmers (Mazana et al., 2021). They further stated that having the right information at the right time will inform farmers' decisions about in-demand products, available markets, and prices charged for products. They further specified that the availability of market information gives farmers the power to bargain and improve their income, make improved production plans and make choices about product marketing. In support, Magesa et al. (2020) observed that access to markets by small-scale farmers resulted in increased incomes, food security, rural employment, and sustained agricultural growth. Furthermore, the use of information communications technology (ICT) tools can improve business and networking among farmers, buyers, and extension agents, as well as facilitate access to hidden markets (Mazana et al., 2021).

Small-scale farmers need to increase their market power through grouping initiatives, such as cooperatives that are usually supported by government institutions (Carron et al., 2017). Carron et al. (2017) also noted that groups have the potential to secure terms of trade, such as better prices, lower transaction costs, and greater access to
Training. Access to high-value markets requires a thorough understanding of marketing strategies that need to be adopted, especially for long-term sustainability (Thaqi & Beqaj, 2017). This study seeks to assess factors that impact small-scale farmers as they venture into high-value markets for agricultural products. Of concern is how socioeconomic factors impact on access to high value market.

A study conducted in the Limpopo Province, South Africa, revealed that marital status, education level, loan repayment, price of an animal, household income, herd size, farm size, and distance travelled to the market, were significant factors influencing market participation and thus profitability in the study area (Nkadimeng, 2019). Additionally, the outcomes of the livelihood model indicated that recent improvements in farm income and farm size were significant in different ways, at different probability levels, and with different signs in terms of their influence on the improvement of smallholder farmers' livelihoods in Limpopo province. A Nigerian study by Dokuboba & Nene (2019) showed that majority of farmers were female (58%), most of them were married (74%), and within the average age group of between 31 and 40 years. Most belonged to the Christian religion (92%), with the Igbo tribe, this farmers had a university degree (58%), and they come from household size of 6-10 people (6-10). They further stated that the majority depended on farming as their primary occupation, with one to five (1-5) years of experience. A study conducted in North-West Bangladesh by Skarker et al. (2021) revealed that age, farming experience, household head's education, income, access to markets, land ownership, the proportion of hired labour, savings, food self-sufficiency, and off-farm income affect the acceptance of new agricultural technologies. Skarker et al.'s (2021) study further revealed that (i) well-equipped farmers are mostly dependent on agriculture and less reliant on off-farm activities, (ii) reasonably resourced households are headed by an older male with greater farming experience and are engaged in both on-farm and off-farm activities, (iii) resource-constrained households have cattle as the main livestock and have income generated from the sale of livestock products, and (iv) severely resourced households are headed by young farmers or men where well-equipped farmers are predominantly dependent on agriculture. It was hoped that the development of this farm household typology would assist the extension service in providing appropriate extension advice that will benefit the farming community. These four farm categories represent the diversity of farms found in North-West Bangladesh.
3 METHODOLOGY

The Greater Giyani Local municipality served as the location for the research project. The GGLM is made up of 31 different wards that are organised into five different clusters and have a combined population of 256 300 people. Of the five local municipalities that make up the Mopani District Municipality in Limpopo Province, South Africa, the GGLM is one of them. Greater Tzaneen, Greater Letaba, Baphalaborwa, and Maruleng are the other four local municipalities in this area. Giyani Town serves as the GGLM’s primary centre of commercial activity. Mozambique, Zimbabwe, and Botswana are the countries that Limpopo Province of South Africa shares its borders. Limpopo Province is the Northern Province in South Africa. The total land area of the municipality is approximately 2,967.27 square kilometres, but there is only one semi-urban area.

A questionnaires were used to collect primary data for the study from 215 small-scale livestock farmers randomly selected from the Greater Giyani local municipality. This municipality is segmented into three service centres, and the sample comprised a comparable number of small-scale livestock farmers from each of those service centres.

As a method for gathering quantitative information, a questionnaire with both closed and open-ended questions was used to collect primary data.

The data from completed questionnaires were coded, captured, and analysed using the Statistical Package for Social Sciences (SPSS) version 28. A binary regression model was used to analyse the data based on the following model: The relationship between the dichotomous dependent variable, which in this case was access to high-value markets, and a set of independent variables, which were socio-economic characteristics of small-scale livestock farmers shown in Table 1, was modeled with the help of binary logistic regression.

The regression model was specified as:

\[ Z_i = \log \left( \frac{\pi_i}{1-\pi_i} \right) \]  

(Tshikororo, 2020 citing Norusis, 1993)

Where:

\[ \pi_i = \text{probability of the } i^{th} \text{ case; } Z_i = \text{value of the independent variable for the } i^{th} \text{ case.} \]
The relationship between the binary status variable \((Z_i)\) and its determinants \(X_i\) is specified as

\[
Z_i = \beta X_i + \varepsilon
\]  

(2)

- **\(Z_i\)**: Dependent variable (0 forward to high-value markets)
- **\(\beta\)**: Vector of the respective parameter which is estimated using the maximum likelihood method. **\(\varepsilon\)**: Error term.

According to Norusis study (as cited in Tshikororo 2020); the probability of a small-scale livestock farmers forwarding the livestock is estimated as follows:

\[
\Pr(\text{event}) = \frac{1}{1 + e^{-z}}
\]  

(3)

Because the cut-off value is 0.5; if the estimated probability of the event is less than 0.5, it is predicted that the event will not occur, if it is greater than 0.5, the prediction is that the event will occur and in an unlikely event that the probability is exactly 0.5, one can flip a coin for prediction (Tshikororo, 2020 citing Norusis, 1993).

The odds that an event will happen = \(\Pr. \text{of the event occurring}\)

\[
\frac{\Pr. \text{of the event occurring}}{\Pr. \text{of the event not occurring}}
\]

\(Z\) is the linear combination and is expressed as

\[
Z = (\beta_0 \text{ (constant)} + \beta_{\text{Gender}} + \beta_{\text{Age}} + \beta_{\text{Marital status}} + \beta_{\text{Level of education}} + \beta_{\text{Household size}} + \varepsilon)
\]  

(5)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Variable description</th>
<th>Variable categories</th>
<th>Expected signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>(I(x))*(dependent variable)</td>
<td>Access to high-value markets</td>
<td>Forward livestock to auction = 0 otherwise = 1</td>
<td>-/+</td>
</tr>
<tr>
<td>Independent variables (X_1) = Gender</td>
<td>Male = 0 Female = 1</td>
<td>-/+</td>
<td></td>
</tr>
<tr>
<td>Gender (X_2 = \text{Age}) spread</td>
<td>Youth (18-35) = 0 Young adults (36-55 years) = 2 Adults (56-65 years) = 2 Elderly (above 65 years) = 1</td>
<td>-/+</td>
<td></td>
</tr>
</tbody>
</table>
4 RESULTS AND DISCUSSION

In terms of age spread, majority of livestock farmers (45.1%) were elderly (above 65 years) and female livestock farmers (27.7%), followed by the adult age spread (32.6%) falling within the age range of between 56 and 65 years and mostly were male respondes (31.6%). Youth participation (12.1%) was minimal. Table 2 analysis raises two concerns, that is, the dominance of the elderly and low youth participation in livestock farming in the GGLM.

Table 2 also revealed that a significant proportion (67.9%) of livestock farmers in the GGLM had no formal education, followed by those with a primary education level (14.9%) and those with tertiary qualifications (6.5%). This contrasts with the findings of a study conducted by Hlatshwayo et al. (2021), which revealed that the educational level attained by farmers was distributed as follows: farmers had no formal education (20.2%), followed by farmers that had primary education (31.6%), lastly farmers that had secondary education (36.2%).

Table 2: Age and level of education of small-scale livestock farmers in the GGLM per gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age spread</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-35 years</td>
<td>7.9%</td>
<td>4.2%</td>
<td>12.1%</td>
</tr>
<tr>
<td>36-55 years</td>
<td>5.6%</td>
<td>4.7%</td>
<td>10.2%</td>
</tr>
<tr>
<td>56-65 years</td>
<td>31.6%</td>
<td>0.9%</td>
<td>32.6%</td>
</tr>
<tr>
<td>Above 65</td>
<td>17.7%</td>
<td>27.4%</td>
<td>45.1%</td>
</tr>
<tr>
<td>Level of education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>37.2%</td>
<td>30.7%</td>
<td>67.9%</td>
</tr>
<tr>
<td>Primary education</td>
<td>11.2%</td>
<td>3.7%</td>
<td>14.9%</td>
</tr>
<tr>
<td>Secondary education</td>
<td>10.7%</td>
<td>0.0%</td>
<td>10.7%</td>
</tr>
<tr>
<td>Tertiary education</td>
<td>3.7%</td>
<td>2.8%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Gender Total</td>
<td>62.8%</td>
<td>37.2%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

n=215.

Source: built by author
Table 3: Marital status and household of small-scale livestock farmers in the GGLM per gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>10.7%</td>
<td>6.5%</td>
<td>17.2%</td>
</tr>
<tr>
<td>Married</td>
<td>25.1%</td>
<td>7.0%</td>
<td>32.1%</td>
</tr>
<tr>
<td>Divorced</td>
<td>19.5%</td>
<td>10.2%</td>
<td>29.8%</td>
</tr>
<tr>
<td>Cohabiting</td>
<td>14.2%</td>
<td>11.6%</td>
<td>25.8%</td>
</tr>
<tr>
<td>Widow/widower</td>
<td>3.3%</td>
<td>1.9%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Household size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 5</td>
<td>38.6%</td>
<td>32.6%</td>
<td>71.2%</td>
</tr>
<tr>
<td>5-10 people</td>
<td>23.7%</td>
<td>3.3%</td>
<td>27%</td>
</tr>
<tr>
<td>Over 10 people</td>
<td>0.5%</td>
<td>1.4%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Gender Total</td>
<td>62.8%</td>
<td>37.2%</td>
<td>100.0</td>
</tr>
</tbody>
</table>

n=215.  
Source: built by author

In terms of the marital status of livestock farmers in the GGLM, Table 3 it was revealed that most were married (32.1%) and more males farmers were married (25.1%), followed by divorced farmers (29.9%), followed by single (never married) (17.2%) livestock farmers, then cohabiting (15.8%), and lastly, widow/widower (5.1%). Household sizes were also analysed, which indicated that majority (71.8%) of small-scale farmers were from a family with less than five people per household, followed by five to 10 people in a household (27%), and lastly the nuclear or a big family or household of over 10 people (1.9%). Similarly, Myeni et al. (2019) and Setschedi and Modirwa (2020) noted low participation of youth in the sector and that most small-scale farmers in the Mahikeng Local Municipality were males, while fewer were female farmers, and the majority of small-scale farmers were married. A study conducted by Hlatshwayo et al. (2021) revealed that educational level attained by farmers was distributed as follows: farmers that had no formal education (20.2%), followed by farmers that had primary education (31.6%), then farmers that had secondary education (36.2%), followed by farmers that had an Ordinary National Diploma/National Certificate Examination holders (6.4%), and lastly farmers that had a Bachelor of Science / Higher National Diploma holders/postgraduate degrees.

Table 4: reflects the impact of various socio-economic factors such as gender, age of the respondent, marital status, level of education, and household size on access to high-value markets. As reflected in that section, access to high-value markets (the dependent variable) was to be determined based on whether farmers sold their livestock at auction markets (category 1) or otherwise (category 0).
Table 4: Logistic regression results for the impact of socio-economic characteristics of small-scale farmers on access to high-value markets (auctions) in the GGLM

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Df</th>
<th>Sig.</th>
<th>Exp (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female gender (1)</td>
<td>0.388</td>
<td>0.589</td>
<td>0.434</td>
<td>1</td>
<td>0.510</td>
<td>1.475</td>
</tr>
<tr>
<td>Young adults (1)</td>
<td>2.022</td>
<td>1.149</td>
<td>3.096</td>
<td>1</td>
<td>0.078 *</td>
<td>7.556</td>
</tr>
<tr>
<td>Adults (2)</td>
<td>1.211</td>
<td>0.668</td>
<td>3.289</td>
<td>1</td>
<td>0.070 *</td>
<td>3.356</td>
</tr>
<tr>
<td>Elderly (3)</td>
<td>1.330</td>
<td>0.635</td>
<td>4.386</td>
<td>1</td>
<td>0.036 **</td>
<td>3.779</td>
</tr>
<tr>
<td>Educational level (1)</td>
<td>-1.052</td>
<td>0.581</td>
<td>3.284</td>
<td>1</td>
<td>0.070 *</td>
<td>0.349</td>
</tr>
<tr>
<td>Educational level (2)</td>
<td>-0.644</td>
<td>0.655</td>
<td>0.965</td>
<td>1</td>
<td>0.326</td>
<td>0.525</td>
</tr>
<tr>
<td>Educational level (3)</td>
<td>18.930</td>
<td>10485.83</td>
<td>0.000</td>
<td>1</td>
<td>0.999</td>
<td>166457282.3</td>
</tr>
<tr>
<td>Household size (1)</td>
<td>-0.770</td>
<td>0.529</td>
<td>2.117</td>
<td>1</td>
<td>0.146</td>
<td>0.463</td>
</tr>
<tr>
<td>Household size (2)</td>
<td>-2.187</td>
<td>1.120</td>
<td>3.813</td>
<td>1</td>
<td>0.051 *</td>
<td>0.112</td>
</tr>
<tr>
<td>Constant</td>
<td>1.234</td>
<td>0.556</td>
<td>4.923</td>
<td>1</td>
<td>0.027 **</td>
<td>3.434</td>
</tr>
</tbody>
</table>

Model summary
-2 Log likelihood: 144.900
Cox & Snell R Square: 0.111
Accuracy of prediction: 86.5%
Nagelkerke R Square: 0.202

Take note that the symbols: ***, **, and * denote significance levels at 1%; 5%, and 10%, respectively.

A -2Log likelihood of 144.900 in Table 4 indicates the null hypothesis was accepted. Cox and Snell R-square showed good data fit. Any Cox and Snell R square value less than 1 indicated a good data model fit. Nagelkerke value of 0.202 indicated an 86.5% relationship between independent and dependent variables. A higher Nagelkerke value indicated a more consistent measure of dependent-independent relationships. The results showed that household size affected access to high-value markets by small-scale livestock farmers. Also, age helped access high-value markets. Below are all the important variables.

The age groups of 36-55 years and 56-65 years were significant at 10% level of significance, whilst, the age group above 65 years (elderly people) was significant at 5% level of significance. This meant that age had a direct influence on access to high-value markets by small-scale livestock farmers in the GGLM. This variable was found to be significant at 5% and 10% levels of significance with a positive coefficient of 2.003, 1.211, and 1.330, respectively. The positive coefficient may indicate that the older the farmers, the higher the possibility of access to the high-value markets by livestock small-scale farmers in the GGLM.

The household size which was above 10 people per household had an indirect influence on access to high-value markets by the small-scale livestock farmers in the GGLM. This variable was found to be significant at 10% level of significance with a negative coefficient of -2.187 when compared to access to high-value markets by small-
scale livestock farmers. The negative coefficient may suggest that with larger sized households, there is less access to high-value markets. Similarly, Mayikiso (2021) previously indicated that household size is significant in accessing high-value markets.

The level of education of the small-scale livestock farmers that had attained a primary school level was found to be negative -1.052 and statistically significant at 10% level (Table 4). This indicates that as the level of education increased, there was a higher likelihood of access to high-value markets by small-scale livestock farmers in the GGLM. Odunyi et al. (2021), Sarker et al. (2021), Hlatshwayo et al. (2021), and Amara et al. (2019) all agreed that the participation of farmers in high-value markets was significantly affected by age, household size, level of education, years of farming and difficulty accessing high-value markets. According to (Tofiq et al, 2023) states that The number of people employed can increase the cultivated area and can have a positive effect on production.

5 CONCLUSION

The study revealed that the majority of the small-scale livestock farmers in the GGLM were male (62.8%) and elderly people (above 65 years) (45.1%). The study further revealed that the majority (67.9%) of the livestock farmers in the GGLM had no formal education. Youth participation in livestock farming was disappointing (12.1%). Inferential statistical analysis revealed that young adults and elderly small-scale livestock farmers were all significant and had a direct influence on access to high-value markets.

The findings from the study revealed that there were more elderly males (above 65 years), who had no formal education and were actively involved in agriculture. This study recommends the involvement of youth and improving the educational achievement of livestock farmers. Since the Department of Basic Education has a programme for people who never attended school to obtain an Adult Basic Education and Training (ABET) certificate, livestock farmers should be encouraged to enrol in such programmes. Farmers can also enrol for Kha RI Gude Adult Literacy Programme (KGALP) whose main objective is to educate adults. The Department of Agriculture, Land Reform, and Rural Development is encouraging the youth to be job creators. It will be wise for young people to start taking part in livestock farming.
REFERENCES


