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Research article

Factors that affect Smallholder Farmers Livestock Extension Service Demand in Enset *Ensete ventricosum* Based Mixed Farming System of Southern Ethiopia.

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Abstract

This study was conducted to identify the determinant factors for smallholder farmers' livestock extension service demand in the Sidama zone of Southern Region (SNNPR) in Ethiopia. A total of 135 sample household heads which represents about 10 percent of the household heads in the two districts (Dale=63 and Shebedino=72) were included in the study. The total sample farmers were also stratified into male (120) and female (15) household heads using Probability Proportional to Size (PPS) approach to identify the gender effect in the study objectives.

As the result of the study indicates, farmers that have access and demand respectively was (13.33 and 94.07%) for improved breeds, (31.85 and 69.63%) for improved forages, (5.93 and 60.74%) for loan, (44.44 and 100%) for training/consultancy and (71.11 and 34.07%) for veterinary services. This result has shown that except the veterinary services the current provision of other extension service was far behind than farmers' demand.

As the study results and logistic regression models prevailed, the demand for improved breeds was 6.07 times more by farmers who have demand for improved forages ($p<0.05$). Demand for improved forage technologies were 10.69, 2.66 and 11.97 times more for those having demand for improved breeds ($p<0.05$), loan ($p<0.05$) and veterinary ($p<0.001$) services, respectively. Farmers who have access for improved breeds ($p<0.05$) and veterinary service ($p<0.001$) were demanded loan service 11.11 and 6.42 times more, respectively than others. The veterinary service

future demand were significantly 6.13, 4.89 and 14.02 times higher, respectively by those farmers who have access for improved breeds ($p<0.05$), improved forages ($p<0.01$) and by those who have demand for improved forages ($p<0.001$).

Finally the study recommend that additional and strong efforts with complete set of technologies provisions are needed to address the big gap in providing all livestock extension services for the better livelihood and livestock productivity of smallholder farmers in the area.

Keywords: Access, Demand, Dale, livestock extension service, Sidama zone, SNNPRS.

Introduction

Ethiopia is a largely rural country with an agrarian economy. Agriculture directly supports 85 percent of the population's livelihoods, provides 46 percent of Gross Domestic Product (GDP), and 80 percent of export revenue (Sintayehu, 2010). Moreover, livestock are of economic and social importance both at the household and national levels, and have in the past provided significant export earnings. Livestock contribute 15 to17 percent of GDP and 35 to 49 percent of agricultural GDP, and 37 to 87 percent of the household incomes (CSA, 2008/2009). Despite the large livestock population and its economic importance, the sector's contribution is well below its potential due to various reasons such as feed shortage, disease, less efforts in introducing the appropriate package of improved livestock technologies such as cross breeds, improved feeds management practices and inadequate healthcare services which limits the current livestock production and productivity.

To alleviate the constraints of livestock production at the farmers' level as well as to considerably increase production and productivity, different livestock packages were introduced since 1994/95 when the new extension approaches started "Participatory Demonstration and Training Extension System (PADETES) (Getahun, 2012) with the objectives of increasing food production and household income, ensuring food security and contributing to the development of the national economy (Goshu, 2005). The main strategy of the PADTES was to focus on the rural and pre-urban and urban areas. In the rural areas, meat, poultry, and honey production Extension Packages have been promoted, while in the pre-urban and urban areas, the focus is on disseminating milk, meat, and egg production technologies. Later on, however, Dairy (milk) extension package were also included for the rural areas (Goshu, 2005).

However, the efforts made so far did not bring changes as expected/planed. For this condition different authors have put their opinions. According to Azage et al., (2010), the way extension system is oriented in Ethiopia may not be in the best interest of livestock keepers and lacks the responsive capacity to the demands for livestock services. In fact, most often livestock development issues are left to development projects and NGOs that have limited scope, coverage and duration. The major inputs for livestock development include animal genetic resources, feeds and forages, veterinary drugs, vaccines, machinery equipment and utensils as well as knowledge. Most of these inputs are supplied only by the government or government sponsored projects. Limited credit facilities to support livestock development have been provided by microfinance institutions, food security projects, small-scale micro enterprises and NGOs.

Therefore, the study was conducted to identify the determinant factors for farmers' livestock production extension services demand in the Sidama zone of Southern Nations, Nationalities and Peoples' Regional State (SNNPRS) of Ethiopia.

Materials and Method

Description of study location

Sidama Zone, found in Southern Nations, Nationalities and People's Region (SNNPR) of Ethiopia, lies between 38^{O} 08' E to 39^{O} 10' E longitude and 6^{O} 40' N to 7^{O} 06' N latitude at an elevation ranging from 501 m to 3000 meters above sea level (SNNPRS, 2010). Currently Sidama Zone is divided in to 19 districts hosting a total population of over 3,504,049, with land mass of 6,832.85 sq. km and a population density of 512.8 Person/sq.km (CSA, 2012). Out of the total land size of Sidama zone, 26.8% is lowlands, 45.49% midlands and 27.71% highlands (SNNPRS, 2010). Farmers in the area practices crop dominated mixed crop-livestock agriculture. The zone is one of the major coffee growing areas of southern Ethiopia; cultivated and wild coffee is a main cash crop of the area.

Sidama zone is well endowed with natural resources contributing significantly to the national economy of the country. Other than coffee, maize, haricot bean, root crops (enset-false banana and potato) and fruits are major crops grown in the zone. Haricot bean and Chat (*Chata Edulis*) production are other sources of cash after coffee. Enset (*Ensete ventricosum*) is a strategic crop substantially contributing to the food security of the zone and is especially important in the highland parts of the zone (Kassu, 2009). According to SNNPRS (2010), the zone have bimodal production seasons known as *Belg* (short rainy season) from March to April and *Meher* (main rainy season) from June to September. The zone receives average annual mean rainfall ranges 801- 1600 mm with annual mean temperature of the zone ranges between 10.1-27 ^{O}C (SNNPRS, 2010).

Sampling procedure and data collection

Reconnaissance survey was conducted to have the notion of understanding about the study area and to select the representative study sites (districts) before to get on questionnaire. Different participatory rural appraisal (PRA) tools and purposive and Probability Proportional to Size (PPS) sampling approach were used to collect data.

Out of the total districts 19 district in Sidama zone 10% or two districts (Dale and Shebedino) and out of districts total (36 and 32) PAs four and three PAs with total sample households of 135 (63 and 72 from Dale and Shebedino districts) were selected. Moreover, in order to capture gender effect in the study objectives, the total sample households at each District and PA's were stratified to female and male headed households and 15 women and 120 men household heads were included in the study.

Data analysis

To predict the determinant factors for smallholder farmers overall and each livestock extension services access. Twenty six explanatory/independent variables which have continues and categorical data nature (Table 2) that are assumed to determine the dependent variable in each analysis were included in the analysis using stepwise logistic regression analysis procedure of SPSS release version 20 (IBM SPSS, 2003) with a mathematical model equation as follows;

$$\text{logit}[p(x)] = \log\left[\frac{p(x)}{1-p(x)}\right] = a + b_1x_1 + b_2x_2 + \cdots + b_nx_n \quad (1)$$

Where:

p = probability of a case belonging to category 1
$p/1-p$ = odds
a = constant
n = number of predictors
$b_1 - b_n$ = regression coefficients
x = the explanatory variable

Beside with the logistic regression analysis, the null hypothesis, validity and goodness of fit of each model were tested using Chi square (x^2), likelihood ratio (G^2), Hosmer-Lemeshow tests (G_{HL}^2) (Hosmer & Lemeshow, 2000), Wald's test-statistic ($\widehat{X}_W^2$) (Wald, 1941) and receiver operating characteristic (ROC) curve.

Prior to the logistic regression analysis, the hypothesized explanatory variables were checked for the existence of multicolinearity using Variance Inflation Factor (VIF $(x_i) = 1/1 - R_i^2$) for association among the continuous and categorical explanatory variables (Gujarati 2003). As a rule of thumb, if the VIF of a variable exceeds 10, there is a multicolinearity problem and removed from logistic regression analysis.

The VIF values displayed below (Table 1) have shown that all the predictor variables have no serious multicolinearity problem.

Table 1. VIF of the Explanatory Variables used in the study.

Explanatory Variables	Tolerance	VIF
Socioeconomic characteristics (7)		
District	0.426	2.348
Gender	0.733	1.365
Age group	0.681	1.468
Educational background	0.602	1.661
Marital Status	0.617	1.621
Main Income source	0.704	1.421
Family size group	0.604	1.655
Asset (9)		
Sheep Ownership	0.863	1.158
Goat Ownership	0.819	1.221
Female cattle Ownership	0.288	3.475
Male cattle Ownership	0.690	1.449
Calf Ownership	0.732	1.365
Poultry Ownership	0.787	1.271
Beehive Ownership	0.691	1.447
Total TLU holding group	0.250	3.995
Farm land holding group	0.576	1.736
Grazing land Ownership	0.762	1.312
Access of extension services (5)		
For Improved Breeds	0.616	1.624
For Improved Forages	0.474	2.111
For Loan service	0.608	1.645
For Training/Consultancy	0.441	2.269
For Vet. Service	0.398	2.516
Demand of extension services (4)		
For Improved Breeds	0.763	1.311
For Improved Forages	0.623	1.604
For Loan service	0.602	1.662
For Vet. Service	0.634	1.577

Results and Discussion

Personal and Socio-economic Characteristics of Respondent Farmers

The study of personal and socio economic characteristics was carried with reference to age, education, marital status, main income source, family size, farm land holding, livestock holding (TLU) and ownership status (Table 2).

The study result reveals that majority (66.67%) of respondent farmers belong to middle (31-55 year) age group with average age of 42.78 years, (35.56%) possessed primary schooling, (92.59%) had agriculture as their main income source, (91.11%) are married, (48.15%) posses family size ranging from 4 to 6 persons with average size of 6.69 persons per household, (68.15%) owned farm land size (<=0.5ha.) with overall mean holding of 0.56 ha. and with the average of 1.89 about 86.67% maintained (0.39-5.42) tropical livestock units (TLU).

The status of respondent farmers in accessing and demanding different livestock extension services is presented in Table 3. As the result of the study indicates, farmers that have access and demand respectively was (13.33 and 94.07%) for improved breeds, (31.85 and 69.63%) for improved forages, (5.93 and 60.74%) for loan, (44.44 and 100%) for training/consultancy and (71.11 and 34.07%) for veterinary services. This result has shown that the current provision of each extension service was far behind than the respondent farmers demand. The access and demand disparity is more pronounced in improved breed, loan and training/consultancy services for which the gap is found to be more than 50%.

Table 2. Distribution of respondents farmers based on personal and socio-economic profile.

Variables	Variables Category	Freq	%
Age	1:-Young (<=30Yrs)	25	18.52
Mean=42.78	2:-Middle (31-55Yrs)	90	66.67
SD=12.951	3:-Old (>=56yrs)	20	14.81
Educational background	1:-Illiterate	24	17.78
	2:-Write &Read	19	14.07
	3:-Prim School	48	35.56
	4:-Second School & Above	44	32.59
Main Income source	1:-Mainly Agric	125	92.59
	2:-Agri with Other	9	6.67
	3:-Others Non Agri	1	0.74
Marital Status	1:-Married	123	91.11
	2:-Unmarried	6	4.44
	3:-Other	6	4.44
Family size	1:-<=3 persons	7	5.19
Mean=6.689	2:-B/n 4-6 persons	65	48.15
SD=2.408	3:-B/n 7-9 persons	46	34.07
	4:->=10 persons	17	12.59
Farm land holding	1:-Small (<=0.5ha)	92	68.15
Mean=0.563	2:-Medium (0.6-1.5ha)	40	29.63
SD=0.453	3:-Large (>=2 ha)	3	2.22
Total TLU holding	1:-Small (<=0.38TLU)	14	10.37
Mean=1.893	2:-Medium (0.39-5.42TLU)	117	86.67
SD=1.362	3:-Large (>=5.43TLU)	4	2.96

However, the current access and future demand for veterinary service result has shown that the provision status was beyond farmers' demand for the service and it may appreciate and need to be strengthening as far as the economical importance of the service is concerned. In general, among the total respondents included in the study only average of (33.33%) and (71.70%) have access and demand for any livestock extension services, and further efforts are needed to address 38.37% of farmers who have shown interest in getting and not have accesses for the services (Table 3).

Table 3. Distribution of respondent farmers based on their access and demand for different livestock extension services.

Extension services type	Farmers Who Have				Gap
	Access (1)		*Demand (1)*		
	N	*%*	*N*	*%*	
Improved breed	18	13.33	127	94.07	80.74
Improved forages	43	31.85	94	69.63	37.78
Loan service	8	5.93	82	60.74	54.81
Training/Consultancy	60	44.44	135	100.00	55.56
Veterinary service	96	71.11	46	34.07	(37.04)
Average	**45**	**33.33**	**97**	**71.70**	**38.37**

Determinant Factors for Farmers' Livestock Extension Services Demand

In the logistic regression analysis of this study fife different livestock extension technologies and services (Improved breed, Improved Forages, Loan service, Training/Consultancy and Veterinary service) access and demand of smallholder farmers were considered. However, due to uniform demand of farmers for training or consultancy service only four (Improved breed, Improved Forages, Loan service and Veterinary service) of the remaining variables are considered in the analysis.

Improved breeds

Farmers demand for improved breed is found more to be determined negatively by their current loan access ($p<0.05$) and positively by improved forages demand ($p<0.05$). This result may indicate as their loan access fulfills their financial constraint and create a way to get improved breeds using the loan they acquired. Since, improved forage technology is a complementary package for the specific technology it has positive impact for farmers' improved breed demand. As a result, farmers who have demand for improved forage technology also have 6.07 times more demand for improved breed that those who have not demand.

Table 4. Factors that affect farmers demand improved breed.

Independent Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Access for Loan service (1*)	-2.29	0.92	6.28	1	0.012	0.10
Demand for Improved Forages (1)	1.80	0.87	4.28	1	0.039	6.07
Constant	2.25	0.55	16.95	1	0.000	9.46

1*, represent for farmers who have access or demand.

Accordingly, the logistic regression model fit for improved breed demand of respondent farmers is expressed by the following equation;

$$\text{logit}[p(x)] = 2.247 - 2.294(\text{AccsLoan}) + 1.803(\text{DmndImpFrg}) \quad (2)$$

Where:

DmndImpFrg= Demand for improved forage
AccsLoan= Access for loan service

Improved forages

As the study result in Table 5 indicates, due to the complementarities nature of improved forage technology demand with improved breed, loan and veterinary service demand these explanatory variables respectively have significant ($p<0.05$), ($p<0.05$) and ($p<0.001$) determinant effect for farmers improved forage demand (Table 5). Accordingly, farmers who have demand for improved breed, loan and veterinary service, respectively have 10.69, 2.66 and 11.966 times more interest in demanding improved forage technology than farmers who have not demanding each respective extension service (Table 5).

Table 5. Factors that affect farmers demand for improved forage technology.

Independent Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Demand for Improved Breeds (1*)	2.37	1.00	5.64	1	0.018	10.69
Demand for Loan service (1)	0.98	0.43	5.23	1	0.022	2.66
Demand for Vet. Service (1)	2.48	0.68	13.18	1	0.000	11.97
Constant	-2.49	1.02	5.89	1	0.015	0.08

1*, represent for farmers who have access or demand.

Considering all these (Table 5) facts, the model equation for improved forages demand of farmers is expressed as follows;

$$\text{logit}[p(x)] = -2.49 + 2.37(\text{DmndImpBrd}) + 0.98(\text{DmndLoan}) + 2.48(\text{DmndVet}) \quad (3)$$

Where:
DmndImpBrd= Demand for improved breed
DmndLoan= Demand for loan service
DmndLoan= Demand for veterinary service

Loan service

The logistic regression analysis for loan service demand takes 3 steps to identify the determinant factors for the condition and the result is presented in Table 6.

The significant and positive effect of farmers past access for improved breed ($p<0.05$) and veterinary service ($p<0.001$) may indicate that farmers intension to improve their livestock production activity using the loan they demanded. Accordingly, those farmers who have access for improved breed and veterinary services respectively have 11.11 and 6.42 times more demand for loan service.

Table 6. Factors that affect farmers' demand for loan service.

Independent Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Access for Improved Breeds (1*)	2.41	1.09	4.93	1	0.026	11.11
Access for Vet. Service (1*)	1.86	0.46	16.39	1	0.000	6.42
Constant	-1.11	0.39	8.06	1	0.005	-1.11

1*, farmers who have access

Therefore, the logistic regression model fit for loan demand of respondents is represented with the following equation;

$$\text{logit}[p(x)] = -1.11 + 2.41(\text{AccsImpBred}) + 1.86(\text{AccVet}) \quad (4)$$

Where:
AccsImpBrd= Access for improved breed
AccsVet= Access for veterinary service

Veterinary service

Due to the integral nature of improved breed and forage technologies with availability of veterinary service, farmers past access for improved breed ($p<0.05$) and forage technologies ($p<0.01$) have significant and positive effect for their veterinary service demand. This result may show that farmers access limitation for the service while they accessed both determinant technologies. Therefore, those farmers having access for improved breed and forages respectively demanded veterinary service 6.13 and 4.89 times more than the others (Table 7). Moreover, farmers who have shown demand for improved forage technology also show significant ($p<0.001$) demand for veterinary service and it was 14.02 times more than others.

Table 7. Factors that affect farmers demand for veterinary service extension service.

Independent Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Access for Improved Breeds (1*)	1.81	0.73	6.14	1	0.013	6.13
Access for Improved forages (1)	1.59	0.48	11.12	1	0.001	4.89
Demand for Improved Forages (1)	2.64	0.69	14.52	1	0.000	14.02
Constant	-3.55	0.71	25.31	1	0.000	0.03

1*, represent for farmers who have access or demand.

Accordingly, the probability of farmers demand for veterinary service is expressed by the following model;

$$\text{logit}[p(x)] = -3.55 + 1.81(\text{AccImpBrd}) + 1.59(\text{AccImpFrg}) + 2.64(\text{DmndImpFrg}) \quad (5)$$

Where:
AccsImpBrd= Access for improved breed
AccsImpFrg= Access for improved forage
DmndImpFrg= Demand for improved forage

Model validation and Goodness fit

A test of the full model against a constant only model was statistically significant in all analysis, indicating that the predictors as a set reliably distinguished between farmers who have and not have demand for improved breed (X^2 □□12.83, p □□□.05 with df □□4), improved forages (X^2 □□34.84, p □□□.001 with df □□3), loan service (X^2 □□35.99, p □□□.001 with df □□4) and veterinary service (X^2 □□46.62, p □□□.001 with df □□3) (Table 8).

Moreover, based on the Hosmer-Lemeshow tests, the null hypothesis that predictions made by the model fit perfectly with observed group memberships and model with non-significant chi-square indicates that the data fit the model well. Accordingly, the chi-square and p-value of all models in this study was not significant and the data of the study fit the models well (Table 8).

Nagelkerke's R^2 of 0.250, 0.322, 0.648 and 0.404 also indicated a fair relationship between prediction and grouping. Prediction success overall was 93.3% (97.6% for who have and 25.0% for not have demand) for improved breed, 75.6% (81.9% for who have and 61.0% for not have demand) for improved forages, 74.1% (90.2% for who have and 49.1% for not have demand) for loan service and 80.0% (58.7% for who have and 91.0% for not have demand) for veterinary services demand of respondent famers (Table 8).

According to the Receiver Operating Characteristic (ROC) curve result presented in Table 8, all dependent variables area under the curve was greater than 0.814 with p-value of ($p<0.01$). Therefore, the logistic regression classifies the group in demanding improved breed, forages technologies, loan and veterinary services were significantly better than by chance.

Table 8. Final step Model test summary by dependent variable.

Model tests	Parameters	Dependent Variables			
		Improved breed	Improved forage	Loan service	Vet. service
		Model Step 4	Model Step 3	Model Step 3	Model Step 3
Omnibus Tests of Model Coefficients	Chi-square (X^2)	12.83	34.84	35.99	46.62
	df	4	3	4	3
	Sig.	0.012	0.000	0.000	0.000
Hosmer and Lemeshow Test	Chi-square (X^2)	0.30	3.21	0.04	0.28
	df	1	4	2	3
	Sig.	0.582	0.523	0.980	0.963
Model Summary	-2 Log likelihood	47.90	130.93	144.88	126.60
	Cox & Snell R^2	0.09	0.23	0.23	0.29
	Nagelkerke R^2	0.25	0.32	0.32	0.40
Percentage Correct	Not demand	25.00	61.00	49.10	91.00
	Have demand	97.60	81.90	90.00	58.70
	Overall	93.30	75.60	74.10	80.00
Receiver Operating Characteristic (ROC) curve	Area Under Curve	0.83	0.79	0.76	0.81
	Std. Error	0.08	0.04	0.04	0.04
	Asymptotic Sig	0.002	0.000	0.000	0.000

Conclusion and Recommendation

As the individual logistic regression model indicates farmers access for improved breed and forage have positively determined their loan and veterinary service demand. Moreover, farmers demand for improved forage technology has also shown positive determinant effect on their demand for improved breed, loan and veterinary services. However, the demand of farmers for veterinary service have positive and negative association with their improved breed and loan service demands, respectively. Accordingly, those farmers that have access for improved breed and forage technologies need to be addressed through loan and veterinary service provisions to make their technology demand more complete. The complete technology set demand also reflected with farmers improved forage demand effect on their future interest in demanding improved breed, loan and veterinary services. However, due to less access Dale farmers for loan service and more demand for the service district difference have shown its effect on farmers loan demand.

As the different tests have confirmed that the models developed for all dependent variables have classified the independent variables better than by chance and the data of the study fit the models well.

Finally the study recommend that additional and strong efforts are needed to address the big gap in providing each livestock extension services for the better livelihood and livestock productivity at smallholder farmers condition of mixed farming system in southern Ethiopia and complete technologies provisions is also the major interest of farmers in the study area. Therefore, any concerned institutes should act accordingly and together.

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References

[1] Azage Tegegne, Berhanu Gebremedhin and Hoekstra D., 2010. Livestock input supply and service provision in Ethiopia: Challenges and opportunities for market oriented development. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project Working Paper 20. ILRI (International Livestock Research Institute), Nairobi, Kenya, pp: 48.

[2] Creighton, L., 2003. Regression Using JMP. Cary, NC: SAS Institute, Inc.

[3] CSA, 2008/09. Livestock and livestock characteristics; Private peasant holdings; # 446, CSA, CSA, 2012. Federal Democratic Republic of Ethiopia. Central Statistical Agency. Statistical Abstract. CSA, Addis Ababa, Ethiopia.

[4] CSA, 2012. Federal Democratic Republic of Ethiopia. Central Statistical Agency. Statistical Abstract. CSA, Addis Ababa, Ethiopia.

[5] Getahun Degu, 2012. Assessment of The Livestock Extension Service In Ethiopia: The Case of Southern Region. International Journal of Scientific & Technology Research, 1(10), pp: 24-30. http://www.ijstr.org/final-print/nov2012/Assessment-of-The-Livestock-Extension-Service-In-Ethiopia-The-Case-of-Southern-Region.pdf (Accessed on September 13, 2014).

[6] Goshu Mekonnen, 2005. Assessment of Extension and Its impact: The Livestock Production Sub-sector. Working Paper Series, Published by EEA/EEPRI, pp: 58.

[7] Gujarati, D.N., 2003. Basic econometrics. Fourth Edition, McGraw Hill, New York.

[8] Hosmer, D.W., & Lemeshow, S., 2000. Applied logistic regression (2nd Edition). New York: Wiley.

[9] IBM SPSS Statistics, 2003. Statistical Program for Social Study. Version 20, release of 2003 Chicago, Illinois, USA.

[10] Kassu Kubayo Seko, 2009. Analysis of Agricultural Input Supply System: The case of Dale district, Southern Nations, Nationalities and Peoples' Region. A Thesis Submitted to the Department of Rural Development and Agricultural Extension, School of Graduate Studies Haramaya Univeersity, pp: 110. https://cgspace.cgiar.org/bitstream/handle/10568/703/Thesis_KubayoAnalysis.pdf. (Accessed on September 13, 2014)

[11] Sintayehu Gebre Mariam, Samuel Amare, Derek Baker and Ayele Solomon, 2010. Diagnostic study of live cattle and beef production and marketing: Constraints and opportunities for enhancing the system. Agricultural Transformation Agency (ATA), Addis Ababa, Ethiopia, pp: 50.

[12] SNNPRS, 2010. Southern Nations, Nationalities and Peoples' Regional State, Bureau of Finance and Economic Development. Data collection - Dissemination core Process, pp: 245.

[13] Wald, A., 1941. Asymptotically most powerful test of statistical hypotheses. Ann. Math. Stat. 12, pp: 1–19.