Economic benefits of African free trade areas: Empirical evidence from live animal and products trade in the COMESA region

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ABSTRACT

This study was conducted to assess the impact of live animal and animal products international trade on economic growth and to describe the association between membership to Free Trade Area of COMESA and live animal and products trade in member nations. A secondary panel data from 11 COMESA member states of which two are non-FTA members was used to model the economic growth impact of livestock production, live animal export and animal products import and export, data ranging between 1991 and 2018. FGLS was deployed to correct data problems and model the impact of independent variables on GDP, with overall $R^2=0.8389$. Among the explanatory variables livestock production, live animal import, animal product import and export were significant at 99% confidence interval. Correlation results showed that there is positive correlation between FTA membership and economic growth as well as live animal and products trade. It was concluded that livestock commodities trade has positive impact on economic growth and the FTA membership improves trade in livestock commodities in COMESA region. Further research is recommended on the export destinations and commodities to fill the knowledge gap in livestock intra-regional and non PTA trade.

Keywords: International trade, economic growth, COMESA, FTA, livestock commodities

INTRODUCTION

Globalization has emerged in a remarkable growth in trade between countries. Transactions in the increasingly globalizing world include goods (physical products that are physically transported across borders by road, rail, water, or air) and services (immaterial commodities, such as tourism, financial and legal services). Many traded services make merchandise trade easier or cheaper—for example, shipping services, or insurance and financial services. Trade in goods has been happening for millennia; while trade in services is a relatively recent phenomenon. Over the last couple of centuries the world economy has

experienced sustained positive economic growth, so observing the dynamics of trade in relation to GDP offers an interesting perspective towards understanding development. Many developing countries depend on exports of primary products, which are subject to disproportionate price fluctuations and this category of exports had negligible impact on economic growth, while manufactured exports had a positive and significant effect on economic growth (Kim & Lin, 2009). Regional trade blocs are recently promoted globally as drivers of economic growth. In general free trade facilitations in regional blocs are well documented by previous studies from developed and developing regions. Most developing countries are members of regional integration agreements (RIAs). From the viewpoint of the efficiency of resource allocation, however, RIAs between developing countries (so-called South– South agreements) are likely to hurt member countries because low-priced imports from non-partner countries are replaced with higher-priced products from partner countries.

Africa is a diverse continent packed with opportunities. From renewable energy and climate-smart agriculture to home grown digital solutions, African countries are accelerating their efforts to advance sustainably. Home to a 1.2-billionperson market and the world's largest free trade zone, Africa offers human and natural resources that have the potential to yield inclusive growth and wipe out poverty in the region, enabling Africans across the continent to live healthier and more prosperous lives. Agriculture forms a significant sector in African economies and plays a crucial role in trade and regional integration. According to the World Bank (2013), Africa earns 23 percent of its annual growth from farming. Agricultural commodities form an important segment of African trade, both regionally and worldwide. Nevertheless, the continent still records a negative trade balance with other international markets, and this trade deficit is widening. UNCTAD (2014) reported that net food imports increased by US$ 14.3 billion from 1999-2001 to 2009-2011 for African countries. The net food imports as a share of GDP increased from 3.2 percent in 1999-2001 to 3.6 percent in 2009-2011.These imports are mainly processed finished products. This means that Africa has a huge scope to strengthen agro-industries and agro-processing. Further, intra-regional trade in processed food items remains low, although the Malabo declaration clearly articulates the need to promote agricultural productivity and boost intra-African trade. The World Bank (2019) estimates value addition in agriculture, forestry and fishing sector

15.3% of the GDP in Sub-Saharan Africa which shows export trade's high degree of dependence in primary goods.

Africa's rising markets show great potential for transforming their production systems. Africa's gross domestic product (GDP) has grown by 4.6% yearly since 2000, being the second fastest rate in the world. Its domestic demand accounts for 69% of this growth performance and has moved towards more processed goods. The African Continental Free Trade Area nurtures new hopes of creating and developing a pan-African market for the continent's industrialization. The African continent is recently moving towards a continental free trade area, in addition to strengthening the existing regional blocs such as ECOWAS, SADC and COMESA. Established in 1994, COMESA is one of the largest blocs in Africa with vast population and area coverage. Currently it has 21 member countries. In October 2000, nine of the member countries (Djibouti, Egypt, Kenya, Madagascar, Malawi, Mauritius, Sudan, Zambia and Zimbabwe) signed the free trade area (FTA) agreement and eliminated their tariff on COMESA originating products. However, some members are still not FTA members of this regional bloc, namely Ethiopia and Eritrea. The region is composed of nations with varying economic base and geographic location that determines the nature of traded goods and services. The sectors with the highest revealed trade potential are: textiles, wooden furniture, horticultural products, household items, hides and skins, footwear and leather products, sugar confectionery, unmanufactured and manufactured tobacco, precious metals, refined copper and copper alloys, waste and scrap of ferrous metals, steel and plastics, basket works, natural sculptures, essential oils, vegetable oils, dried leguminous vegetables, fruit juices, jewelry and white and red meat (Musengele *et al.,* 2016).

Even though the agriculture sector contributes the least to the region's economy, it remains the most important in creating employment opportunities. According to Upton (2014), agriculture provides a livelihood for more people than any other industry in the world. Growth in agricultural production and productivity is needed to raise rural incomes, to support the increasing numbers dependent on the industry and to meet the food and raw material needs of the faster growing urban populations. Enhancing agricultural productivity contributes to industrial growth by providing cheap labor, capital investment, foreign exchange and markets for manufactured consumer goods.

Agriculture contributes to 20–60% of the Sub-Saharan Africa (SSA) Gross Domestic Product (GDP) by mobilizing up to 80% of labor force and constituting 50–90% of export share (Cleaver, 1985). As an integral part of the agriculture sector, livestock industry contributes about 1.2 percent of the global GDP—as much as 5 percent for some countries—and is growing by about 2.5 percent per annum (Iimi, 2007). The contribution of live animals and their products to the agricultural economy accounts for 40%, excluding the values of draught power, manure and transport of people and products (Winrock International, 1992) in Ethiopia, whereas its contribution is between 18 and 88 % of the net value of agricultural production in East Africa (Noula *et al*, 2013).

In many of the poorest countries, livestock farming is one of the important industries to develop for not only economic growth but also poverty reduction and environmental protection. The livestock industry contributes about 1.2 percent of the global GDP—as much as 5 percent for some countries—and is growing by about 2.5 percent per annum (Iimi, 2007). IGAD (2013) estimates that Livestock and their products constitute a fifth of Ethiopia's exports, but about half of these exports are not recorded or officially recognized because they are produced by the informal cross border trade in live animals. These unofficial exports contribute to the welfare of Ethiopians by financing the importation of a wide range of consumer goods, including necessities such as clothing and staple food items. On the other hand, as Wanjiku *et al.* (2016) explained, governments lose revenue in unpaid custom taxes and duties because the volume of informal trade is increasing with liberalization of cross-border trade in staple foods in the region. The missing informal trade data leads to unreliable statistics which affects effective formulation, implementation and monitoring of domestic, regional and international trade policies. It is therefore difficult to assess the impact of any trade related policy initiatives in the region.

Most of African nations have economies based on agriculture and internationally trade primary products. Trade in similar goods between similar countries is welfare improving (Bjornskov, 2005). Sub-Saharan Africa exports to EU is decreasing; bovine meat at 22.5% and raw hides and skins at 3.3% between 2016 and 2017 (EU, 2018). Livestock and products trade within and outside of the COMESA region has significant contribution to economic growth in the region. Livestock provided 45% of agricultural GDP in 2008 according to IGAD (2013) estimates that included their contribution to crop

production in terms of draught power. The hides, skins and leather industry in the East African region is one of the key agricultural sub-sectors with a high potential towards commodity development that addresses pertinent issues of socio-economic importance and positively impact on rural development, creation of wealth and employment (IGAD, 2013).

According to Upton (2014) livestock and livestock products are estimated to make up over half of the total value of agricultural gross output in the industrialized countries, and about a third of the total in the developing countries. The global importance of livestock and their products is increasing as consumer demand in the developing countries expands with population growth and rising incomes. This growth in consumption is reflected in improvements in the average human nutritional status due to the intake of animal protein. The resultant changes have been dubbed 'the next food revolution' and the growth in developing country consumption of animal products is predicted to continue at least until 2020.

Arega (2011) reported on the impacts and determinants of agricultural exports from Sub-Saharan Africa to the West that highlighted both demand and supply side variables affecting agricultural trade. Goodhope (2014) reported that trade liberalization has a direct positive implication for national economic development and emancipation, particularly in Nigeria within the ECOWAS sub region. Similarly, Sunge and Mapfumo (2014) called for the coming into effect of the establishment of the COMESA-EAC-SADC FTA following their study on intra-regional trade agreements effect on trade flows in Zimbabwe. Mamo (2014) examined the trade linkages among the member countries of the COMESA and the extent to which the introduction of the COMESA common external tariff liberalized their trade regimes and reported a negative association between the region's external tariff and trade. In light of these reports about the relationship between free trade and economic growth little has been done to document the impact of specific commodities in the economy of nations within the COMESA bloc.

Even though the contribution of live animals and their products to the agricultural economy accounts for 40%, excluding the values of draught power, manure and transport of people and products (Winrock International, 1992) and 18 and 88 % including the draught power (Behnke and Metaferia, 2013), its impact on the economic growth of COMESA member nations has not been

documented. In addition, the difference between FTA member and non-FTA member countries economy and livestock commodities trade is not yet documented. Should these non-FTA member states liberalize or restrict their international trade in the context of agricultural commodities trade requires detailed knowledge on specific impacts of commodities trade on their economic growth. If the African Continental Free Trade Area is to materialize in the near future, there needs to be an understanding of its importance to specific traded goods. This paper tries to address the information gap regarding the relationship between free trade area and economic growth in Africa by taking COMESA member countries and their trade in livestock and products.

Robust statistical models and data analysis rely on numerous studies that provide accurate results from which we obtain valid conclusions. Econometric analysis using panel data was initially conducted and reported in a number of works (such as Mundlak, 1961; Mundlak, 1978; Hoch, 1962; Balestra & Nerlove, 1966). The primary advantage in using panel data models is the combination of cross-sectional data and time periods that increases the degrees of freedom (Baltagi, 2013). These models also allow us to control for heteroscedasticity, thereby increasing forecast accuracy. This study investigates the analysis of using panel data, which make our estimates of variability precise and achieve accurate inferences. Panel data can be used to control for heterogeneity through several models. Compared with cross-sectional regression models, panel data models can allow for heterogeneity among subjects, generally through subject-specific parameters. In other words, these models separate the effects of incidental or nuisance parameters (α_i) from the disturbance or error term (v_{it}).

Panel data models can also be used to select which among the fixed effect model (FEM), the random effects model (REM), and the pool regression model (PM) is the best in estimating the fitting model. Some researchers have studied and applied theoretical panel data models (E.g., Chuang & Wang, 2009; Kai & Qin, 2011; Baltagi, 2013; Hamzalouh *et al*., 2016). An important phenomenon in panel data analysis is unobserved heterogeneity. The presence of heteroscedasticity can lead to unreliable confidence intervals, inconsistent estimations, and misleading inferences (Hsiao and Hsiao, 2004). Modeling unobserved heteroscedasticity in empirical research is challenging, but should we allow heteroscedasticity slope coefficients to exist in a regression? To answer this question, FEM addresses heterogeneity. Panel data allows us to

control for heterogeneity, study dynamics, and test more complicated behavioral hypotheses than is possible with a single time series or cross-section. Panel data generate better predictions and provide micro-foundations for aggregate data analysis.

MATERIALS AND METHODS
Research Approach and Design
The research approach of this study is quantitative as it uses econometric data, such as GDP and export values, to identify association between economic growth measured in GDP and agricultural commodity production and commodity trade (live animal and products) in COMESA preferential trade area. The research is designed following descriptive and causal relationship between economic growth and livestock commodities export while quantifying the share of these commodities from the total exported commodities in the economy of the selected COMESA member countries. A quantitative approach whereby descriptive and inferential statistics design was followed in this study to assess the theoretical relationship with empirical evidences particularly in the context of agricultural commodity international trade and economic growth in preferential trade bloc in Africa.

Data Sources and Collection Methods
This study used the secondary balanced panel data from year 1991 to 2018. Total observations of 308 were targeted for each variable from 11 panel and 28 time variables. Data were gathered from official online secondary sources such as FAOSTAT DATA for agricultural export commodity data, the World Bank for National Accounts data. All data used in study were quantitative.

Variables Description
This study attempted to identify the association that live animal and animal products trade (export and import) have with economic growth in COMESA member countries. The following variables were used to describe and analyze the impact of livestock sector contribution to economic growth in the COMESA region; Gross Domestic Product (GDP) in USD as current value to each year and each country, Livestock Production as value of livestock production in USD to each year and each country, Live Animal Export values in USD to each year and each country, Live Animal Import values in USD of each year and each country, Livestock Products Import and Livestock Products Export as sum of value of dairy products, meat, hides, skins and eggs imported and exported in USD of each year and each country.

Table 1: Variable Description, Data Source and Expected Sign

Variable and code	Data Source	Data Description	Expected Sign
Gross domestic product (GDP)	World Bank	GDP in USD as current value to each year and each country	Dependent variable
Livestock Production (LSProd)	FAOSTAT	Value of livestock production in USD	Positive
Live animal import (IMPLA)	FAOSTAT	Value of live animal imports in USD	Negative
Live animal export (EXPLA)	FAOSTAT	Value of live animal exports in USD	Positive
Livestock products export (PEXP)	FAOSTAT	Sum of value of dairy products, meat, hides, skins and eggs exported, in USD	Positive
Livestock products Import (PIMP)	FAOSTAT	Sum of value of dairy products, meat, hides, skins and eggs imported, in USD	Negative

Population and Sampling

COMESA region is the largest regional bloc in Africa. It stretches between Tunisia in the northern Africa and Zimbabwe in the south covering area of 11.8 million square kilometers. The area is home to more than 555 million people that generated 2.2 trillion USD income in 2018. A vast population of livestock are found in this region with the leading cattle population records of 95 million heads in total from Ethiopia and Sudan (CIA, 2018). Annex 1 presents details of geographic, economic, demographic and livestock resource base of the COMESA region. The target population is a finite population of COMESA member countries, namely Burundi, Comoros, D. R. Congo, Djibouti, Egypt, Eritrea, Eswatini, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Somalia, Uganda, Zambia and Zimbabwe. Descriptive analysis part has based on these population data. According to Alreck & Settle (2005) the choice of sample size is normally made after considering statistical precision, practical issues and availability of resources. Malhotra & Peterson (2006) stated that, the larger the sampling size of a

research, the more accurate the data generated. This study included all the member countries with adequate data set to make inferences about their livestock sector international trade. Of the 21 countries listed in the population above, only Burundi, Egypt, Eritrea, Ethiopia Kenya, Madagascar, Mauritius, Malawi, Rwanda, Sudan and Tunisia were selected for having adequate data for years 1991 – 2018 to run balanced panel data regression analysis with post-estimation tests. Therefore, the econometric analysis was made based on data from these sample countries.

Data Analysis Techniques

After the data were collected both descriptive and inferential econometric analyses were employed to analyze the panel data. The descriptive analysis includes mean, minimum, maximum and standard deviation. The regression analysis was used to identify effect of livestock production and trade (import and export) on economic growth of the sampled countries in COMESA. Thus, both the strength of the relationship between variables and the influence of independent on dependent variable and statistical significance were assessed. STATA 14 software was used for the inferential analysis and SPSS 16.0 was used for the descriptive and Pearson's correlation analysis. The objective of this study is to analysis the relationship between livestock product and trade on economic growth of COMESA member countries. To achieve the entire objective the model has the following macro-economic variables. The variable includes GDP, Livestock Production (LSProd), live animal import (IMPLA), live animal export (EXPLA), livestock product import (PIMP), livestock product export (PEXP) which were collected from FAOSTAT and the World Bank databases. Livestock products included dairy products, meat, eggs, and hide and skins. And live animals included cattle, camel, sheep, goats, pigs and poultry. All variables' data were in values of USD. The standard panel data model according to Wooldridge, (2002) which satisfies the classical model assumptions was developed as:

$\ln GDP_{it} = \beta_0 + \beta_1 \ln LSProd_{it} + \beta_2 \ln IMPLA_{it} + \beta_3 \ln EXPLA_{it} + \beta_4 \ln PIMP_{it} + \beta_5 \ln PEXP_{it} + u_{it}$

$$u_{it} = \alpha_i + v_{it}$$

Where, GDP is GDP at current value,

       LSProd is Livestock production value,

IMPLA is Import value of live animals,

EXPLA is Export value of live animals,

PIMP is Import value of animal products,

PEXP is Export value of animal products,

´´U´´is the Error term and the subscript ´´*it*´´ indicates the country and the time period respectively and

´´ln´´ is the natural logarithm form of each variable described above.

Post Estimation Tests

Test for unit roots: The unit root tests of the variable was checked using Harris-Tzavalis unit-root test, Levin - Lin - Chu & Hadri Lm stationarity tests with the following hypotheses;

H_0: Panels contain unit roots and

H_1: Panels are stationary

If the variable is stationary or not is based on the P-value if the p value is greater than 0.05(5%)   reject the null hypothesis implies that there is stationeries otherwise the variable have stationary problem.

Normal distribution test: Skewness test was made and results showed that data did not have normal distribution ($P > Chi^2$). As a remedy data was transformed to natural logarithmic value of all dependent and independent variables.

Multi-collinearity is phenomenon that, when occurred in the multiple regressions, results in greater confidence interval and high estimation of standard errors (small t - value) and high R^2. It may occur as a result of little variation in the explanatory variable or high correlation between one or more explanatory variables (Gujarati, 2004). In this study the problem was checked by the variance inflation factor (VIF). As a rule of thumb if the VIF is greater than 10 there is a multicollinearity problem. It was found that the explanatory variables, i.e. livestock production, export and import, showed no multicollinearity as all VIF values were less than 10.

Hausman specification test: Under this section we carry out some diagnostic tests to examine which estimation technique fits the model and the data well. Panel data models examine fixed and/or random effects of group of time. Hence, our data should have individual effects or time effects. In order to examine the presence of individual effects and/or time effects, it is required to perform either fixed effects or random effects test.

For choosing whether fixed effect or random effect used in the mode Hausman specification testes is used. Therefore the study test the specified models under which model they fail whether fixed effect or random effect is appropriate. The null and alternative hypothesis for this test are:

H_o: difference in coefficients not systematic (Random effect is appropriate) and
H_1: Ho is not true.

If we fail to reject the null hypothesis, the random effect regression model is favored and vice versa. A fixed effect was, thus, followed to run the regression as $P > Chi^2$ was significant enough to reject the null hypothesis.

Heteroscedasticity: The homoscedasticity assumption states that the variance of the unobservable error, u, conditional on the explanatory variables, is constant. Homoscedasticity fails whenever the variance of the unobservable changes across different segments of the population, which are determined by the different values of the explanatory variables (Wooldridge, 2004). In short, if we persist in using the usual estimation procedures despite heteroscedasticity, whatever conclusions we draw or inferences we make may be very misleading according to Gujarati (2004). In this study, thus, the Breusch – Pagan test was applied for detecting heteroscedasticity as discussed in Verbeek (2012). This study estimates the square of residual of the random effects model. The test statistics multiplies the R^2 of auxiliary regression of this residual with explanatory variables used in the model by N (T-1). The test statistics has a Chi-square distribution with J degrees of freedom, where J is the number of explanatory variables used in the auxiliary regression. Variables were showing heteroscedasticity and as a result a generalized transformation was used and the feasible generalized least squares (FGLS) estimators were used to correct heteroscedasticity as well as serial correlation problems (Gujirati, 2011).

RESULT AND DISCUSSION

COMESA member countries have a total of 2.2 Trillion USD economy which is much less than world's top 5 countries economy. On the average share of service sector is 54.12% of GDP which makes the sector the main actor in majority of member countries. The agricultural sector is at 21% of the GDP contribution which is still within range of the report from the end pf the previous millennia (Cleaver, 1985).

On average, livestock production accounts to 28% of the agricultural production in the sampled countries as shown in Table 2 below. According to report by IGAD (2013) national accounts neglect the contribution of livestock to crop production in the form of manure as fertilizer, drought power as means of cultivating land and transporting agricultural produce to the market and farm in countries such as Ethiopia where 80% of the crop production utilizes oxen power. Therefore, it can be argued that this result represents the minimum contribution of livestock sub-sector to the economy of nations in COMESA region. Taking Ethiopia, Sudan and Kenya has respectively cattle population of 60, 35 and 13.3 Million and share of service is 87.2%, 45% and 43.1%, respectively, which can show that livestock sector is not contributing much to the economy. The same is presumed on other livestock sources, such as sheep and goats, which these member countries are not doing well in the sector under consideration. However, it should be noted that the contribution of the cattle is underestimated by national accounts as reported by IGAD (2013). In addition, informal trans-border trades contribution are an accounted for which strengthens the fact that this result represents the minimum contribution of livestock to the formal economic development of the nations considered.

Table 2: Trade Volume of Agricultural Products (1991 – 2018)

Variables	Mean	Min.	Max.	Std. Dev.
Agric. production (in million USD)	6082.80	136.04	38028.93	7405.33
Livestock production (in million USD)	2056.70	37.74	15775.21	2979
Livestock to total agriculture ratio (%)	28.55	4	81	16.74
Total agric. imports (in million USD)	1160.10	12.28	15252.57	2428.03
Total agric. exports (in million USD)	730.07	.16	5093.66	969.95
GDP, current (million USD)	27877	422.03	3.33E5	53321.92
Live animal import (million USD)	12.15	.00	240.61	33.66
Live animal export (million USD)	21.16	.00	544.76	69.88

Source: Author's calculations from FAOSTAT data

Balance of Trade of Livestock Products in COMESA Member Countries

Fifty-five percent of the sampled countries are in negative balance of trade in terms of live animal commodity with Egypt scoring the highest (-85.7 million USD) between 1991 and 2017. Sudan has the highest positive balance of trade in live animals, with record of 144 million USD, followed by Ethiopia. Placed at the top in cattle population from Africa, Ethiopia seems losing benefits of its immense livestock resources (Figure 1).
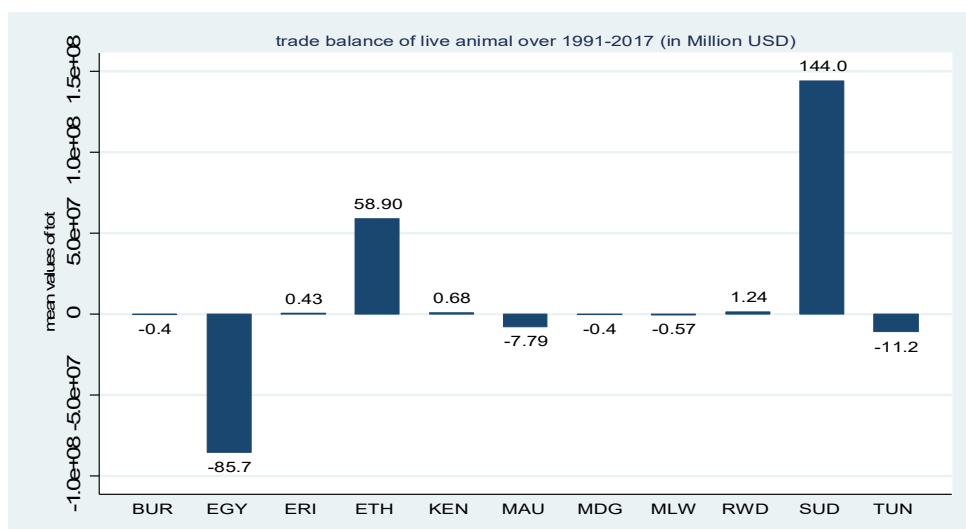

Figure 1: Balance of Trade of Live Animals (1991–2017) in millions of USD
Source: Author's computation from analysis of FAOSTAT data

As Figure 2 below illustrates the balance of trade of COMESA member countries in animal products commodity. The countries with the higher positive balance of trade are Sudan and Ethiopia which is expected considering their livestock resource endowments and similar magnitude of trade balance in live animal commodity. However, since this study did not analyze data about the destination of exports and source of imports it is less confident to address the share of COMESA region from this expanded market. Animal products trade is subject to a number of regulatory standards and requires higher level of technology such as processing and cold chain facilities as compared to live animal trade (Melaku, 2007). The negative balance of trade observed in majority of the COMESA member countries in the current study signals COMESA member nations trade mostly with the rest of the world. This in turn indicates a potential to develop the intra-regional trade for live animal and products.
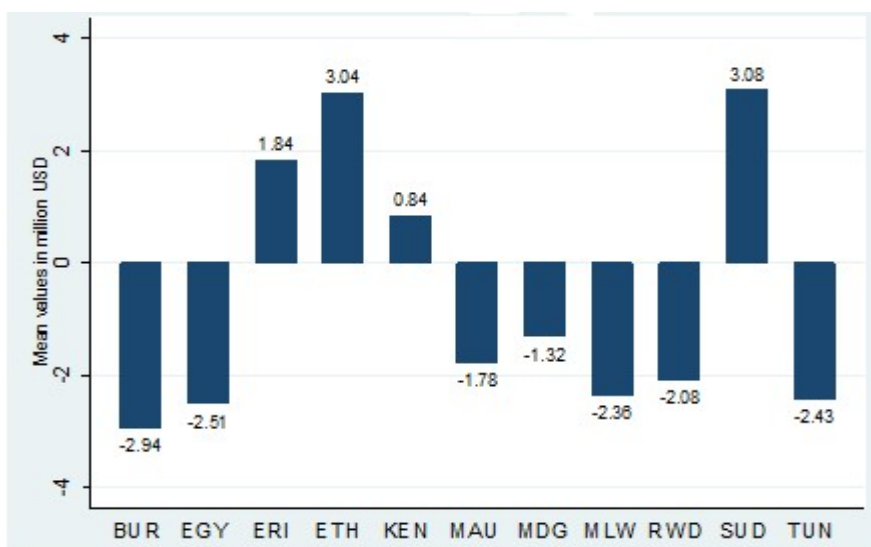

Figure 2: Animal products balance of trade in COMESA member countries (1991-2017) in millions of USD

Source: Author's computation using FAOSTAT data

Trends of International Trade in COMESA for Livestock and Livestock Products

Figure 3 below shows the trend in live animal international trade in COMESA member countries. Apparently, there is an increasing trend in live animal

exports in COMESA member countries especially since 2008. Following this time overlap between the accelerated growth in live animal export trend and COMESA establishment, it is argued here that COMESA has an effective trade facilitation role through its FTA.
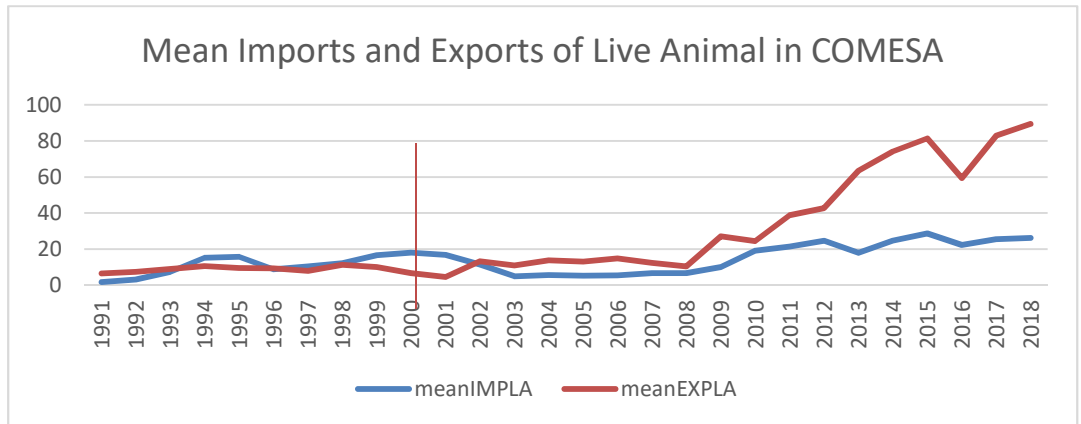

Figure 3: Mean imports and export values of live animal
Source: Author's computation from FAOSTAT data

Figure 4 below illustrates the trend in the import and export of animal products in COMESA region. The year 2000 was a benchmark for the establishment of COMESA. FTA and the increase in trade values trends is observed to accelerate afterwards, especially since 2005. This indicates that free trade areas promote the exchange of livestock products
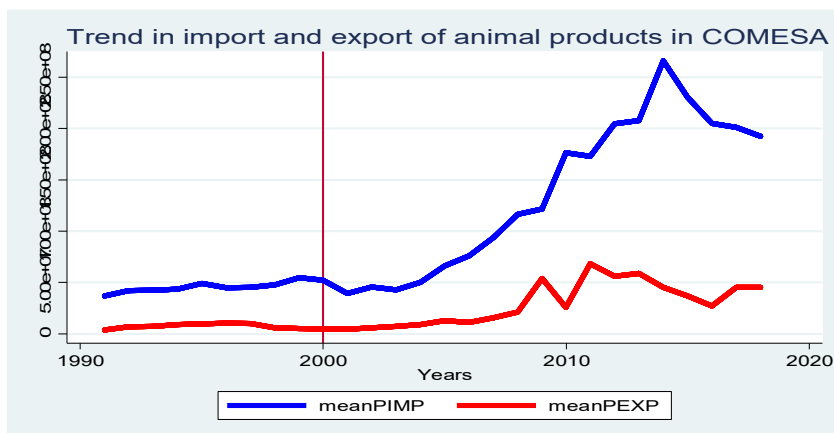

Figure 4: Trend in animal products import and export in COMESA member countries
Source: Author's computation using FAOSTAT data

Relationship between COMESA FTA Membership and Trade in Live Animals and Livestock Products

Table 3 shows the correlation between membership to the FTA of COMESA and livestock commodities trade. GDP and imports of animal products have highly significant correlation with FTA membership addressing free trade area's importance to develop economic growth and promote importation of welfare improving goods such as high quality animal proteins. This is in line with the above results where growth trends in live animal and animal products accelerated after the establishment of COMESA FTA in year 2000. Live animal import has shown significant correlation with COMESA FTA membership. As COMESA FTA facilitates international trade in the region through lifting tariff and non-tariff barriers such as high standards for primary products, the livestock sector of member states can improve efficiency as one of the key impacts of free trade is efficiency improving and welfare improving (Bjornskov, 2005).

Table 3: Pearson's Correlation between Trade, Economic Growth and FTA Membership to COMESA

Pearson correlation	GDP	FTA-membership	IMPLA	EXPLA	PIMP	PEXP
GDP	1	0.252^{***}	0.696^{***}	0.162^{***}	0.925^{***}	0.777^{***}
FTA-membership		1	0.120^{**}	0.077	0.230^{***}	0.137^{**}
IMPLA			1	0.040	0.709^{***}	0.420^{***}
EXPLA				1	-0.019	0.087
PIMP					1	$.761^{***}$
PEXP						1

*** Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).

Source: Author's analysis from FAOSTAT and World Bank data

Estimation Results for the Relationship between Economic Growth and Livestock Commodity Trade

The main objective of this study was to measure the impact of live animal and products international trade on economic growth of nations that are member of the COMESA regional integration. Since the data for this study cover a time period of 28 years across 11 COMESA member countries the estimation and

interpretation of the inferences is based on panel data analysis. After checking the normality and stationarity tests of the variable the study used the Hausman specification tests to choose whether the fixed effect model or random effect is appropriate to interpret the regression results. Finally the multicollinearity and heteroscedasticity problems were also checked and the existing problems solved using logarithmic transformation and using the feasible generalized least square (FGLS) methods to rectify heteroscedastic and serially correlated nature of the variables.

The growth model equation tested was as follows;

$$\ln GDP_{it} = \beta_0 + \beta_1 \ln LSProd_{it} + \beta_2 \ln IMPLA_{it} + \beta_3 \ln EXPLA_{it} + \beta_4 \ln PIMP_{it} + \beta_5 \ln PEXP_{it} + u_{it}$$

Table 4 presents model estimation results after the post-estimate tests were made and remedial measures were taken. The Prob > chi^2 = 0.000 result show that the model is fit enough to explain the association between GDP and the livestock commodities trade variables considered. An overall R^2 of 0.8377 indicates that for the variation observed in the dependent variable of lnGDP in the above model, 83.77% is explained by variation in the independent variables. This means local livestock production, live animal import, animal product export as well as import have shown significance in explaining the variation in GDP. Among the explanatory variables only lnEXPLA was insignificant in explaining the observed variation in GDP. Hence, export of live animal does not contribute to economic growth. Export of goods and services are expected to contribute to economic growth. However, live animal export in COMESA region was found to be insignificant to economic growth of the member countries.

Table 4: Relationship between Economic Growth (lnGDP) and Trade

Variables	Coefficient	Sd. Error	P>z
lnLSProd	0.49	0.023	0.000***
lnIMPLA	0.02	0.011	0.091*
lnEXPLA	-0.01	0.009	0.399
lnPIMP	0.29	0.017	0.000***
lnPEXP	0.12	0.017	0.000***

Number of observation=308 Time periods = 28   Number of groups =11
Overall R^2 = 0.8377   Waldchi^2 =3656.57   Prob   > chi^2=0.000

*** is significant at 1%, ** significant at 5% & *Significant at 10%,
Source: Own estimation result of the growth equation

All the expected signs were observed to hold in the model except for lnEXPLA. Even though this variable is not significant, the negative association between export and economic growth was unexpected. This could arise from either quality of data as secondary data are subject to modifications such as projecting missing data and reliability of local reports. COMESA aims to increase the prospects of cooperation and intra-trade among its member countries. Thus, the force of exports and imports in the market depends primarily on the ability of these countries to achieve competitiveness and comparative advantage. The results of this study indicated that livestock production significantly contributed to economic growth of COMESA member countries, and membership to COMESA explained the variation in GDP by 49% (P<0.01). The contribution of livestock as food and non-food products and services to households has been reported by different earlier reports (Aklilu and Catley, 2009; Upton, 2014; IGAD 2013; Wannous and Nabarro, 2014). A report by IGAD (2013) addressed the unaccounted contribution of livestock to agriculture sector in the forms of manure for soil fertility improvement, draught power for cultivation of land and transportation of agricultural and non-agricultural products to and from market. Therefore the current results are in line with previous reports.

It was also found in this study that import of live animals in the COMESA member countries significantly explains 2% of the variation in GDP. Live animals are imported for the purpose of consumption as well as parent breeding stock for rearing animals for later consumption. The data used for this analysis was total value of imports in USD for live animal import and does not differentiate between livestock species. Nevertheless, a significant causal effect was observed of live animal imports on economic growth. Import of live animals, for instance cattle, can be beneficiary as it gives option to further produce products such as milk, meat and hides that give way to further economic activities and income. On the contrary, export of live animals without cuts the benefits of value addition and may render less than expected contribution to economic growth. Taking cattle export for example, is subject to a number of sanitary and phyto-sanitary regulations, less value to volume ratio, and cuts the benefit of producing beef, hide and other by products within the boundaries (Wannous and Nabarro, 2014). This means that exporting products could have contributed better to the economic growth than live cattle export by creating more jobs and income along the beef and leather value chains.

Animal product international trade in COMESA region has significant impact on economic growth, which has explained 29% and 12% of variation in GDP, by import and export, respectively, in the current study. The animal products considered in the current study are dairy products, eggs, meat and raw hides and skins. Arega (2011) tested the relationship between trade openness and economic growth using data from agricultural trade between 47 sub-Saharan-African countries and the West and reported positive association between economic growth and international trade which is in line with the current study results.

The current results that showed higher contribution by import of products than exports in explaining economic growth in COMESA member countries indicate that this theme needs further study as to the determinants of agricultural products trade in the region. Some presumptive explanations worth discussing are the fact that most of the countries in the region have less developed agroindustry to add value to primary products and the fact that more countries are in negative trade balance of products than live animal (63% vs. 54%). Theoretically, free trade promotes welfare in both the importing and exporting countries that have either absolute or comparative advantages through. As being composed of countries with dominant primary product exporters, COMESA region has less comparative advantage in terms of processed commodities such as dairy products, meat and eggs that require more capital than labor and land to produce and trade.

SUMMARY AND CONCLUSION

Livestock sector comprises 28% of agricultural production in value in the COMESA region which shows that the sub-sector is important for the economy of the region. Most of the members of COMESA regional integration are in negative trade balance in terms of live animal and animal products trade. The negative balance of trade observed in majority of the COMESA member countries in the current study signals COMESA member nations trade mostly with the rest of the world. This in turn indicates a potential to develop the intra-regional trade for live animal and products. With the recent positive developments in the establishment of the African Continental Free Trade Area, lessons can be drawn from COMESA and other blocs to enable intra-regional and inter-regional trade so that nations take advantage of the trade potential mentioned above.

There is a growing trend in live animal and products international trade in the COMESA region which is accelerated by the COMESA FTA facilitation. Moreover, membership to FTA of COMESA has highly significant correlation between animal product import and GDP and less significant correlation with import of live animals and export of animal products. Economic growth, as measured by GDP, is significantly determined by livestock production value, live animal import value, animal products import and animal products import, but not by live animal export in the COMESA region. It can be seen here that value addition on primary agricultural products such as live animals yields better economic benefit in trade than export of primary products. This could be from the retained opportunities such as job creation, product diversification and byproduct utilization from value addition process. Member nations of the COMESA bloc have mostly agrarian economy and thus can take lessons from this association in planning national development strategies.

From the abovementioned findings of this study the following conclusions are drawn. Livestock production and trade has important contribution to economic growth of nations in COMESA regional bloc. It is significant enough to deserve attention from national policy makers as well as regional institutions that endeavor development of the region and the respective countries that constitute COMESA. Membership to the free trade area of COMESA positively affects growth of economy as well as livestock and products international trade. Therefore COMESA member nations that are not yet FTA members such as Eritrea and Ethiopia are losing the trade facilitation benefits of COMESA. Taking the association between economic growth and live animal and products trade as proxy it can be concluded that free trade agreements promote economic growth at least in the COMESA region.

COMESA establishment has positively affected the trends of live animal and products trade. However, most of the members are still in negative balance of trade which signals a higher proportion trade with non-member countries. Economic growth as measured in GDP is significantly determined by livestock production, live animal imports, animal products imports and exports in COMESA member countries. Livestock production is a means of livelihood to millions of pastoralists and farmers in Africa. In addition, livestock products have important contribution to household nutrition and combating food and nutritional insecurity. International trade facilitation by COMESA has positive outcomes in livestock and products thereby improving livelihoods and

nutritional security. Even though the agricultural sector in general has the least contribution compared to manufacturing and service in COMESA region, its growth has important purpose to economic growth, as empirical evidence shows in this study.

RECOMMENDATIONS

The positive association between live animal and animal products import and export in COMESA region should be promoted with institutional and policy infrastructures to enhance economic growth of nations in the region. Supporting policies are required to be crafted and enforced to further exploit the potential of livestock sub-sector for the development of the economy of nations in COMESA region. Countries with livestock resource endowments, especially Ethiopia and Sudan should device more convenient systems through policies and institutions that implement them in favor of livestock value chains to contribute more to the development of their economy. As it shown empirically that it is economical to join FTA, COMESA members that are not yet member of the FTA of the region, namely Eritrea and Ethiopia, should become members of the FTA and benefit from the trade facilitation the regional bloc offers. Regional economic integration is eminent in the globalizing world and, thus, nations should prepare themselves towards joining such beneficial trade blocs. Recent developments in the ratification of the continental free trade area of Africa offer even wider opportunities to the nations in Africa. Lessons drawn from such commodity specific indicators of regional economic integration can be taken to model the economic development for nations from African Continental Free Trade Area.

Further research should be conducted to identify which export destinations and commodities have the higher advantage for the members of COMESA. As livestock sub-sector is an integral part of the agricultural sector its relationship with other agro-commodities in the regional trade should be further studied. In addition determinants of live animal and products trade and economic growth in the COMESA region should be conducted to strengthen the knowledge base of the sector in the region.

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Annex 1: Geographic, economic, and demographic and livestock resource base of COMESA member countries

Countries	Human pop. (in millions)	Area (km²)	GDP/PPP (Billions USD)	% of GDP			Animal pop. (in million)		
				Agric.	Industry	Service	Cattle	Camel	Sheep and goat
Burundi	11.80	27,830	8.00	40	16	44	0.33	na	0.26
Comoros	0.80	2,235	1.32	48	12	41		na	na
Congo D.R.	85.20	2,344,858	68.60	20	44	37	0.90	5.30	0.85
Djibouti	0.88	23,200	3.64	2	17	80	0.27	na	0.97
Egypt	99,4	1,001,450	1200.00	26	25	49	4.80	0.15	9.40
Eritrea	5.97	117,600	9.40	12	30	59	1.55	0.37	3.27
Ethiopia	108.00	1,100,000	200.60	35	20	45	60.00	4.80	82.00
Kenya	48.50	580,367	163.70	6	7	87	13.30	3.10	13.40
Libya	6.30	1,759,540	61.97	1	52	46	1.70		3.32
Madagascar	25.60	587,041	39.80	24	20	57		na	na
Malawi	19.80	118,484	39.80	22	77	4	0.75	na	1.37
Mauritius	1.30	2,040	28.20	4	22	74	1.40	na	10.30
Rwanda	12.10	26,338	24.60	31	18	52	0.73	na	0.92
Seychelles	94.60	455	2.75	3	23	74		na	
Sudan	43.10	1,861,484	45.80	40	3	58	35.00	3.00	79.50
Swaziland	1.08	17,364	4.47	7	45	49	0.66	na	0.46
Somalia	11.25	637,657	20.44	60	7	33	0.34	0.08	4.60
Tunisia	11.50	163,610	137.70	10	26	64	1.50	0.24	7.90
Uganda	40.85	241,038	89.19	28	21	51	5.70	na	5.55
Zambia	16.40	752,618	68.93	8	35	57	2.20	na	1.19
Zimbabwe	10.03	390,757	34.27	12	22	66	5.50	na	3.30
TOTAL	555.06	11,755,966	2253.18	**21**	**26**	**53**	**136.62**	**17.03**	**228.56**

Source: Author's compilation from World Factbook, CIA