INNOVATIONS

Meat Prices Change Trends in Ethiopia: Focused on Twenty Two Beef and Chicken Markets

Amalo Soga Mago[1] & Professor V. Krishna Mohan[2]

[1]Research Scholar in the Department of Commerce and Management Studies, Andhra University

[2] Professors in the Department of Commerce and Management Studies, Andhra University

Abstract

The **objective** this study is to investigate the beef and chicken price change trends in Ethiopia in the last ten years. It focused on the twenty two markets that included in the study from north, south, southwest, west and east regions. **Quantitative research** approach was applied to analyze the data. The data source was central statistics agency databases. One sample and independent sample test were used. One-way ANNOVA also used to test price change disparity between twenty two markets. After all data were collected and checked, Statistical package of social science version 20 applied to calculate and analyze the finding. The **result** shows that the beef price was 280.82 percentage and chicken price was 273.54 percentage higher than the base year in the study markets. The price change of both items was widely experienced in all twenty two markets. Even though there were market integration between studied markets, the highest beef price change recorded in the eastern markets such as Haromaya, Hareri, Adama and Diredawa but the lowest change was recorded in Melka Werers in Afar region and Addis Ababa. In the case of the chicken, Debrebirehan, Hosana and Asosa recorded highest change but lowest change recorded in Afar region at Melka Werers and Awash Sebat killo markets. There were significant difference of an average retail prices between twenty two chicken markets but not on the beef. However, relatively an average higher beef prices were recorded in southern and eastern markets like Hareri, Diredawa, Moyale, Jigjiga, Negeleborena and Haromaya. The lowest retail price recorded in Adwa and Asosa. In the case of the chicken, the higher price recorded in the Gambella, Mekele, and Asosa. The lower prices were recorded in the eastern markets like Melka Werers, Haromaya, and Harari. **Conclusion**: Overall beef and chicken prices were highly increased in the studied markets in the last ten year.There was market integration on both beef and chicken markets. Finally recommendation was forwarded to policy makers to be high alert to react actively for the highly increase of beef and chicken prices and should have strategy to narrow the meat price change which help to enhance faire consumption between consumers who highly valued for the beef meat and chicken, and work to ensure affordability of the animal proteins. Second the researchers should come with the research question why high beef and chicken prices in the country that has high animal population. This question is very an important for further research.

Key words: 1. Beef, 2.Chicken, 3. Market integration, 4.Price trend, 5. Retail price.

1. Introduction

Ethiopia is one of the countries among the sub-Saharan Africawhich has high potential meat supply, because itis categorized in the countries that has largest animal population in the continent. According to the report of Central statistical agency,the population of meat animals increased by 56.25% in 2015 compared to 2007 (CSA, 2015 and 2016). However,the increase of the meat animals' population not reflected into satisfy increasing meat demand at affordable price for larger population (Sintayehu, 2013; and AGP, 2013).

The increases of the meat price in the domestic market is forcing many households unable to procure meat and forced to stay without meat for long time in a year. Meat consumption is highly valued in Ethiopia during special occasions, festivals and it has cultural symbolic value than other foods. Thus for many Ethiopians, meat is one of the delicious food and highly liked food item. Commonly there is saying "የበዓልድባብየምኖረዉእርድ ስኖርነዉ"(there is festival setting if there is slaughter).The highmeat appetite**,** especially for raw meat is in a challenge by the rise of price. It was also commented that this may affectsanimals' protein nutritional status of the low income households and causes changeof feeding culture of the people (Tsegay et.al, 2015).

The increase of the meat price was one of the important agenda among the consumers since the beginning of the last ten years. Government attempted to fix the meat price to enhance fair consumption for the larger population (Assefa, 2015) but it was not successful. The meat price was increasing time to time. There were complaints from the consumers on the rise of meat price. Consumers were not only complaining on the increase of the meat price but also price variation between markets. However, there was limitation of scientific explanation to show the existing reality.

The knowledge of the meat price change is considered as important to identify animals' protein consumption affordability. Ethiopia meat consumption per capita was lowest compared to Africa countries. Among the top nine Africa countries only one country has a lower per capita consumption of meat compared with Ethiopia. High domestic meat prices was one of the determinant factorforthe low consumption of meat by larger population(Sintayehu, 2013; AGP, 2013;Tafere and Worku, 2012, andFikrie, 2019). To narrow the consumption gap which resulted by rise of price, market integration and price change knowledge is very crucial for policy maker. Because the availability of food in general and meat particularly determined by the market integration and price change trend.

Most of the existing researchersfocused on determinants of meat price but few of them included in their study meat price variation at micro-level. According to these research finding there was price variation between farmer gate market and central markets. In addition meat animals price differences associate with seasonal variation and the consumption rate of meat varies by religious and festival periods (Negassa et.al., 2011;and Tsegay, et.al, 2014). Most of the available researches were ten years back and not updated. There was limitation of studies on comprehensive meat price change trend at wider level in the country. As described in the above paragraph there was complain from consumers on the rise of meat price and variation of meat price between markets. However, there was limitation of scientific research supports. Therefore investigation of regionalinclusive meat price trend and market integration analysis is considered as research gap and focused to investigate in this study.

2. Review Literature

Meat Price Change Trend

According to FAO (November 2021) meat price index,the meat price decreased 1% in November 2021 compared to previous months at world market. However, it was higher than the corresponding month before a year. Relativelythe meat prices stay stable comparing other animals' source food items.The FAO (August 2021) also reported thatfrom the beginning of the month of the 2021, meat price increased 14.9% at international markets due to increase of the demand and deficit of supplies from largest share exporting countries. However, the report ofOECD-FAO (2019) shows that, meat price lower 2.2% in 2018 than 2017 at world market. This decline was associated with the decline of pig and poultry meatsprices. On the other hand the beef price continued stable and sheep meat prices increased. Based on the meat price change trend observed in the last years it was forecasted that overall nominal price of meat increase by 2028 because of the increase of demand on animal protein in developing countries (OECD-FAO,2016 and FAO, August 2021).

In the case of Ethiopia,many literatures focused on the factors that determine the meat price variation rather than study comprehensive meat change trend at national level. However, few researchesincluded in their studies that meat price variation as one variable in the animal source food items. They associated meat price variation with the social and religious events like Christmas, fasting period and during the New Year celebration (Tsegay, Mohammed and Sandip,2013). In addition Hailemariam et.al, (2009) and Bachewe et al. (2017) related meat price difference with the livestock price change. According to these studies livestock prices change revealed in variation between dry and rain seasons. It is higher in rain seasons compared to dry period. Another studies emphasized on the meat production and consumption trend. According to these studies overall meat production increased between 2004 and 2010but decreased in 2017. They identified that meat consumption per capita was lowest compared to the other developing countries. They associated the rise of meat price as one of the factor that determine lower the meat consumption per capita in Ethiopia. These studiesclicked an important issues such as why the meat price is highand the contribution is very limited from meat sectorin the country that had huge number of livestock population (Tekeba, 2018 and Addis, 2019).

Bachewe et.al, (August, 2017) compared how meat price especially beef prices were higher than maize. According to this study beef prices were too expensive than maize that sixteen times higher than the maize prices. This study expanded investigation that the consumption of the meat determined by cultural elements. Consumption increases during the time of celebration duringthe New Year, Christmas, ending of fasting and during the other social events but limited during the Christians fasting days and seasons. The investigation associated how meat price related to social and cultural or religious events. Seasonal changes in demand seemingly drive changes in prices of livestock in general and meat particularly.According to Tsegaye et.al (2013) report beef is more preferable a type among the consumers. The reason related to the accessibility of this type of meat at every local markets than others.

The second research concept that researchers not emphasized was meat price integration at national level. There were few studies that attempted to analyze meat price variation at regional level. Only limited studies which stayed more than ten years backdescribed animals' source food in generaland meat particularly show variation at regional levels. These report indicate that there was significant price variation by region. According to these studies meat ox price higher in Addis Abba comparing to Afar region. Diredaw and Harari experienced higher price and comparably livestock's price

higher Benshangul-Gumuze. In south nation nationalities and people regional state the price of livestock were lower than the others. Also lowland and pastoral areas like Somali, prices of the livestock were lower. The sheep price was lower in Somali region but overall cattle price highest in Afar (Teklewold et al. 2009 and Ababa, 2010).

Beef and other animals' products prices were lower in Tigray than country level. Prices are also low for these products in the western regions, Benishangul-Gumuz and Gambella. On the other hand, prices for beef and cow milk were high in the lowlands of Somali and Afar. In recent time FAO (2017) added one report that animal source food were high in eastern like Harari and Dire Dawa compared to Capital city, Addis Ababa. Pastoralized cow milk price was lower in Addis Ababa. There was significant egg prices variation between urban and rural areas. In Tigray,Amhra and south nation nationalities and people regional states the price of egg was lower and in Oromia it was medium but it was higher in lowland pastoralist areas.

Regarding to beef price it was reported that beef prices increased by 33% and egg price increased by 32% in 2016 compared to 2007. There was meat price change variation by region. It showed that the price increased in the east, central, and southern parts of the country (Bacheweet.al.,August 2017). Beef prices in 2011 dropped significantly compared to bull prices, possibly because of price-fixing of beef by the government in the beginning of that year (Hassan 2011). Cross country the prices of beef in Saudi Arabia, and a major export country for Ethiopia, the USA import prices increased. The chicken price also increased between 2007 and 2016 Bacheweet.al., August 2017).

Another researches also highly emphasized on the meat consumption and trading but missed how price change trend in the last continuous years. According to this studies meat production was very low compared to other African countries and unable to use existing opportunity to be competitive in the continent. The research conducted in Hawassa, identified that people prefer beef than the other types. It also added that the rise of meat price limiting the consumption rate and forced to wait the time of social events like holidays, weeding, and public ceremonies (Tsegay, 2013 and Tekeba, 2018).

From the reviewed literature it was observed that most of them deals on the causes of the meat price rises and meat animal price variation. Few of them investigated meat price variation at regional level but majority of these analysis were ten year back. There was limitation of investigation on the recent market integration characteristic on the meat price. This indicate that there was limitation on comprehensive meat price change trend investigation at national level. For the most of the researches, meat price change trend was not key analysis areas for their analysis. This is concerned as research gap area. Taking in consideration this facts this study aimed to investigate the beef and chicken price change trend and their market integration.

3. Genera objective

This study aimed to investigate the beef and chicken price change trend in Ethiopia between 2010/11 and 2019/20.

Specific objectives

1. Analyze meat (beefand chicken) price change trends in the last ten years.
2. Compare meat (beef and chicken) mean prices change difference between twenty twoselected markets.
3. Compare beef and chicken priceschange variation in the last ten years.
4. Compare beef and chicken retail price differencebetween twenty two markets.

4. Hypothesis

1. Null hypothesis (H_0) = there was no significant price change of meat (beef and chicken) between 2011/12and 2019/20 compared to base year (2010/11).

- Alternative hypothesis (H_1) = there was significant price change of meat (beef and chicken) between 2011/12and 2019/20 compared to base year (2010/11).

2. Null hypothesis (H_0) = there was no significant price change variation of chicken and beef between twenty two selected markets in last ten years.

- Alternative hypothesis (H_1)=there was significant price change variation of chicken and beef between twenty two selected markets in last ten years.

3. Null hypothesis (H_0) = there was no statistically significant price change variation between chicken and beef price in the studied years.

- Alternative hypothesis (H_1) = there was significant price change variation between chicken and beef price in the studied years.

4. Null hypothesis (H_0) = there was no significant variation ofchicken and beef retail prices between twenty two selected markets.

- Alternative hypothesis (H_1) = there was significant variation of chicken and beef retail prices between twenty two selected markets.

5. Significance of the study

Market price trend information is crucial for producers, sellers, consumers and policy makers to make decisions on amount to produce and placeto supply for consumers. Considering this fact, this study will contribute input for meat suppliers and consumers on the characteristics of marketintegration and co-movement of the price. It will also contribute as an input for the policy makers who are working to ensuremeat market stability. In addition this study contributes academic knowledge and indicate research gap in the areas of marketing and related fields.

6. Research Method and Data Sources

This study aimed to investigate beef and chicken price change trends in the last ten years (2010/11 and 2020/21) between regional markets. It targeted sample market centers from north, south, west, southwest and east Ethiopia regions. North represented by Adwa, Aksum, Mekele, Gonder, Debrebirhan and Bahirdar, east represented by Melka Werers, Awasha Sebat killo, Jigjiga, Diredawa, Haromaya and Harari, south-west represented by Hawassa and Hosana, westwas represented by Gambella, Asossa, Jimma, south represented by Dilla, Negeleborena, Moyale, centralpart of the country represented by Adama and Addis Ababa. They were considered in the sample to cover wide markets and to get sufficientunderstanding onbeef and chicken price change characteristics in the country.

The study applied aquantitative research approach because it was aimed to know the mean price variations between different markets in the study period. In addition the data were numerical and researcher decided to compare mean variation of the two items in the period of the study.

Major data source of this study was central statics agency database. Monthly and annual data of consumers' retail goods were collected by central statistical agency and stored at the central level. This data bank was major source for this study. From this data bank only necessary data for this study was collected used for the analysis.

Data were analyzed by mean change comparison techniques. Descriptive statistics was used explain the findings. Mean comparison techniques were used to analyze the data. An independent sample test was used to understand the changes between two items, price change variation between beef and chicken. One sample test was also used to compare price change variation between base year and years that targeted for the studied. In addition one-way ANOVA was also applied to test the mean difference of beef and chicken price change trends between twenty two markets. Statistical Package of Social Science version twenty was applied for data analysis.

7. Data Presentation and Discussion

Shapiro-Wilk test was applied to check data normality. Following hypothesis was formulated to test the normality of data.

- Null hypothesis (H_0): overall beef and chicken price data of all markets was normally distributed.
- Alternative Hypothesis (H_1): overall beef and chicken price data of all markets was not normally distributed.

Table 7.1 statistical result for data normality test

	Kolmogorov- Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
twenty two markets chicken price index	.148	10	.200*	.955	10	.729
twenty two markets Beef price index	.123	10	.200*	.977	10	.944
*. This is a lower bound of the true significance. a. Lilliefors Significance Correction						

Source: computed from central statistics agency database 2010/11-2019/20

Result presented on the normality test table 7.1 shows that under Shapiro-Wilk test column the P-value of both item were greater than sig. = 0.05 at 95% confidence interval level of difference. Therefore, failed to reject null. This shows all data are normal distributed.

7.1Beef and chicken price change trends.

Table 7.2One-Sample Statistics results on twenty two market mean price index

	N	Mean	Std. Deviation	Std. Error Mean
Beef price index	10	280.82	124.32	39.31
chicken price index	10	273.54	127.22	40.23

Source: computed from central statistics agency database 2010/11-2019/20

From table 7.2 it was observed that the beef mean price index of twenty two market was 280.82 at 124.32 standard deviation. In the case chicken the mean index was 273.54 at standard deviation.

Table 7.3One-Sample Test results beef and chicken price index						
	Test Value = 0 (2010/11 was base year)					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Beef price index	7.14	9	.000	280.82	191.88	369.75
chicken price index	6.80	9	.000	273.54	182.53	364.54

Source: computed from central statistics agency database 2010/11-2019/20

As shown in the table 7.3 beef price index statistics (t) = 7.14 and sig. (2tailed) = .000 at 5% level significance. The chicken price index statistics (t)= 6.80 and sig.(2-tailed) = .000 at 5% level of the significance. Both items test value were lessthan p-value = .05 at 5% level of significance. Since both hypothesis were rejected in favoring the alternative hypothesis.

This implies that there were statistically significant difference of beef and chicken price between 2011/12 and 2019/20 compared to the 2010/11. From the result it was observed that beef price was 280.82% higher than the base year. Like beef, chicken price was also higher than the base year. It was 273.54% higher than the base year.

7.2Beef and Chicken Prices change difference between twenty two selected markets.

Table 7.4ANOVA result on beef and chicken price index between twenty two markets						
		Sum of Squares	df	Mean Square	F	Sig.
Beef price index	Between Groups	451272.248	21	21489.155	1.374	.135
	Within Groups	3097169.631	198	15642.271		
	Total	3548441.879	219			
Chicken price index	Between Groups	284740.893	21	13559.090	.762	.763
	Within Groups	3521097.304	198	17783.320		
	Total	3805838.197	219			

Source: computed from central statistics agency database 2010/11-2019/20

One-way ANOVA result that presented in the table 7.4 shows that beef price index F (21, 198) = 1.374 and sig. = 0.135. In case of chicken it was F (21,198) = .762 and sig. = 763. Since the test value of beef and chicken were higher than the p-value 0.05 at the 95% confidence interval of the differences. Therefore failed to reject null hypothesis and reject alternative hypothesis.

This implies that there were no significance price change difference in the last ten years between twenty two markets on beef and chicken. Since the sample represented markets from the all regions, it indicates the price change widely observable almost all part of the country. Despite of no price change variation between markets, from the mean plot graph it was observed that relatively the highest beef price change recorded in the eastern like Haromaya, Hareri and Diredawa, and in the center at Adama markets but the lowest change recorded in Melka Werers in the Afar region and Addis Ababa markets. In the case of the chicken, Debrebirehan, Hosana and Asosa recorded highest

change but lowest change recorded in Afar region at Melka Werers and Awash Sebat killo markets (refer appendix I figure 1 and appendix II figure 2).

7.3Beef and chicken prices change variation

As presented in the bale 7.2 the beef price index was 280.82 and chicken was 273.54. Under this subtopic it was interested to investigate whether there was significant price change difference between the two items in the last ten years. From the independent sample test table 7.5, it was observed that price index statistics (t) = .129 and sign .898 at alpha 5% significance level, the test value was greater than the p-value = .05.

Since the test value was greater than p-value = .05 at 5% significant level, it was failed to reject the null hypotheses which stated that there was no significant price change variation between beef and chicken in the last ten years. This implies that beef and chicken prices changed in the same way in the last ten years between the studied markets.

Table 4.5 Independent Samples Test result on beef and chicken price change variation

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
beef and chicken price index	Equal variances assumed	.024	.878	.129	18	.898	7.28	56.25	-110.90	125.45
	Equal variances not assumed			.129	17.99	.898	7.278	56.25	-110.90	125.46

Source: computed from central statistics agency database 2010/11-2019/20

7.4 Beef and Chicken Retail Price Variation between Twenty Two Markets.

Table 7.6 ANOVA result on the beef and chicken retail price variation between twenty two markets.

		Sum of Squares	Df	Mean Square	F	Sig.
Beef retail price	Between Groups	81688.315	21	3889.92	.978	.492
	Within Groups	787248.403	198	3976.00		
	Total	868936.718	219			
chicken retail price	Between Groups	133290.560	21	6347.17	1.735	.028
	Within Groups	724436.418	198	3658.77		
	Total	857726.978	219			

Source: computed from central statistics agency database 2010/11-2019/20

One-way ANNOVA result which presented on the table 7.6 shows that beef retail price F (21,198) = .978 and sig. value = .492. In the case of the chicken retail price F (21,198) = 1.735 and sig. value = .028. This one-way ANNOVA result shows the beef test value was greater than p-value is equal to .05 at 95% confidence of level of the difference but in the case of chicken it was less than p-value is equal to .05 significance level.

Since the test value of beef was greater than the p-value, the hypothesis that said there was no significance mean difference of retail price of beef between twenty two markets was accepted. However, the test value of the chicken retail price was less than the p-value .05 at 95% of confidence of level of the difference. Therefore, the hypotheses that says there was no statistically significant difference of retail prices of chicken between twenty two markets was rejected in favoring the alternative hypothesis. This indicates that at least two chicken markets had different average retail price in the last ten years but there was no significant difference on the beef retail prices between these markets.

Even though there was no significant mean retail price variation, from the mean plot figure 3 and 4, it was observed that relatively an average higher beef prices were recorded in southern and eastern markets. Among the markets that recorded higher retail prices were Hareri, Diredawa, Moyale, Jigjiga, Negeleborena and Haromaya. The lowest retail price recorded in Adwa and Asosa. In the case of the chicken, the higher price recorded in Gambella, Mekele, and Asosa. The lower prices were recorded in the eastern markets like Melka Werers, Haromaya, and Harari (refer appendix III figure 3 and appendix IV figure 4)

7.5 Compare Beef and Chicken Retail Price Variation

Table 7.7 Group Statistics result on beef and chicken retail price

	Item	N	Mean	Std. Deviation	Std. Error Mean
beef and chicken retail price	Beef	10	139.54	61.78	19.53
	Chicken	10	123.99	57.67	18.24

Source: computed from central statistics agency database 2010/11-2019/20

As presented in the table 7.7 the mean retail of beef was 139.54 at 61.78 standard deviation. The chicken was 123.99 at 57.67 standard deviation in the last ten years. It was assessed whether this difference was statistically significant or not as follows.

Table 7.8Independent Samples Test result										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
beef and chicken retail price	Equal variances assumed	.010	.920	.582	18	.568	15.54	26.72	-40.60	71.69
	Equal variances not assumed			.582	17.92	.568	15.54	26.72	-40.62	71.70

Source: computed from central statistics agency database 2010/11-2019/20

The independent statistics result which presented in the table 7.8 shows that statistics (t) is equal to .582 and sig. value is equal to .568 at 5% significant level. Since the test value was greater than the p-value is equal to .05 at 5% significant level, the hypothesis which says that there was no statistically significant difference between mean retail price of beef per kilo gram and chicken was accepted.

This shows that the price of beef per kilogram was in the same range of the retail price of chicken per piece in the last ten years.

8. Conclusion

The beef and chicken price were highly changed in the twenty two markets that included in the study sample from north, southwest and west, east, and south markets. The result of this study shows that beef price was 280.82% higher than the base year in the study markets. Like beef, chicken price increased and it was 273.54% higher than the base year. The price change was widely experienced in different markets in the country. Twenty two beef and chicken markets price change experience show that there was no significant difference of price change between markets. However, relatively highest beef price change recorded in the eastern like Haromaya, Hareri, and Diredawain the center at Adamamarkets but the lowest change recorded in Melka Werers and Addis Ababa markets. In the case of the chicken, Debrebirehan, Hosana and Asosa recorded highest change but lowest change recorded in Afar region at Melka Werers and Awash Sebat killo markets.

There were significant difference of an average retail between twenty two chicken markets but there was no significant difference on the beef retail prices between these markets. Even though there was no significant retail price variation, relatively an average higher beef prices were recorded in southern and eastern markets. Among the markets that recorded higher retail prices were Hareri, Diredawa, Moyale, Jigjiga, Negeleborena and Haromaya. The lowest retail price recorded in Adawa and Asosa. In the case of the chicken, the higher price recorded in Gambella, Mekele, and Asosa. The lower prices were recorded in the eastern markets like Melka Werers, Haromaya, and Harari. There was also no significant price change variation between beef and chicken. There was also no significant difference between the retail price of beef per kilogram and chicken per piece in the last ten years.Overall beef and chicken prices were highly increased in the studied markets in the last ten year. Besides,beef and chicken markets were integrated in the studied areas.

Recommendation

The policy makers should be alert on why price of beef and chicken highly increased. As it is known, people of Ethiopia highly value for meat and chicken, thus policy makers should make appropriate strategy to narrow the consumption gap between high and low income consumers that will created through high price of meat. Second it is important to rise questions why beef priceis too expensive in the country that has highly populated animals in the sub-Saharan countries. Thus it is expected that another study will conduct on question why beef price is high the country that has largeranimals' population.

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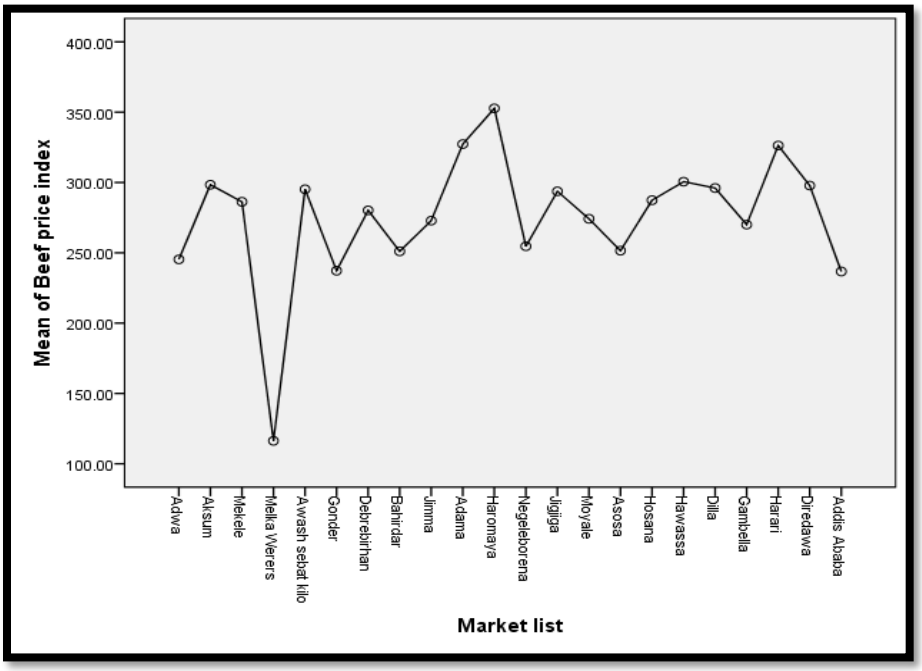
Appendix I

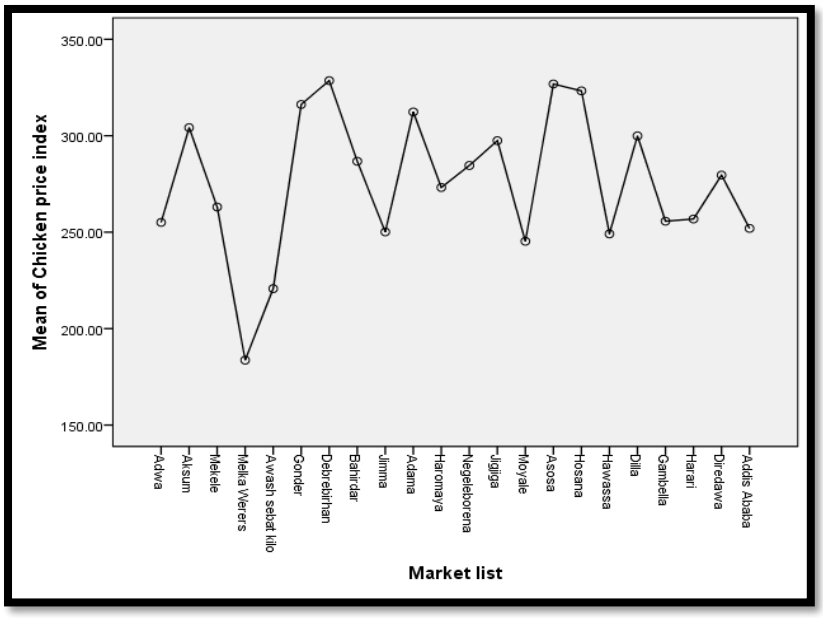
Figure 1 figure on price change index of beef and chicken



Source: computed from CSA database

Appendix II

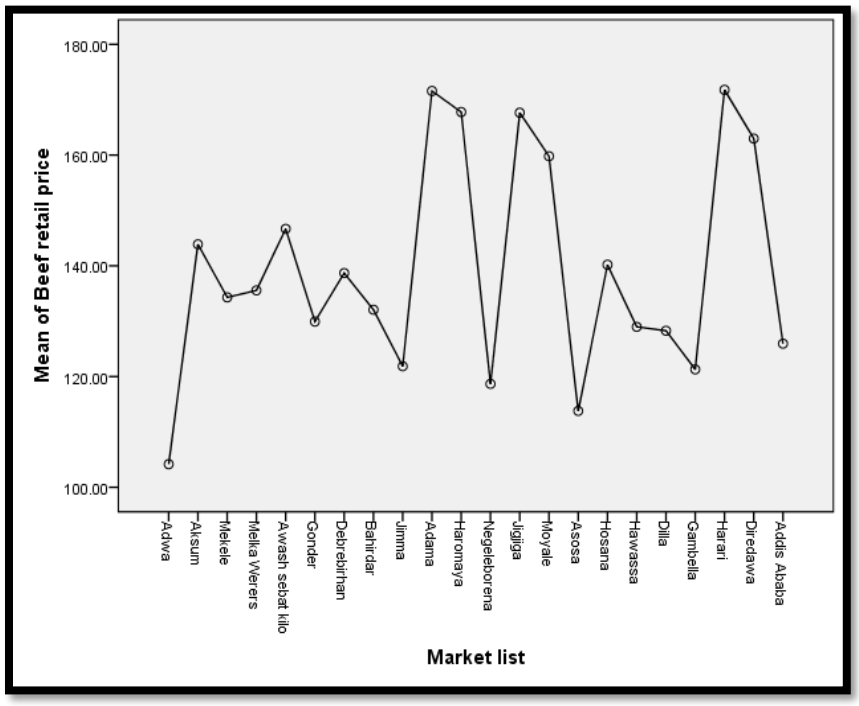
Figure 2 figure on price index of chicken



Source: computed from CSA database

Appendix III

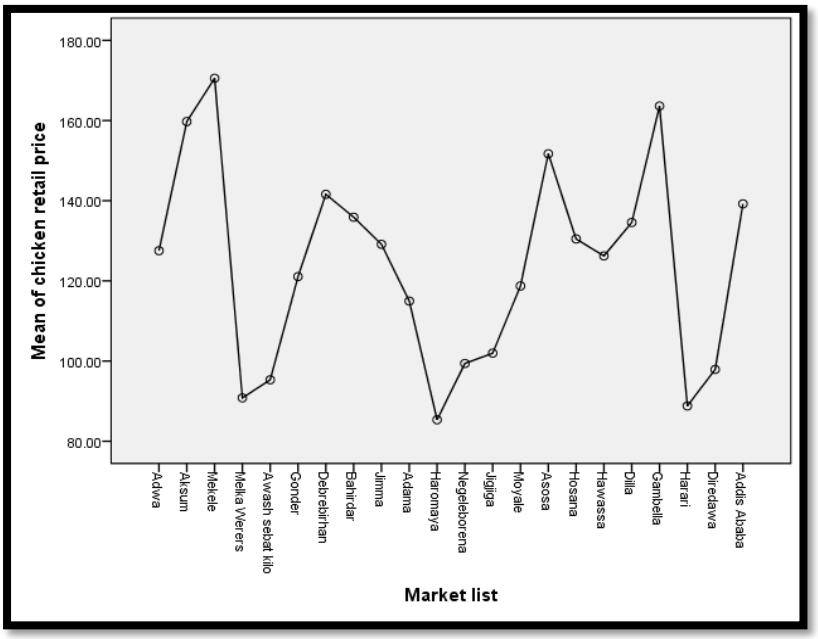
Figure 3 beef retail price



Source: computed from CSA database

Appendix IV

Figure 4 chicken retail price



Source: computed from CSA database