DETERMINANTS OF SUPPLY OF LOCALLY PROCESSED POULTRY MEAT IN GREATER ACCRA REGION OF GHANA

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ABSTRACT

The major constraints identified by farmers using Kendall's Coefficient of Concordance were high costs of inputs, low tariffs on imported meat, high borrowing costs, relative cheaper price of imported poultry meat and higher prices of locally processed meat. The degree of agreement of rankings by poultry producers was 42% using the Kendall's Coefficient of Concordance. In estimating the determinants of supply of locally produced processed poultry meat using OLS, the constraints: disease outbreaks, relative high price of locally processed poultry meat and high average cost of inputs were found to be significant at probability levels of $p < 0.01$, $p < 0.05$ and $p < 0.1$ respectively.

KEYWORDS: Poultry, Accra, Ghana, Ordinary least squares, Kendall's Coefficient of Concordance, Determinants, Supply

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Introduction

Currently, agriculture contributes 22% to the Gross Domestic Product of Ghana (MOFEP, 2014), employs close to 60% of the labour force and generates more than 55% of foreign exchange earnings (MOFEP, 2008).

Table 1: Share of Agriculture in GDP

Economic Sector	2006	2007	2008	2009	2010	2011	2012
Agriculture	**30.4**	**29.1**	**31.0**	**31.8**	**29.8**	**25.6**	**22.7**
Industry	20.8	20.7	20.4	19.0	19.1	25.9	27.3
Services	48.8	50.2	48.6	49.2	51.1	48.5	50.0

Source: ISSER 2012

Traditional agriculture provides for food security, supply of raw materials for industry, creation of employment and generation of foreign exchange earnings. Beyond these, agriculture is also recognized to have a greater impact on poverty reduction than other sectors in developing countries. Other roles are social stabilization, buffer during economic shocks, support to environmental sustainability, and cultural values associated with farming.

The livestock subsector comprises poultry, pigs, small ruminants and large ruminants. Despite the country's vast resources of forage and grain, its livestock resource is modest, with about 1.4 million cattle, 3.4 million sheep, 4.1 million goats, 491,000 pigs and over 37 million poultry (MOFA/DFID, 2002). Poultry contributes the largest to the livestock sub-sector. In 2007, the poultry sub-sector contributed 29,630 MT to the total 97,229 MT of meat produced in the country. The poultry industry comprises chicken (commercial and village types), Guinea fowl, Turkey, Duck, Quail and Pigeon.

Since the 1970s, global production, consumption and trade of poultry meat have grown faster than that of any other meat. During the 1990s, when demand growth slowed for other meats, including fish, demand growth for poultry meat accelerated and poultry continued to lead the expansion of meat trade (Barbut, 2002). Per capita consumption of poultry meat varies around the world, ranging from 0.7 kg in India to 44 kg per annum in the US (Bilgili, 2002). (Atarah, 2005), reports that by 1995, Ghana, domestically supplied 95% of the total amount of poultry meat consumed with imports accounting only for 5%.

However by 2004, though trend in the consumption of poultry meat has increased substantially, 89% of the total amount of poultry meat consumed was imported, with the domestic producers only supplying 11%. Hausmann noted that the survey also showed that poultry production in the Greater Accra region was at a high risk of collapsing, as most farmers had moved from the production of broilers to eggs due to the influx of imported chicken in markets. Thus, the meat production sector of the poultry industry is currently perceived to be dying with most farms folding up because of increasing cost of production and inability to meet the unfair competition pose to it by imported processed poultry meat. With the high imports of cheap euro-carcass into the country coupled with its ease of access and convenient form in which it is supplied, consumers have therefore be compelled to prefer the imported processed meat to the domestically produced meat. Hence, to make the processed domestic broiler meat competitive requires understanding of the determinants of the supply of processed domestic meat in the country with particular emphasis in Greater Accra region which has major poultry farms and also high consumption market.

Methodology

Description of the Study Area

The Greater Accra region is the study area. Greater Accra region was purposively selected based on the fact that according to Aning (2006), Greater had the highest number of poultry population in 2005 amongst the ten regions of Ghana as depicted by Table 2. Greater Accra region is the smallest region in terms of landmass covering a total surface area of 4,450km.sq. It is centrally located within the coastal belt of Ghana and shares boundaries with the Eastern Region to the north, Central region to the west and Volta Region to the east. To the south of the region lies the Gulf of Guinea which spans 220km coastline stretching from Langma near Kasoa in the west to Ada in the east. Greater Accra region dominates in terms of poultry birds' population in the country. Exotic birds are kept for commercial purposes, and they are more abundant in the urban areas of Greater Accra where markets for their products exist (LPIU, 2006). According to the literature, though poultry birds were found throughout the Greater Accra region, they were

concentrated in urban areas where incidentally the three main poultry farmers associations were located.

Study Population

The population for this study was all poultry farmers who belonged to known or recognized poultry farmers' associations, consumers of poultry meat and sellers of poultry meat in the Greater Accra region. Poultry farmers, sellers and consumers are spread out in the whole Greater Accra region and therefore a sample of the population of poultry farmers, sellers and consumers were taken from the Greater Accra region. The Greater Accra Poultry farmers Association (GAPFA) is made up of about 200 members, Tema Metropolitan Poultry Farmers Association (TEMPFA) making up of about 50 active members and Oyarifa Livestock Farmers Association (OLFA) comprising of about 45 active members. Also, according to ISODEC (2004), the number of registered poultry farmers in the Greater Accra region was 344.

Sampling Procedure and Sample Size

Table 2: Summary of Sample Size and Sampling Technique Used

Population	Population Size	Sample Size	Sampling Technique
1.Poultry farmers	All poultry farmers who belong to a registered poultry farmers' association in the Greater Accra region , 344(ISODEC,2004)	36	Simple Random
2.Consumers of locally processed poultry meat	All consumers of locally processed poultry meat in the Greater Accra region	108	Snow-ball
3. Sellers of locally processed poultry meat	All Sellers of locally processed poultry meat in the Greater Accra region	72	Snow-ball
Total	-	216	

Source: Field data, 2009

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126

Theoretical Supply Model

The concept of supply describes as the quantity of a good or service a household or firm would like to sell at a particular price. As with demand, the quantity supplied can change according to a variety of factors. These factors include a change in the price of inputs (Y_1), a change in technology (Y_2), a change in the natural environment (Y_3), a change in expectations (Y_4) and a change in the availability of credit (Y_5) , (Stiglitz, 1993). The functional expression is given as:

$$S = f(Y_1, Y_2, Y_3, Y_4, Y_5)\ldots\ldots\ldots\ldots.\ 1$$

The general specification of the model is:

$$S = \beta_0 + \beta_1 Y_1 + \beta_2 Y_2 + \beta_3 Y_3 + \beta_4 Y_4 + \beta_5 Y_5 \ldots\ldots\ldots\ldots\ 2$$

Where:

S = Supply of a good

β_0 = Constant

$\beta_{1>0},\ \beta_{2>0},\ \beta_{3<0},\ \beta_{4>0}$ and $\beta_{5>0}$

Y_1 = Price of inputs

Y_2 = Level of technology

Y_3 = Natural environment

Y_4 = Expectations

Y_5 = Availability of credit

Empirical Supply Model

In specifying the model for estimating the supply of locally processed poultry meat in the Greater Accra Region, there are other real factors that specifically influence the supply of locally processed poultry meat in the Greater Accra that should be factored in the model specification. Hence, the empirical model for estimating the supply of locally processed poultry meat in the Greater Accra Region will include the theoretical supply function in equation (4) in addition to those specific factors not considered in the theoretical model but are of importance in estimating the supply of locally processed poultry meat in the Greater Accra Region. Those specific factors are price of imported poultry meat (Y_2), Government policy in terms of tariffs on imported

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127

poultry meat, borrowing rate of interest to agriculture (Y_5), processing know-how (Y_6), distance from the consuming market (Y_9), technical support (Y_{10}) and disease outbreaks (Y_8). It takes the form:

$$S_{LP} = \beta_o + \beta_1 Y_1 + \beta_2 Y_2 + \beta_3 Y_3 + \beta_4 Y_4 + \beta_5 Y_5 + \beta_6 Y_6 + \beta_7 Y_7 + \beta_8 Y_8 + \beta_9 Y_9 + \beta_{10} Y_{10} + U_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

Where: S_{LP}= Supply of locally processed poultry meat

β_o= Constant

β_1 to β_{10} are coefficients with

$\beta_{1>0}$, $\beta_{2>0}$, $\beta_{3<0}$, $\beta_{4>0}$, $\beta_{5<0}$, $\beta_{6>0}$, $\beta_{7>0}$, $\beta_{8<0}$, $\beta_{9<0}$ and $\beta_{10>0}$

Y_1 = Price of locally processed poultry meat (price per 1 kg in GH¢)

Y_2 = Price of imported poultry meat (price per 1 kg in GH¢)

Y_3 = Average cost of inputs for local production (monthly average cost in GH¢)

Y_4 = Government policy in terms of tariffs on imported poultry meat (dummy, favourable = 1, unfavourable = 0)

Y_5 = borrowing rate of interest to agriculture (per annum borrowing rate in %)

Y_6 = Processing know-how (dummy: Yes = 1, No = 0)

Y_7 = Availability of credit to local poultry farmers (dummy: Yes = 1, No = 0)

Y_8 = Disease outbreaks (dummy: Yes = 1, No = 0)

Y_9 = Distance from the consuming market (in kilometers)

Y_{10} = Technical support (dummy: Yes = 1, No = 0)

U_t = Error term

Results and Discussion

Table 3: Poultry Farmers Who Process and Do not Process Poultry Meat

Producers processing and not processing	Frequency	Percent
Process poultry meat	1	2.8
Sell live birds	30	83.3
Process and sell live birds	5	13.9
Total	36	100.0

Source: Field data, 2009

On the processing capacity of poultry farmers, out of 36 respondents, 30(83.3%) of the poultry farmers did not process poultry meat at all but sold live birds. Reasons cited by those respondents for not processing poultry meat were customers' preference for live birds, high electricity bills, high processing cost, lack of processing equipment, lack of storage facilities, lack of processing know-how and others not willing to go into processing of poultry meat at all. The result also shows that 1(2.8%) of the respondents completely process poultry meat, whereas 5(13.9%) of the respondents sell live birds and also process poultry meat as well. As depicted by Table 3 above, the poultry industry is highly dominated by farmers who sell live birds as compared to those who process the meat for the market.

Table 4: Producers' Sources of Funding for their Poultry Businesses

Sources of funding	Frequency	Percent
Bank or government	12	33.3
Personal or family	17	47.2
Both bank or government and personal or family	7	19.4
Total	36	100.0

Source: Field data, 2009

On the sources of credit for poultry business, 12(33.3%) of the farmers cited the bank or the government as source of credit for their business whereas 17(47.2%) also depended on personal or family sources for funding for their productions. Those who depended on both bank and government and personal or family sources for funding were 7(19.4%) of the farmers. It is therefore depicted by Table 4 that the majority of the farmers depended on bank/government family sources for funding of their productions

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129

Table 5: Producers' Perception on Impact of Tariffs on Imported Poultry Meat on Local Production

Perception	Frequency	Percent
Positive	33	91.7
Negative	3	8.3
Total	36	100.0

Source: Field data, 2009

On the effect of tariffs imposed on imported processed poultry meat on local poultry production, 33(91.7%) of the poultry farmers responded that it had a positive effect on the local poultry production. However, 3(8.3%) of the farmer respondents disagreed that imposition of tariffs on imported processed poultry meat impacted positively on local poultry production. Poultry farmers who saw something positive about the imposition of tariffs on imported processed poultry meat cited restriction on the quantity of imported poultry meat which in turn boosts demand for locally processed poultry meat. Those farmers who expressed divergent view about the positive impact of tariffs imposed on imported processed poultry meat on local poultry production said that the tariff percentage imposed was insignificant hence its inability to deter importation of processed poultry meat to any meaningful extent.

Table 6: Producers' Satisfaction with the 20% Tariff on Imported Poultry Meat

Satisfaction	Frequency	Percent
Satisfied	7	19.4
Not satisfied	29	80.6
Total	36	100.0

Source: Field data, 2009

As presented on Table 6, 7(19.4%) of the farmer respondents were satisfied with the current 20% tariff imposed on imported processed poultry meat. However, the majority of the farmers, representing 29(80.6%), were not satisfied with the current 20% tariff imposed on imported poultry meat by government. The ideal percentage tariff suggested by respondents ranged between 10 – 100 %. The majority of the respondents suggested percentage tariffs higher than 35%. It can be concluded that the majority of the poultry meat producers were not satisfied with the current (i.e. 2009) 20% tariff on imported poultry meat.

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130

Table 7: Possession of Poultry Meat Processing Equipment by Poultry Farmers

Possession of processing equipment	Frequency	Percent
Possess processing equipment	4	11.1
Do not possess processing equipment	32	88.9
Total	36	100.0

Source: Field data, 2009

On poultry meat processing know-how of poultry farmers, the majority of the farmer respondents had no poultry meat processing know-how. Those farmers with poultry meat processing know-how said that they acquired the know-how from a friend poultry farmer, through schooling, training workshops and seminars. Those with the processing know-how intimated that the know-how had really helped them to process poultry meat to suit the taste of consumers.

Thirty two poultry farmers (88.9%) of the farmer respondents did not possess poultry meat processing equipment which implied that those poultry farmers did not process the poultry meat they produced but rather sold live birds to consumers who rather did the processing. Four (11.1%) farmer respondents had poultry meat processing equipment. This gives credence to the fact that only few poultry farmers process the poultry meat they produce for the market.

Table 8: Impact of Transportation Cost on Levels of Production and Profit Margins

Impact	Frequency	Percent
No impact	26	72.2
Has impact	10	27.8
Total	36	100.0

Source: Field data, 2009

From Table 8, it can be seen that 26(72.2%) of the farmers responded that the cost of transporting their produce to the market centres had no effect on their levels of production and also profit margins but 10(27.8%) of the farmers agreed that transportation cost had effect on their levels of production and also profit margins.

Table 9: Availability of Technical Support for Poultry Farmers

Availability of technical support	Frequency	Percent
Receive technical support	26	72.2
No technical support	9	25.0

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131

No response	1	2.8
Total	36	100.0

Source: Field data, 2009

On the availability of technical support for poultry farmers from the Ministry of Agriculture, an agency or NGO, 26(72.2%) respondents confirmed that they had been receiving a kind of technical support from the Ministry of Agriculture, an agency or NGO on production and management practices. These farmers said the technical support impacts positively on their productions. 9(25.0%) respondents do not receive any technical support from the Ministry of Agriculture, an agency or NGO and this did not help them in their productions. They said that this made it difficult to deal with certain situations that cropped up on their farms where they did not have any idea about the solutions to the situations. 1(2.8%) respondent could not tell whether technical support from the Ministry of Agriculture, an agency or NGO was available or not.

Table 10: Weighted Average Percentage Contribution of each Input's Monthly Cost to the Total Average Inputs Cost

Input	Weighted average % contribution of a particular input cost to average total monthly inputs cost
Labour	19.5
Feed	69.0
Medication	9.0
Energy	2.5
Total	100

Source: Field data, 2009

The poultry farmers sampled for this study were asked to state the average monthly expenditure or cost incurred on inputs such as labour, feed, medication and energy. The average percentage contribution of monthly labour cost to the average total monthly inputs cost of all the farmers sampled was 19.5% as Table 10 depicts. The average percentage contribution of monthly feed cost to the average total monthly inputs cost of all the farmers sampled was 69.0%.

Further with respective cost of labour, feed, medication and energy incurred by farmers in a month, the average percentage contribution of monthly medication cost to the average total monthly inputs cost of all the farmers sampled was 9.0%.

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132

On energy, the percentage contribution of monthly energy cost to the average total monthly inputs cost of all the farmers sampled was 2.5% as presented on Table 10.

Table `11: Constraints Identified by Poultry Farmers

Constraints Identified	Number of Farmers	Percent
1.Price of locally processed poultry meat	33	91.6
2.Price of imported processed poultry meat	36	100
3.Average cost of inputs	36	100
4.Government policy in terms of tariffs on imported poultry meat	26	72.2
5.Borrowing rate of interest to agriculture	30	83.3
6.Processing know-how	31	86
7.Availability of credit to poultry farmers	27	75
8.Distance from the consuming market	20	55.5
9.Technical support	18	50
10.Disease outbreaks	29	80.5

Source: Field data, 2009,   n = 36

The major constraints faced by poultry farmers were price of imported processed poultry meat which clearly indicates the negative effect of WTO agreement on some infant industries in countries like Ghana. With high average cost of inputs farmers are not able to compete with the cheap euro-carcass that enters our markets. Borrowing rate is very high compared to other countries; the difference between industrial loan and agricultural loan interest are almost similar in the country. Processing know- how price of locally processed meat was seen to be constrains to farmers.

Table 12: Rank Totals of Constraints

Constraints	Rank Totals	Position
1.High average cost of inputs	296	1st
2. Low tariffs on imported poultry meat	252	2nd
3 High borrowing rates of interest	243	3rd
4. Relative cheaper prices of imported poultry meat	237	4th
5.Relative higher prices of locally processed poultry meat	235	5th
6. The unavailability or difficulty in accessing credit	204	6th
7.Lack of processing know-how	186	7th
8.Disease outbreak	133	8th
9.Lack of technical support	98	9th

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133

10.Distance from the consuming market	85	10th

Source: Field data, 200,   n = 36

The poultry farmers (poultry meat producers) were asked to rank the constraints to the production of locally processed poultry meat identified in order of severity on a scale of 10 to 1 with 10 being the most severe and 1 being not severe. The rankings by the poultry farmers are presented shows high cost of inputs and low tariffs on imported poultry meat in the country. It is therefore not surprising our poultry industry though have potential but collapsing.

Degree of Agreement of Rankings by Poultry Farmers

The degree of agreement of rankings by poultry meat producers was computed by using the

Kendall's Coefficient of Concordance, W. It is expressed as: $W = \frac{S}{\frac{1}{12}k^2(n^3-n)}$;and

$$S = \sum (SR)^2 - n\left(S\tilde{R}\right)^2$$

From Table 28, S = $(296)^2 + (252)^2 + (243)^2 + (237)^2 + (235)^2 + (204)^2 + (186)^2 + (133)^2 + (98)^2$

$$W = \frac{44596.9}{\frac{1}{12}*1296(1000-10)}$$

$+ (85)^2 - 10(196.9)^2 = 44596.9$. Hence,

W = 0.42. This implies that W is 42% and hence indicates a fair agreement by poultry farmers as to the order of severity of the constraints to the production of locally processed poultry meat.

Estimation of Supply

The OLS regression results for estimated supply of locally processed poultry meat are presented below.

Table 13: Summary of Supply Function for Locally Processed Poultry Meat

Variables	Coefficients	t-value
Constant	2.1663	1.11
Distance from the consuming market	-0.0090	-0.32[NS]
Government policy on tariffs	-0.0247	-0.04[NS]
Borrowing rate of interest to agriculture	0.0038	0.11[NS]
Technical Support	-0.4433	-0.99[NS]
Average cost of inputs	-0.3475	-1.97*
Price of imported poultry meat	0.2395	0.85[NS]
Price of locally processed poultry meat	0.1818	2.22**
Availability of credit to local poultry farmers	0.1474	0.31[NS]
Disease outbreaks	-1.0146	2.56***
Processing know-how	0.3004	0.66[NS]

Model Summary

R^2		Adjusted R^2	F	p- value
0.54		0.51	2.23	0.05

*** = significant (p < 0.01), ** = significant (p < 0.05), * = significant (p < 0.1),
NS = Not significant.
Source: Field data, 2009

From Table 13, it can be seen that the distance of the place of producing locally processed poultry meat from the consuming market did not affect the producer's decision to process and take the produce to the market or sell live birds at the farm. This outcome is in line with the research finding of Ghafoor *et al.* (2010). The borrowing rate of interest also had the expected sign of negative (-). The reason could be that because the farmers mentioned the unavailability of credits for their production, they did not see the rate of interest on credits advanced to poultry farmers as a major factor in their decisions to supply locally processed poultry meat. This is contrary to the finding of Akanni (2007), that high interest rate impacts significantly on poultry meat production. Technical support such as veterinary services, extension services and training workshops was statistically non significant in this study. Though the coefficient did not have the expected sign (+), which would have meant that provision of technical support positively affects the production of locally processed poultry meat. This factor not being statistically significant is similar to the finding of Adebayo and Adeola (2005). The average cost of inputs was significant (p < 0.10). The coefficient (-0.3475) means that a GH¢ 1 increase in the average cost of inputs would result in an average reduction in the supply of locally processed poultry meat by 0.3475 Kg. Similar findings were made by Ghafoor et al. (2010), Adebayo and Adeola (2005) and Ja'afar-Furo & Gabdo(2010) in other countries. The coefficient of price of imported poultry meat was 0.2395, which means that the price of imported has positive effect on the supply quantity of locally processed poultry meat. As per economic theory, imported poultry meat, being the closest substitute for locally processed poultry meat, there is a direct relationship between the price of imported poultry meat and the supply quantity of locally processed poultry meat. In practical terms, especially in Ghana, that is not the case. The reason is that in Ghana, the price of imported poultry meat is always cheaper compared to that of the locally produced poultry meat that an increase in the price of imported poultry meat will not serve as an incentive for the poultry farmer to supply more locally processed poultry meat over a period. Though the coefficient of price of imported poultry meat had the expected sign as far as theory is concerned, this variable was statistically non-significant contrary to the finding of FAO (2010). Own-price of locally

processed poultry meat was statistically significant ($p < 0.05$) in this study. The coefficient (0.1818) means that a GH¢ 1 increase in the price of locally processed poultry meat would result in 0.1818 Kg increase in the supply of locally processed poultry meat. This is in line with economic theory that an increase in price of commodity leads to an increase in the supply quantity of the commodity over a period. Availability of credit to local poultry farmers has positive impact on the supply of locally processed poultry meat but in this study, this variable is non significant in its effect on the supply of locally processed poultry meat. The non significance of this variable is contrary to the research finding of Akanni (2007) that availability of credit impacts significantly on the production decisions of poultry farmers.

Disease outbreak had significant ($p < 0.01$) effect on the supply of locally processed poultry meat in the study area. The coefficient (-1.0146) has the expected sign (-). Similar research finding was made by Ghafoor et al. (2010) in terms of the significance of this variable in affecting supply decisions of poultry meat producers.

Know-how or experience in processing local poultry meat was statistically non-significant in this estimation. This is contrary to the research finding of Ghafoor *et al*. (2010) where Know-how or experience was significant in influencing the supply of poultry meat.

The value of Adjusted R^2 in the supply estimation was 0.509 which implies that the independent variables included in the supply model for locally processed poultry meat explained about 51% variation in the dependent variable. The p-value (0.05) of the regression model shows that the model fit the data set, thereby showing the correct specification of the model.

Conclusion and Recommendations

83.3% of the poultry farmers did not process poultry meat at all but sold live birds. The result also shows that (2.8%) of the respondents completely process poultry meat, whereas (13.9%) of the respondents sell live birds and also process poultry meat as well. On the sources of credit for poultry business, (33.3%) of the farmers cited the bank or the government as source of credit for their business whereas (47.2%) also depended on personal or family sources for funding for their productions. Those who depended on both bank and government and personal or family sources for funding were (19.4%) of the farmers. On the effect of tariffs imposed on imported processed poultry meat on local poultry production, 33(91.7%) of the poultry farmers responded that it had

a positive effect on the local poultry production. However, 3(8.3%) of the farmer respondents disagreed that imposition of tariffs on imported processed poultry meat impacted positively on local poultry production. 88.9% of the farmer respondents did not possess poultry meat processing equipment which implied that those poultry farmers did not process the poultry meat they produced but rather sold live birds to consumers who rather did the processing. 11.1% farmer respondents had poultry meat processing equipment. 25.0% respondents do not receive any technical support from the Ministry of Agriculture, an agency or NGO and this did not help them in their productions. 2.8% respondent could not tell whether technical support from the Ministry of Agriculture, an agency or NGO was available or not. The major constraints identified by farmers using Kendall's Coefficient of Concordance were high costs of inputs, low tariffs on imported meat, high borrowing costs, relative cheaper price of imported poultry meat and higher prices of locally processed meat.

In estimating the determinants of supply of locally produced processed poultry meat using OLS, the constraints: disease outbreaks, relative high price of locally processed poultry meat and high average cost of inputs were found to be significant at probability levels of $p < 0.01$, $p < 0.05$ and $p < 0.1$ respectively.

Government should institute a proper loan scheme for farmers especially poultry farmers which has low interest rate and also endeavour to assist local poultry feed producers so as to cut down the cost of inputs. On importation tariffs, they should be stringent non tariffs barriers to protect local industries. Government should also provide poultry farmers with subsidies on agricultural inputs such as feed, medicine and electricity.

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138