



An Analytical Study for the Demand of Red Meat in the Egyptian Market

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Abstract: Red meat is the most important source of animal production which represented about 37% of the value of animal production during the period (2016-2020). The problem of the research is the low quantity of production from red meat which led to the existence of a food gap estimated about 457 thousand tons during the same period. The research aims to identify the status quo of red meat production, consumption, prices and the most important factors affecting consumption in the Egyptian market. The most important results are: Red meat production was about 644 thousand tons. Beef came in the first ranking, represented about 51% of the average amount of total red meat production in Egypt during the period (2016-2020). The average per capita consumption of red meat was about 8.7 kg/year. The self-sufficiency average of red meat reached about 58%, the self-sufficiency reached the maximum for buffalo and goat meat with a coverage 100%. It was found that retail price for boneless middle aged cattle, veal (with bone) and Lamb (with bone) took an increasing L.E 0.49, 0.59 and 0.51 per Kg monthly respectively, during that period. The retail price increased monthly about 0.37%, 0.44%, and 0.37% of the average of meat price, which amounted to about L.E 132.5, 132.8, and 136.2 per Kg monthly, respectively during the same period. The most important factors affecting consumption of boneless middle aged cattle and lamb, by using the factor analysis model are the time variable caused the highest effect which amounted to about 0.97, the retail price of poultry about 0.93 for each during the same period. A change in the real retail price of boneless middle aged cattle by 10% leads to a change in the reverse direction of individual consumption by about 0.21%. A change in the real retail price of Lamb meat by the amount of 10% leads to a change in the reverse trend of individual consumption of lamb meat by about 0.02%. The research ended to some recommendations such as: Retrieving the “Young Buffalo with bones” project, and overcoming all problems to increase the supply, especially in seasons and religious Occasions, encourage investment in animal production and the settlement of highly productive types of meat from economic animals in Egypt.

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Key words: Factor Analyses, Red meat, prices, Demand, Consumption

1. Introduction:

The food security subject represents a real challenge for the Egyptian state by working on parallel axes to achieve healthy, safe food and maintaining its stability, development, working to secure food by increasing production, storage, import, and keeping price stability.

Many countries in the world including Egypt face the current circumstances, many crises that affect food security, such as wars, epidemics and climate changes which are reflected in the form of shortage of food supply, and hence there is a necessary need to redouble efforts to achieve and stabilize food security for people.

Livestock is a major corner of the agricultural production sector in Egypt. It contributed about 36% of the total value of agricultural production. Red meat is one of the most important sources of protein and

animal products. It represented about 37% of the value of animal production during the period (2016-2020)⁽⁵⁾.

Research Problem

The decrease in the quantity of production of red meat compared with the quantity of consumption led to a nutritional gap in red meat estimated at 457 thousand tons as an annual average in the period (2016-2020). As the result to this gap, beef accounted for about 97.4%⁽⁵⁾ of imports to compensate this gap, in addition to the fact that the per capita share of red meat amounted to about 8.7 kg / year. Recent years have also witnessed an increase in retail prices for red meat at high rates, despite the decline in real incomes to meet basic needs and provide animal protein.

Objective of research

The research aims mainly to identify the status quo of production, consumption and prices of red meat in the Egyptian market, moreover, knowing the size of the nutritional gap for red meat. To achieve this goal, the research will study and analyze the following:

- 1- Recognizing the relative importance of the value of agricultural and livestock production and types of red meat in Egypt.
- 2- Identifying some economic indicators of the production, consumption, per capita share, and the self-sufficiency rate of red meat.
- 3- Studying seasonal price fluctuations of consumer prices for the most important types of meat.
- 4- Studying the most important factors affecting the individual consumption of red meat.

2. Methodology and data sources

The research depended on the use of the quantitative and descriptive analysis method, using some statistical analysis models, Estimation of some economic indicators for the production and consumption of red meat at the national level.

The research depended on published and unpublished data issued by the Central Agency for Public Mobilization and Statistics, Ministry of Agriculture the Economic Affairs Sector, websites of the International Information Network, In addition to some scientific references and previous studies related to the subject of the research.

3. Results:

The value of livestock production in Egypt

Table (1) shows the relative importance for agricultural and animal production value in Egypt during the period (2016-2020). It was found that the total value of agricultural production amounted to about L.E 476 billion, and livestock production amounted to about L.E 173 billion, which represents about 36% of the total agricultural production. While the total value of red meat production estimated by L.E 63 billion, representing about 37% of the value of animal production during the same period.

With regard to the importance of red meat types in Egypt, it was found that beef is the most important type of red meat, as its production value represents about L.E 31 billion, represents about 49%, 18% from the value average of the total red meat production and the total value of animal production, respectively.

Buffalo meat came in the second ranking, with a production value of about L.E 24 billion, representing about 38%, 14% from value of the total production for red meat and the value of animal production, respectively. sheep meat came in third ranking, with a

production value of about L.E 4 billion, represents about 7% and 3% of the total production value for red meat and animal production value, respectively. Finally goat, camel and pig meat with a value of about L.E 2,600, 1,020, 32 million, represents about 4%, 2%, 0.05% of the average total of red meat production value, and about 1%, 0.6%, 0.02% of the value of animal production during the same period respectively.

From the above it is obvious that beef and buffalo meat are considered the most important types of red meat, they amounted to about 87% of the value of red meat production and the rest of the types represents about 13%, and 32% of the value of total animal production during the same period.

Indicators of meat production and consumption in Egypt

Table (2) shows some economic indicators for the production, consumption, per capita share and nutritional gap of red meat during the period (2016-2020). The average of total production of red meat types amounted to about 644 thousand tons. Beef ranked first because it is the most important type produced, with an average of production quantity about 328 thousand tons, represents about 51% of the average quantity of red meat in Egypt. The buffalo meat production came in the second order, with a quantity average about 240 thousand tons, represents about 37.3% from the total production. In the third order came the production of Lamb with a quantity average about 41 thousand tons, represents about 6.4% of the total production. Lastly production of goat, camel and pig meat with a quantity average about 12, 22, 1 thousand tons, represents about 3.4%, 1.9%, 0.2% from total meat production respectively, during the same period.

The average amount of red meat imports was about 457 thousand tons. Beef has the largest share, where the amount average of imports was about 445, represents about 97.5% of the total amount of imports, followed by camel and Lamb meat, the quantity was about 2, 9 thousand tons, represents about 2%, 0.4% of the total amount of red meat imports respectively, during the period (2016-2020).

Beef meat is the most important type of red meat in terms of consumption, its consumption amounted to about 773 thousand tons, represents about 70% of the total consumption average of red meat in Egypt which amounted to about 1101 thousand tons during the same period. Buffalo meat came in second place in terms of consumption with a quantity average It amounted to about 240 thousand tons, represents about 22% of the average total consumption of red meat, followed by the consumption of Lamb, goats and camels with a quantity average of about 22, 43,

21 thousand tons, represents about 4%, 2%, 2% of the total consumption average of red meat In Egypt

respectively, during the same period.

Table (1): The relative importance of the value of agricultural and livestock production and types of red meat in Egypt during the period (2016-2020) (Million L.E)

Year		Value	2016	2017	2018	2019	2020*	Average
Type								
Types of Red Meat	cows	The Value	25464	30353	33763	33458	33611	31330
		% Red Meat	46	44	47	60	52	49
		% Animal production	19	18	18	18	18	18
	buffalo	The Value	21301	28870	30053	16333	23193	23950
		% Red Meat	38	42	42	29	36	38
		% Animal production	16	17	16	9	12	14
	Sheep	The Value	4912	5480	4699	3122	3911	4425
		% Red Meat	9	8	7	6	6	7
		% Animal production	4	3	3	2	2	3
	goats	The Value	3463	3074	2991	1319	2155	2600
		% Red Meat	6	4	4	2	3	4
		% Animal production	3	2	2	1	1	1
	camel	The Value	592	1170	503	1723	1113	1020
		% Red Meat	1	2	1	3	2	2
		% Animal production	0.4	0.7	0.3	0.9	0.6	0.6
Pork	The Value	20	24	31	46	39	32	
	% Red Meat	0.04	0.03	0.04	0.08	0.06	0.05	
	% Animal production	0.01	0.01	0.02	0.02	0.02	0.02	
Total	Red Meat	The Value	55752	68971	72040	56001	64021	63357
		% Animal production	42	41	38	30	34	37
	Animal Production	The Value	134055	170064	187770	187368	187569	173365
		% Agri. production	38	36	38	35	36	36
	Agricultural Production		356958	469202	500413	534244	517329	475629

*2020 estimated

Source: Central Agency for Public Mobilization and Statistics - **Statistical Yearbook** – different Issues.

Central Agency for Public Mobilization and Statistics - **Annual Bulletin of Prices of Food Products and Services** - different Issues.

Ministry of Agriculture and Land Reclamation - Economic Affairs Sector - **Food Balance Bulletin**- different Issues

Table (2): Some economic indicators for the production, consumption and per capita share of red meat during the period (2016-2020)

Indicators Type	Production		imports		consumption		self-sufficiency	Gap	per capita
	thousand tons	%	thousand tons	%	thousand tons	%	%	thousand tons	kg/year
Beef	328	50.9	445	97.5	773	70	42	(445)*	10.3
Buffalo	240	37.3	0	0.0	240	22	100	0	4.6
Lamb	41	6.4	2	0.4	43	4	95	(2)	1.8
Goats	22	3.4	0	0.0	22	2	100	0	0.4
Camels	12	1.9	9	2.0	21	2	57	(9)*	0.2
Pork	1	0.2	1	0.1	2	0.2	50	(1)*	0.2
Total	644	100	457	100	1101	100	58	(457)	8.7

•Numbers are negative

Source: collected and calculated - Ministry of Agriculture and Land Reclamation - Economic Affairs Sector - **Food Balance Bulletin** - Various numbers

The average per capita share of red meat was about 8.7 kg / year. Beef meat came in the first ranking with an average of about 10.3 kg / year, followed by buffalo meat with about 4.6 kg / year, lastly lamb, goats and camels with a per capita share of about 1.8, 0.4, 0.2 kg/year, respectively during the same period.

The average self-sufficiency of red meat reached about 58% during the period (2016-2020), self-sufficiency reached the maximum for buffalo and goat meat with a coverage rate of 100% while the self-sufficiency rate for lamb, camels, pigs and beef reached about 95%, 57%, 50 %, 42% respectively during the same period.

Regarding to the food gap, the total quantity of the food gap for red meat reached about 475 thousand tons during the period (2016-2020). It reached its maximum in beef with a quantity average about 445 thousand tons, followed by camel meat with about 9 thousand tons and then lamb about two thousand tons during the same period.

From the previous results it was obvious that the most important types of red meat which are produced in Egypt are beef and buffalo, where their total production amounted to about 88.2% of the total quantities produced from red meat. The total consumption average of all types of red meat in Egypt shows the high nutritional gap for red meat and the decline in the per capita share of small beef due to the increase in demand and the lack of supply.

Using the monthly price time-movement model for the most important types of red meat

This part deals with the monthly price changes in retail price of the most important types of red meat by using the following form:

$$P_i = T_i S_i C_i L_i$$

Where as

P_i = the monthly (retail) price of the commodity per kilo of red meat (boneless middle aged cattle, veal with bone, lamb with bone)

T_i = general trend in monthly price movements

S_i = seasonality of price changes

C_i = cyclical component of retail price movements

L_i = irregular changes

To perform the analysis of the time-movement model, it is necessary:

First:

Conducting a simple regression analysis of the monthly retail price values separately and testing the significance of each price with the time component, in six years (72 months) during the period (2016-2021).

Second:

The seasonality was estimated by the monthly trend values, given the general time trend equation.

Third:

Getting rid of accidental changes by obtaining the ratio of the actual values to the monthly trend values, then adjusting the monthly relative values from the annual average to reach 1200.

Concerning the periodic changes, that were estimated after eliminating the effect of seasonal changes and the general time trend. One of the non-parametric statistic test runs and the median was used. The variables were divided into two parts less than the test values of group (A) and greater than the test values of the median (B) and then calculate the number of runs.

Time trend Equations for evolution of the monthly retail price for the most important types of red meat

Table (3) shows time trend equations for monthly development of retail prices for red meat in Egypt during the period (2016-2021), the average of retail price for middle aged cattle (boneless), veal (with bone) and Lamb (with bone) revealed an increasing trend during the period (2016-2021) by L.E 0.49, 0.59, 0.51 a kilo monthly, respectively during the same period. The significance was at 0.01 probability level for all types of meat in this study. The retail price increased at a monthly rate to about 0.37%, 0.44%, 0.37% of the price average of meat, which amounted to about L.E 132.5, 132.8, 136.2 per kilo monthly, respectively during the same period. The value of (R²) was about 0.27, 0.44, 0.30, which means that there are 27%, 44%, 30% changes in the retail price, respectively due to all the factors that are reflected in the time factor during that period.

Monthly Seasonal Retail Price Index

Table (4) shows the seasonal index of monthly price fluctuations in the retail price of the most important types of red meat during the period (2016-2021). It was found that the retail price of middle aged cattle (boneless) fluctuated between a minimum 97% in January and February, which is less From the normal retail price per kilo of meat and a maximum 102 % in August and September, which is higher than the normal price of a kilo.

It was found that the price of a kilo from veal meat (young cattle with bone) for the retail fluctuated between a maximum 102% in July and August, while the lowest index was about 99% during the period from October to March, which is lower than the normal price average in the year. Related to Lamb meat the results showed that indicated instability, as the highest record reached about 101% in the period from April to September, while the lowest record reached about 98% at the beginning of the year in both January and February. From the previous results it was clear that the maximum retail price index for the three types of meat is confined to the period from April to September, while the lowest record is from November to January. Through searching for religious occasions during the period (2016-2020), it was found that Ramadan month and Eid al-Adha were between the months of April and September, which increased the consumption of animal protein is increased during that period. The prices of red meat increased in general and it was found during that period that some Coptic brothers' feasts in Egypt, which Explains the relative rise in prices during that period compared to other periods during the year and in accordance to the economic logic.

Table (3): Equations of the time trend of the development of monthly consumer prices for red meat in Egypt during the period (2016-2021)(L.E / kg)

serial	Data Type	The equation	R ²	annual growth rate %	Average monthly price	sig
1	Middle aged cattle (boneless)	$Y_{i1} = 114.6 + 0.49 x_i$ (5.03)	0.27	4.32	132.5	**
2	Young aged cattle (with bones)	$Y_{i2} = 111.4 + 0.59 x_i$ (7.4)	0.44	5.28	132.8	**
3	Lamb (with bones)	$Y_{i3} = 117.5 + 0.51 x_i$ (5.6)	0.30	4.44	136.2	**

Where y₁ 'y₂'y₃ consumption price for Beef; Veal; Lamb respectively.

X_i =time where i= (1;2;3;4;5.....72)

- The value in brackets indicates the calculated (T)

** sig 1%

Source: collected and calculated from the data of the Central Agency for Public Mobilization and Prices - Price Bulletin - different issues

Table (4): The seasonal index of monthly retail prices for the most important types of red meat during the period (2016-2021)

Month \ Type	Middle aged cattle (Boneless)	Young cattle (with bone)	Lamb (with bone)
January	97	99	98
February	97	99	98
March	98	99	99
April	100	100	101
May	100	101	101
June	100	101	101
July	101	102	101
August	102	102	101
September	102	101	101
October	101	99	100
November	100	99	99
December	100	99	100

Source: collected and calculated from the data of the Central Agency for Public Mobilization and Prices - **Price Bulletin** - different issues

Runs test ⁽⁸⁾

Runs is defined as a group of similar events that is preceded or followed by a different type of event or not followed or preceded by any events during a period of time. The number of events in a run is called the run length, and it is entered as a basic variable in the test procedure. When the run length is too large, an uncertainty occurs in randomness.

Table (5) shows the testing of the monthly seasonal runs of retail prices of 72 months during the period (2016-2021). Runs 4, 6, 4 for the three types, respectively during the months of the period (2016-2021). The average of monthly retail price for a kilo was about L.E 132.5, 132.8, 136.2 for middle aged cattle, veal and lamb during that period, respectively. The number of values less than the average was 20, 20, 21, while the number of months with a higher price than the average was about 51, 52, 52 respectively, for the three types.

Factors affecting the consumption of red meat in Egypt

In order to analyze the most important factors affecting the individual consumption of red meat in Egypt, the Factor analysis (F.A) model has been used, which aims to verify the hypotheses and determine the least number of specific factors that can explain the relationships between a large number of phenomena. It is represented in reducing the components of the variance tables between a numbers of variables in terms of a small number of unobserved random variables. The idea is based on the assumption that the variables in a particular group could be grouped, which is strongly linked to each other, but their relationship to the variables of other groups is weak ⁽¹⁾.

The objectives of (FA) are the identification of interrelationships, economy in describing data, estimating, testing hypotheses, transforming data and exploratory uses⁽⁷⁾ and the importance of (FA) appears and performs the following functions:

Table (5): Testing the Runs and seasonal fluctuations of monthly consumer prices for Red meat during the period (2016-2021)

Data	Type	Middle aged cattle (Boneless)	Young cattle (with bone)	Lamb (with bone)
Test Value(a)		132.48	132.81	136.24
Cases < Test Value(A)		21	20	20
Cases >= Test Value(B)		51	52	52
Total Cases		72	72	72
Number of Runs		4	6	4
Z		-7.70	-7.09	-7.68
Asymp. Sig. (2-tailed)		0.00	0.00	0.00

A =value less than mean B =value more than mean

Source: collected and calculated from tables (3, 4)

The method allows summarizing the variables in a smaller number of main factors that can explain this phenomenon.

To highlight the group of latent elements that are difficult to detect and that can have a role in explaining the relationships between a large numbers of variables⁽⁶⁾.

Obtaining a new set of variables with a smaller number to partially or completely replace the original set of variables.

Identification the variables that have statistical significance and that require further analysis, like regression⁽⁹⁾.

The importance of this approach is the economy in the number of variables.

The objective of the factor analysis is to explain the large variance in a large set of tests in light of a smaller number of primary abilities or factors.

The correlations between the sections of economic activity were calculated - after excluding the incomplete and not indicated elements, and the correlation matrix was analyzed globally by the method of the basic components.

The following conditions were chosen for the worker's acceptance and the percentage of his contribution:

It is equal to (Eigen value) at least one true because this degree is the most common. The value of (Eigen value) is not relative to the interpretation of the variance, but to measure the size of the variance used, and the factor in which the value of (Eigen value) is greater than the correct one which is accepted. The value less than the correct one are rejected.

- The acceptable significance degree for the saturation of the variable on the factor is 0.05. The representation of the model depends on constructing structural equations that solve simultaneously using

time series and Ordinary Least Squares (OLS) with one, two or three stages:

$$Y_2 = Q + Bx_{ui}$$

Factor analysis, regression and the multiple models depends on the following structural equation:

$$Y = Q + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5$$

Where:

Q = constant

Y = Real individual consumption of middle aged cattle (boneless) red meat, lamb meat (with bones) (kg/year).

B_1x_1 = the real retail price of red meat, lamb meat (LE / kg).

B_2x_2 = real retail price of white poultry as a substitute commodity (L.E/kg).

B_3x_3 = real retail price of tilapia fish as a substitute commodity (L.E/kg).

B_4x_4 = Real individual income (thousand L.E/year)

B_5x_5 = time

First: Discussing the results of the factorial analysis of middle aged cattle red meat and lamb meat in Egypt

Bartlett's Test

It is used to test if the original correlation matrix is a unit matrix or not. If this matrix is not a unit matrix, this indicates that there are relationships between the variables, and this is what is required when using the main components method.

Table (6) shows the value of Bartlett's Test for middle-aged cattle and lamb equal to 61.8 and 66.5 at a significance level of 1% for each of them during the period (2007-2020). We conclude that the original correlation matrix is the unit matrix. The condition for using factor analysis was fulfilled by testing each of the factors separately with a percentage of less than 0.01. It is noticed that the value of (Kaiser-Meyer-Olkin KMO) is 0.72, 0.74 for middle-aged cattle meat and lamb meat respectively. It is an

acceptable value because the minimum value for that value is 0.60, which means that the measurement is excellent. Degree of significance of the measurement is 1%. This means that the factor analysis has reduced the factors with good quality.

Communalities

It means the degree of contribution of the variable to the value of the reducing factor. Table (7) shows that the extracted factors explained a high percentage of the variance of the variables, as the lowest percentage of the real retail price variable for red meat, middle - aged (boneless) and lamb(with bone) are 0.71 and 0.78 respectively.

Table (6): KMO and Bartlett's Test during the period(2007-2020)

Lamb	Middle aged cattle	Type
0.742	0.722	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.
66.535	61.847	Bartlett's Test of Sphericity Approx. Chi-Square
10	10	df
0.000	0.000	Sig.

Source :Central Agency for Public Mobilization and Statistics - **Annual Bulletin of Prices of Food Products and Services** - Various Issues.

Table (7): Distinctive roots of principal components and cumulative variance after Rotated during the period (2007-2020)

Factors	Type	Middle aged cattle	Lamb
	Initial	Extraction	Extraction
Real retail Prices for middle aged and young Cattle	1.000	0.713	0.776
Real retail Prices for white poultry	1.000	0.931	0.927
Real retail Prices for tilapia fish	1.000	0.814	0.902
Individual income	1.000	0.954	0.953
Time	1.000	0.984	0.987

*Extraction Method: Principal Component Analysis.

The real value was calculated on the basis of the general price index in 2007

Source: Central Agency for Public Mobilization and Statistics - **Annual Bulletin of Prices of Food Products and Services** - Various Issues.

Explained total variance

Table (8) shows the explained total variance of middle-aged cattle (boneless) meat and lamb (with bone) during the period (2007-2020) and the ranking of each factor according to its contribution of all variables to the matrix factors. The first and second factors are greater than one and accepted. For red meat, middle-aged cattle (boneless) and lamb (with bone) the percentages of interpretation of the discrepancies from the total variance of middle age and lamb are about 87.9%, 90.8%, respectively.

Component degree for factors:

Table (9) shows Rotated Component Matrix (reduced) factors for real prices during the period (2007-2020) that the variables were reduced to only

two factors. Concerning middle –aged cattle (boneless) meat, it was found that the first factor is characterized by a strong correlation with four variables, which can be called the (the most affective) factor for the consumption middle –aged cattle (boneless) meat. The time variable contributed the highest effect, amounting to about 0.97, then the real retail price of poultry meat, real individual income, real retail price of tilapia fish with an impact degree of about 0.93, 0.91, 0.62, respectively during the same period. The second factor was associated with strong relationships with three variables, which can be called the (influencing) factor. The real retail price variable for middle aged cattle contributed the highest correlation, which amounted to about 0.97.

Table (8): Total Variance Explained for middle aged cattle and Lamb red meat during the period(2007-2020)

Boneless Middle aged Cattle							
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadingsa
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.27	65.58	65.58	3.27	65.58	65.58	3.12
2	1.12	22.32	87.90	1.11	22.32	87.90	1.96
3	0.49	9.95	97.86				
4	0.09	1.79	99.66				
5	0.02	0.33	100.00				
Lamb meat with bones							
1	3.49	69.86	69.86	3.49	69.86	69.86	3.33
2	1.05	21.01	90.87	1.05	21.01	90.87	2.09
3	0.34	6.82	97.70				
4	0.10	2.01	99.72				
5	0.01	0.28	100.00				

The real value was calculated on the basis of the general price index in 2007

Source: Central Agency for Public Mobilization and Statistics - **Annual Bulletin of Prices of Food Products and Services** - Various Issues.

Table (9): Rotated Component Matrix for real price during the period (2007-2020)

middle aged Cattle (Boneless)			
Variable		Component	
		1	2
X5	Time	0.974	
X2	Real retail Prices for white poultry	0.932	
X4	Individual income	0.917	0.338
X3	Real retail Prices for tilapia fish	0.623	-0.570
X1	Real retail Prices for middle aged Cattle	-0.484	0.761
Lamb meat (with bones)			
Variable		Component	
		1	2
X5	Time	0.977	
X2	Real retail Prices for white poultry	0.936	
X4	Individual income	0.901	0.376
X1	Real retail Prices for Lamb	-0.778	0.413
X3	Real retail Prices for tilapia fish	-0.495	0.810

Extraction Method: Principal Component Analysis.

The real value was calculated on the basis of the general price index in 2007

Source: Central Agency for Public Mobilization and Statistics - **Annual Bulletin of Prices of Food Products and Services** - Various Issues.

Concerning with lamb meat (with bones), it was found that the first factor is associated with strong relationships with three variables, which can be called the (the most influential) factor for the consumption of lamb meat. The time variable contributed the highest effect, amounting to about 0.97, followed by the variable real retail price of poultry meat, real per capita income by a degree

Effect amounted to about 0.93, 0.90, respectively. The second factor has strong relationships with three variables, which can be called the (influencing) factor. The real retail price variable for tilapia fish contributed with the highest effect, amounting to about 0.81, followed by the real retail price variable for Lamb meat, with an effect degree of about 0.41.

Second: The most important factors affecting the individual consumption of red meat in Egypt

Through studying the relationship between the individual consumption of middle aged cattle (Boneless) meat, and lamb meat (with bones) it was found:

1- Middle aged cattle (boneless) red meat

By estimating the model using the method of multiple regression analysis in the double logarithmic form because it is the most appropriate statistical form for interpreting the model during the period (2000-2007), it was shown from Table (10) the significant effect of (X_1) the real retail price of red middle aged cattle meat (L.E / kg), (X_2) Real retail price of white poultry meat (L.E / kg), (X_3) real retail price of tilapia fish (L.E / kg), (X_4) real individual income (L.E thousand / year), (X_5) time on individual consumption of middle aged red meat in Egypt.

The results showed that the change in the real retail price of middle aged red meat by 10% leads to a change in the reverse trend of individual consumption of middle aged red meat by about 0.21% which is an inverse relationship consistent with the economic logic and less than one which indicates that middle aged red meat is one of the necessary commodities for the consumer to meet the needs of animal protein. It was also found that the change in the real retail price of white poultry meat, as it is a substitute commodity for red meat, by an amount of 10% leads to a change in the same direction for the individual consumption of red

middle aged meat by about 1.52% and this is relationship is consistent with the economic logic.

It was also found that the change in the real retail price of tilapia fish as it an alternative commodity for red meat by an amount of 10% leads to a change in the same direction for the individual consumption of red meat by about 0.29% and this relationship is consistent with the economic logic. A change in the level of per capita income of 10% leads to a change in the same direction for the individual consumption of middle aged cattle red meat by about 0.65% and this relationship is consistent with the economic logic. Time leads to an increase in the individual consumption of red meat of middle aged red meat by about 0.66%.

The value of (R^2) for the model also indicates that about 97.3% of the changes that occur in the individual consumption average of red middle -aged meat are due to factors whose impact reflects the factor of the real retail price of red meat. The average of retail price for white poultry meat, the real retail price of tilapia fish, Real per capita income, time and the remainder to other factors haven't been taken. The calculated (F) value for the model was about 199.5, which is statistically significant at level 0.01. The statistical value of Durbin-Watson was 1.86, which means that there is no problem of autocorrelation between independent variables affecting the individual consumption of red meat for middle-aged cattle (Boneless).

Table (10): Double logarithmic regression analysis of Middle aged cattle (Boneless) meat and red lamb (with bone) in Egypt during the period (2007-2020)

middle aged Cattle (Boneless)						
Model	B	T	R ²	F	Durbin-Watson	Sig.
(Constant)	0.387		0.97	199.5	1.86	0.00
Real retail Prices for middle aged Cattle	-0.021	-2.214				0.00
Real retail Prices for white poultry	0.152	7.330				0.00
Real retail Prices for tilapia fish	0.029	1.882				0.00
Individual income	0.065	4.420				0.00
Time	0.066	4.189				0.00
Lamb meat with bones						
Model	B	t	R ²	F	Durbin-Watson	Sig.
(Constant)	0.836		0.97	188.1	2.08	0.00
Real retail Prices for Lamb	-0.002	-1.964				0.00
Real retail Prices for white poultry	0.159	7.602				0.00
Real retail Prices for tilapia fish	-0.020	-2.007				0.00
Individual income	0.074	4.741				0.00
Time	0.077	4.531				0.00

*The real value was calculated on the basis of the general price index in 2007

Source: Central Agency for Public Mobilization and Statistics - **Annual Bulletin of Prices of Food Products and Services** - Various Issues.

2- Lamb meat (with bone)

Estimating the model using the multiple regression analysis method in the double logarithmic form, which turned out to be the most appropriate statistical form to interpret the model during the period (2000-2007). Table (10) shows the significant effect of (X_1) the real retail price of Lamb meat (L.E / kg), (X_2) the real retail price of white poultry meat (L.E / kg), (X_3) the real retail price of tilapia fish (L.E / kg), (x_4) Real per capita income (thousand L.E/year), (x_5) (time) on individual consumption of Lamb meat in the Egyptian market.

The results showed that the change in the real retail price of Lamb meat by an amount of 10% leads to a change in the reverse trend of individual consumption of Lamb meat by about 0.02% and this relationship agree with economic logic.

It was also found that the change in the real retail price of white poultry meat, as an alternative commodity to red meat, by an amount of 10% leads to a change in the same direction for the individual consumption of Lamb meat by about 1.59% and this relationship agree with the economic logic.

It was proved that the change in the real retail price of tilapia, as a substitute commodity for Lamb meat, leads to a change in the opposite direction of individual consumption of Lamb meat, which didn't agree with the economic logic.

A change in the level of per capita income by 10% leads to a change in the same direction for the individual consumption of Lamb meat by about 0.74%, as a direct relationship agreed with the economic logic. Time leads to an increase in the individual consumption of Lamb meat by about 0.77%. (R^2) value is about 97.2% indicates the changes that occur in the individual consumption of Lamb meat due to factors whose impact reflects the factor of the real retail price of Lamb meat, the real retail price of white poultry meat, the real retail price of tilapia fish, and The real individual income, time and the rest of other factors that were not taken, and the value of (F) was about 188.1, which is statistically significant at level 0.01. the statistical value of Durbin-Watson reached 2.08 and this means that there is no problem of autocorrelation between independent variables affecting individual consumption for lamb meat.

Conclusion

Livestock is a major pillar of the agricultural production sector in Egypt. It contributed about 36% of the total value of agricultural production. Red meat is also one of the most important sources of animal products and the most important source of animal

protein. It represents about 37% of the value of animal production during the period (2016-2020).

The research problem is summarized in the low quantity of Egyptian production of red meat from the quantity of consumption, which contributed in the existence of a food gap in red meat which estimated to about 457 thousand tons during the period (2016-2020). The acquired Beef is about 97.4 % of imports to cover this gap. The per capita share of red meat was about 8.7 kg/year, in addition to an increase in consumer prices. The research aims to identify the current situation of the production, consumption, prices of red meat, knowing the size of the nutritional gap for red meat and the most important factors affecting the individual consumption of red meat.

The most important results

Beef is considered the most important type of red meat. Its production value represents about L.E 31 billion, which represents about 49% and 18% of the value average for red meat and animal production, respectively. Buffalo meat came in the second ranking with a production value about L.E 24 billion represents about 38% and 14% of the value average of red meat and animal production, respectively during the period (2016-2020).

The quantity average of red meat imports is about 457 thousand tons. Beef has the largest share, with quantity average of about 445, represents about 97.5% of the total quantity of imports, then camel and mutton meat, with quantity average about 2.9 thousand tons, represents about 2%, 0.4% of The total quantity of red meat imports respectively during the same period.

Beef is the most important type of red meat in terms of consumption. Its consumption has been estimated about 773 thousand tons represents about 70% of the total average of red meat consumption in Egypt which has been estimated about 1,101 thousand tons during the same period. Buffalo meat came in the second ranking with a quantity average of about 240 thousand tons represents about 22% of the average of total consumption of red meat in the Egyptian market.

The average per capita share of red meat was about 8.7 kg / year. Beef meat came in the first ranking with an average of about 10.3 kg / year, then buffalo meat with about 4.6 kg / year, then lamb, goats and camels with a per capita share of about 1.8, 0.4, 0.2 kg/year respectively during the same period.

Concerning to the monthly retail price. It was found that the average of retail price of red meat, middle-aged cattle boneless, young meat (with bones) and lamb meat (with bones) had an increasing trend

to about L.E 0.49, 0.59, 0.51 a kilo monthly respectively during that period. The retail price increased at monthly rate of about 0.37%, 0.44%, and 0.37% from the average of red meat price, which amounted to about L.E 132.5, 132.8, and 136.2 a kilo per month respectively during the same period. Searching for religious occasions during the period (2016-2020). It was found that Ramadan month and Eid al-Adha were between the months April and September. They are the periods through which high demand and consumption of animal protein lead to an increasing in prices of red meat.

With regard to the most important factors affecting the consumption of red meat in Egypt using the factor analyses model during the period (2007-2020). For meat of middle aged cattle (boneless), it was found that the first factor is characterized by a strong correlation with four variables, which can be called the (most influential) factor for red meat consumption. They are middle aged cattle (boneless), the time variable contributed to the highest effect, amounting to 0.97, then the real retail price of white poultry meat, real per capita income, real retail price of tilapia fish with an impact degree of about 0.93, 0.91, 0.62 respectively during the same period.

Related to red lamb meat, it was found that the first factor is associated with strong relationships with three variables, which can be called the (most influential) factor for the consumption of red lamb meat. They are the time variable contributed the highest effect, amounting to about 0.97, then the variable of real consumer price of white poultry meat, real per capita income. The effects amounted to about 0.93, 0.90, respectively.

Furthermore, estimating the model using multiple regression analysis in the double logarithmic form. It was found that the change in the real retail price of middle-aged meat cattle (boneless) by 10%, leads to a change in the reverse trend of individual consumption to about 0.21% and this is an inverse relationship agree with the economic logic. The change in the real retail price of white poultry meat by 10% leads to a change in the same direction for the individual consumption of red meat for middle aged cattle (boneless) by about 1.52%. A change in the real retail price of tilapia fish by 10% leads to a change in the same direction for the individual consumption of red meat of middle aged cattle (boneless) by about 0.29%. A change in the level of individual income by 10% leads to a change in the same direction for individual consumption by about 0.65% with direct relationship consistent with the economic logic. Time leads to an increase in the individual consumption of red meat to about 0.66% of middle aged cattle (boneless).

With regard to red Lamb meat, it was found that a change in the real retail price of Lamb meat by 10% leads to a change in the reverse trend of individual consumption of Lamb meat by about 0.02%. change in the real retail price of white poultry meat by 10% leads to a change in the same direction for individual consumption for Lamb about 1.59%. A change in the level of per capita income by 10% leads to a change in the same direction for the individual consumption of Lamb meat by about 0.74% and this is a direct relationship consistent with the economic logic.

Recommendations

1. Working to restore the young aged cattle project because it is one of the important projects that may help in increasing the local production of red meat in Egypt.
2. Encouraging investment in the animal production field especially in beef production field because the results of the research indicated that beef is the most important type of meat in addition to its great imports.
3. Increasing the supply of red meat in seasons through the spread of state outlets in order to control the rise in red meat prices.
4. Paying attention to poultry production projects in Egypt to increase the supply as the results of the research indicated that there is an effect of poultry prices on the consumption of red meat.
5. Working on breeding high-productivity types from economic meat animals in Egypt to increase the production of red meat to face the high increase in consumption.
6. Studying the possibility of granting small breeders simple loans to acquire high-productivity breeds to increase the supply and could be reduced the price.

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