Websites:
http://www.sciencepub.net
http://www.sciencepub.net/rural

Emails:
editor@sciencepub.net
sciencepub@gmail.com

World Rural Observations

MARSLAND PRESS
Multidisciplinary Academic Journal Publisher

Econometric Estimation of Food Security Coefficient for Red Meat in Egypt, a Study of Demand and Consumer Spending Functions On Red Meat in Fayoum Governorate.

Dr. Amr Sayed Sofey El Sayed

Agricultural Economic Research Institute -Agricultural Research Center- Giza- Egypt
amrsofy120@gmail.com

Abstract: The research relied on identifying the economic dimension of food security for red meat in Egypt during the period (2000-2019), through a study of the current situation, where it was found that the average production and consumption amounted to about 898.4,1184 thousand tons, respectively, for red meat in Egypt for the study period. By estimating the strategic stock and the food security factor for red meat, it was found that the amount of the strategic stock amounted to about 270.90 thousand tons, sufficient for local consumption for 93 days, and the value of the food security factor was about 0.229. To achieve the objectives of the study, econometric analysis was used by conducting multiple regression analysis in the linear form using the Tobit Model and according to the unconventional analysis method known as the Tobit model to measure the impact of the most important economic factors, which are supposed to have an impact on the food security coefficient. These factors are represented in the value of agricultural investment in billions of dollars, the population in a million people, the amount of processed fodder in million tons, and the value of individual income in a thousand dollars. The significant effect of these factors was proven. By characterizing the study sample in the countryside and urban areas of Fayoum governorate in the 2022 season, which was collected through the questionnaire form, where the study sample population was divided into three categories, according to the monthly income criterion for the family. Each category was divided into rural and urban in Fayoum governorate, where the first category is less than 2,200 pounds, the second category is from 2200 to 4200 pounds, and the third category is 4,200 pounds or more. It was found that the most important factors affecting the consumer spending function of red meat for the countryside for the total sample are the price of red meat, the number of family members, the monthly income of the family, and the price of poultry, respectively. The total flexibility amounted to about 1.533. It also became clear that the most important factors affecting the consumer spending function of red meat for urban residents of the total sample are the price of red meat, the number of family members, and the monthly income of the family and the price of fish, respectively. The total flexibility amounted to about 1.621.

[Amr Sayed Sofey El Sayed. **Econometric Estimation of Food Security Coefficient for Red Meat in Egypt, a Study of Demand and Consumer Spending Functions On Red Meat in Fayoum Governorate.** *World Rural Observ* 2022;14(3):1-19]. ISSN: 1944-6543 (Print); ISSN: 1944-6551 (Online). http://www.sciencepub.net/rural. 1. doi:10.7537/marswro140321.01.

Keywords: Food security coefficient - red meat - demand function - consumer spending function - food gap.

Introduction:

The concept of food security is considered one of the important concepts in recent times, as it took several directions during the global food crisis, in light of the high global food prices and consequently several international political crises that made food a strategic commodity for the global economy. Food security depends on two main components: the quantity and type of food required to achieve food security, and how to obtain food from local and external sources to ensure its continuous availability.

The agricultural sector is considered a mainstay of the Egyptian economy, as it is the main source of food for humans. Animal production plays an important role in providing animal products, which are the main source of proteins needed to build the cells of the body. Livestock is one of the important agricultural capital resources, as its various products contribute to increasing agricultural income. The average value of animal production and the value of red meat were estimated at about 11.7, 4 billion dollars, which represents about 40.76%, 14% of the average value of agricultural production respectively, which amounts to about 28.7 billion dollars during the period (2000-2019). The production of red meat in Egypt depends on a variety of sources of farm animals. Nevertheless, Egypt faces great challenges in the production of red meat in light of the insufficient local production to meet the nutritional

needs of the growing consumption of the population, which leads to an increase in the size of the food gap, which in turn the state resorts to imports to fill The gap, which represents a burden on the country's trade balance. The average quantity of red meat imports was about 381.4 thousand tons, and the self-sufficiency rate was estimated at about 78.2%, and the food security factor was estimated at about 0.229 during the study period. Therefore, it appears the importance of increasing the local production of red meat to reduce the size of the food gap.

Research problem:

The problem of providing food is one of the matters of importance that society cares about as a result of the imbalance between consumer needs and what is available from food. The research problem is limited to the lack of production capacity of red meat to meet the requirements of the increasing local consumption, which led to the widening of the food gap of red meat in Egypt, which is estimated at 276.4 thousand tons for the average period (2000-2019), with a production and consumption capacity estimated at 898.3 and 1184 thousand tons, respectively for the same period. This results in a continuous decrease in the average per capita share of red meat in Egypt from global averages. This gap caused resorting to imports, which led to an increase in the burden on the country's trade balance in light of the rise in international prices, as it was found that the average value of imports amounted to about 1265.82 million dollars during the period of the study. This calls for studying all aspects of the food gap for red meat from production and consumption, with the need to work on increasing the strategic stock of meat to meet emergency conditions as one of the main ingredients for achieving stability and food security in Egypt.

Research Objectives:

The research aims mainly to identify the impact of the economic dimensions of the food security policy for red meat in Egypt by studying the current situation of red meat production and consumption in Egypt during the period (2000 - 2019), estimating the strategic stock and food security coefficient for red meat in Egypt during the study period, and studying the economic factors which affect food security coefficient of red meat in Egypt during the study period, and estimate Econometrics functions of demand and consumer spending in the study sample in Fayoum Governorate.

Methodology and data sources:

The research relied on descriptive and quantitative analysis to describe the study variables for the secondary data, using simple regression, and the phased gradient regression that was used in estimating the functions of demand and consumer spending for the study sample, which was estimated to know the best cases whose results agree with the parameters of the economic and statistical logic, as well as estimating the strategic stock and food security coefficients using the following economic formulas:

1 - The period of production sufficiency for consumption = total domestic production ÷ daily domestic consumption.

2 - Import coverage period for consumption = total imports ÷ daily domestic consumption.

3- Amount of surplus and deficit in red meat = [(total length of production adequacy periods and import coverage - 365) x daily domestic consumption] - (amount of exports).

4 - Food security coefficient = the size of the strategic stock (the sum of the surplus and deficit) ÷ the average annual domestic consumption.

By estimating the regression function according to the unconventional analysis method known as the Tobit Model, and that method is called (Tobit Censored - Truncated Regression) in relation to James Tobin, which is used to estimate the parameters of the regression function with a finite dependent variable (where the value of the food security factor ranges between zero and one with Replacing zero or negative observations with zero), and this method is used instead of using the traditional analysis method (OLS method) which assumes that there are no limits for the dependent variable (+∞, -∞), and it can be shown that the OLS estimates are less than the actual values, and biased downward when limiting the dependent variable (YI) as follows:

$$Y_i = \beta x_i + u_i$$

Where random variables are distributed normally

$$u_i \approx (\sigma, \mu)$$

By setting an upper bound on the dependent variable (YI), so that Yi =<C, the previous regression equation can be reformulated to become:

$$\beta x_i + u_i \leq C$$

Thus we find that:

$$u_i \leq C - \beta x_i$$

Therefore, the random error expectation becomes not equal to zero, as the OLS method assumes. This expectation can be formulated as follows:

$$E(u_i | u_i \leq C - \beta x_i) \neq 0$$

That is, the expected random error E (Ui) is a function of the independent variable (Xi) and therefore the residuals (Y - Y^) will be associated with the independent variable, and therefore the estimates of the regression coefficients in the model are not acceptable if the OLS method is used. As we expect the value of the random variable to decrease as the value of the independent variable increases as long as B > O, then the OLS estimates of the regression coefficients will be biased downward, i.e. the estimates of the regression coefficients become underestimated.

Therefore, the use of an unconventional analysis method known as the Tobit model, which allows setting limits for the dependent variable, has become a necessity to remedy bias in OLS estimates. There are two methods for estimating the model, the first method is Truncated Tobit, where zero and negative observations are deleted from the dependent variable and their corresponding counterparts with independent variables, then the model is estimated on the rest of the observations, and the second method is Tobit Censored, where the entire model is estimated by entering all observations with the replacement of zero and negative observations in the variable The function is only zero. To estimate the regression coefficients in this case, it is necessary to apply the Maximum Likelihood Estimator (MLE) method (Akerolf 1980, Olsen 1978), where the regression equation can be formulated in the model as follows:

$$Y^* = \beta' x_i + u_i$$

whereas:

$$y_i = L_{1i} \text{ if } y_i < L_{1i}$$

$$y_i = Y^* \text{ if } L_{1i} \leq Y^* \leq L_{2i}$$

$$y_i = L_{2i} \text{ if } y_i > L_{2i}$$

Where it L_{1i} expresses the minimum of the dependent variable (i) while L_{2i} it expresses the maximum of the same change. While Y^* it expresses the dependent variable between the minimum and maximum or the limited dependent variable (1).

To estimate the coefficients of the regressive function in this case using the MLE method, it is necessary to formulate (Madala, 1987) Likelihood Function (15), (Green 1993) (16), as follows:

$$L(\beta, \sigma | y_i, x_i, L_{1i}, L_{2i})$$

$$= \prod_{y_i = L_{1i}} \Phi\left(\frac{L_{1i} - \beta' x_i}{\sigma}\right).$$

$$\prod_{y_i = Y^*} \frac{1}{\sigma} \phi\left(\frac{y_i - \beta' x_i}{\sigma}\right). \prod_{y_i = L_{2i}} \left[1 - \Phi\left(\frac{L_{2i} - \beta' x_i}{\sigma}\right)\right]$$

So the expected value of the dependent variable E (Yi) becomes:

$$E(y_i | L_{1i} < Y^* < L_{2i})$$

$$= \beta' x_i + E(u_i | L_{1i} - \beta' x_i < u_i < L_{2i} - \beta' x_i) + P(y_i - L_{2i}) L_{2i}$$

$$= \beta' x_i + \sigma \frac{\phi_{1i} - \phi_{2i}}{\Phi_{2i} - \Phi_{1i}}$$

whereas:

$$\Phi_{1i} = \Phi\left(\frac{L_{1i} - \beta' x_i}{\sigma}\right), \Phi_{2i} = \Phi\left(\frac{L_{2i} - \beta' x_i}{\sigma}\right)$$

$$\phi_{1i} = \phi\left(\frac{L_{1i} - \beta' x_i}{\sigma}\right), \phi_{2i} = \phi\left(\frac{L_{2i} - \beta' x_i}{\sigma}\right)$$

Each probability density function Φ, ϕ is defined as a function of the probability distribution. Thus, it was possible to estimate the parameters of the regression function of the food security coefficient with a limited dependent variable.

The coefficient of determination is also estimated in the model as follows:

$$R^2 = 1 - \sum_{t=1}^{T} \varepsilon_t^2 / \sum_{t=1}^{T} (Y_t - Y^-)^2$$

$$\varepsilon_t = Y_t - (\sigma f(X_t \beta) + \sigma F(X_t \beta)(X_t \beta))$$

ηi = βiẊi/Ẏ, and the elasticity's of the model are estimated.

The research also relied on two types of data, the first of which is the secondary data published from its various sources, which is represented in the Economic Affairs Sector of the Ministry of Agriculture and Land Reclamation, the Central Agency for Public Mobilization and Statistics, the website of the International Monetary Fund, the World Bank, and the Food and Agriculture Organization (FAO), and the second is the primary data, which was Obtaining it through the questionnaire for a random sample in Fayoum Governorate.

Description of the study sample:

Table (1) Shows the variables of the study sample in the rural and urban areas of Fayoum Governorate, season 2022, which were collected through the questionnaire form The study sample population was divided into three categories, according to the family's monthly income criterion, and each category was divided into rural and urban centers in Fayoum governorate, where the first category was less than 2,200 pounds, the second category ranged from 2,200 to 4,200 pounds, and the third category was 4,200 pounds or more, and the study sample amounted to about 275 families. They were divided into 147 families from the rural, which represents about 53.5%, and about 128 families, which represent about 46.5% of the total sample of the study. The number of family members for the first, second and third categories and the total sample amounted to about 4, 4, 5, 4 from the rural, and it amounted to about 4, 3, 3, according to the data of the study sample. 3 individuals from urban areas, respectively, and the data of the study sample show that the average monthly income of the head of the family for the first, second and third categories, and the total sample amounted to about 1950, 3350, 4800, 3360 from the rural, and it amounts to about 2,150,4100, 5500, 3916.7 pounds / month from the urban, respectively, as shown The data of the study sample that the average individual consumption of red meat for the first, second and third categories, and the total sample amounted to about 0.750, 1.100, 1.400, 1.080 from the rural, and it amounted to about 0.950, 1.300, 1.650, 1.300 kg / month from urban areas, respectively, and it is clear from the data of the study sample The average per capita consumption of poultry meat for the first, second and third categories and the total sample amounted to about 0.970, 1.310, 2,110, 1.460 from the rural and about 1.250, 1.990, 2.660, 1.970 kg/month from the urban, respectively, as it is clear from the data of the study sample that the average consumption The individual for fish meat for the first, second and third categories and the total sample amounted to about 0.940, 1.250, 1.690, 1.290 from the rural, and it amounts to about 1.120, 1.650, 1.970, 1.580 kg/month from the urban, respectively, and the data of the study sample shows that the average individual consumption of the total meat to roll The first, second and third category and the total sample amounted to about 2,650, 3,660, 5,200, 3,830 from the rural, and about 3.320, 4,950, 6.270, 4.820 kg / pound from the urban, respectively, and it is clear from the data of the study sample that the average price of red meat for the first, second and third categories and the total sample It amounted to about 140, 145, 155, 146.67 from the countryside and about 145, 155, 160, 153.33 from the urban area, respectively, as it is clear from the data of the study sample that the average price of poultry for the first, second and third categories and the total sample amounted to about 30.50, 32.50, 34.50, 32.50 from the countryside and is About 32.50, 33.50, 35, 33.67 pounds from urban residents, respectively, and it is clear from the data of the study sample that the average price of fish for the first, second and third categories and the total sample amounted to about 30.50, 36.80, 45.40, 37.57 from the countryside, and it amounts to about 33.50, 40.50, 50.60, 41.53 pounds from Urban, respectively, and the data of the study sample show that the average monthly expenditure of the family of red meat for the first, second and third categories, and the total sample amounted to about 675.50, 760.96, 1308.82, 915.09 from the countryside, which amounts to about 727.32, 925.82, 1274.88, 9 76.01 pounds from urban, respectively, as the data of the study sample shows that the average monthly expenditure of the family from poultry for the first, second and third categories, and the total sample amounted to about 147.16, 170.56, 291.32, 203.01 from rural areas, and it amounts to about 163.02, 200.10, 278.88, 214 pounds from urban, respectively. , and it was found from the data of the study sample that the average monthly expenditure of the family of fish for the first, second and third categories and the total sample amounted to about 142.59,183.26,306 and 210.62 from the countryside, amounting to about 150.48, 200.96, 298.59, 216.68 pounds from the urban respectively, and the data of the study sample shows that The average total monthly expenditure of the family for the first, second and third categories and the total sample amounted to about 965.25, 1114.78, 1906.13, 1328.72 pounds from the rural, and it amounts to about 1040.82, 1326.87, 1852.35, 1406.68 pounds / month from the urban, respectively.

Table (1) Characterizing the variables of the study sample in the rural and urban areas of Fayoum Governorate, season 2022.

Variables	first category less than 2200		Second ccategory 2200 - 4200		the third category more than 4200		total sample		
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Total
number of families	33	28	72	65	42	35	147	128	275
number of family members	5	4	4	3	4	3	4	3	7
The average monthly income of the family in pounds	1950	2150	3330	4100	4800	5500	3360	3916.7	7276.7
Average per capita consumption of red meat kg/month	0.75	0.95	1.1	1.3	1.4	1.65	1.08	1.30	2.38
Average per capita consumption of poultry meat kg/month	0.97	1.25	1.31	1.99	2.11	2.66	1.46	1.97	3.43
Average per capita consumption of fish meat kg/month	0.94	1.12	1.25	1.65	1.69	1.97	1.29	1.58	2.87
Average per capita consumption of total meat kg/month	2.65	3.23	3.66	4.95	5.20	6.27	3.83	4.82	8.65
The average price of red meat kg/pounds	140	145	145	155	155	160	146.67	153.33	300
Average price of poultry meat kg/pound	30.50	32.50	32.50	33.50	34.50	35.00	32.50	33.67	66.17
The average price of meat and fish kg/pounds	30.50	33.50	36.80	40.50	45.40	50.60	37.57	41.53	79.10
Average red meat tunnels pounds	675.50	727.32	760.96	925.82	1308.82	1274.88	915.09	976.01	1891.10
Average expenditure of poultry pounds	147.16	163.02	170.56	200.10	291.32	278.88	203.01	214.00	417.01
Average spending of fish is a pound	142.59	150.48	183.26	200.96	306.00	298.59	210.62	216.68	427.29
Average Total Expenditure for Meat in EGP	965.25	1040.82	1114.78	1326.87	1906.13	1852.35	1328.72	1406.68	2735.40

Source: collected and calculated from the data of the study sample in Fayoum Governorate, season 2022.

Results and Discussion:

Firstly: study of the current situation of the production and consumption capacity of red meat in Egypt.

Table (2) showed the development of the local production of red meat in Egypt during the period (2000-2019), where the minimum was estimated at about 705 thousand tons in 2001 and the maximum was estimated at about 1012 thousand tons in 2009 with an increase rate of about 43.6% over the minimum for the study period, and it was found that the average local production amounted to about 898.3 thousand tons Table (3) indicated that the local production took a general, increasing, and statistically significant trend, amounting to about 12.23 thousand tons, with an annual increase rate of about 1.4% of the average domestic production during the study period, and the coefficient of determination (R^2) was estimated at about 0.46, which indicates that 46% of the changes in local production are due to the influence of the time factor.

The same table also shows that the minimum quantity of imports was estimated at about 100 thousand tons in 2002, and the upper limit was estimated at about 811 thousand tons in 2019 at an increase rate over the minimum by about 711% for the study period, and the average amount of imports for red meat amounted to about 381.4 thousand tons, and Table (3) indicated that the quantity of red meat imports The imports took a general, increasing trend, statistically significant, amounting to about 34.14 thousand tons, with an annual increase rate of about 9% of the average quantity of imports during the study period, and the coefficient of determination (R^2) was estimated at about 0.85, which indicates that 85% of the changes occurring in the quantity of imports are due to the influence of the time factor.

It is evident from the same table that the minimum local consumption of red meat was estimated at about 873 thousand tons in 2000, and the upper limit was estimated at about 1527 thousand tons in 2019, at an increase rate over the minimum by about 74.9% for the study period, and the average local consumption of red meat amounted to about 1184 thousand tons, and Table (3) Indicates that domestic consumption took a general, increasing, and significant trend, amounting to about 33.74 thousand tons, with an annual increase rate of about 2.9% of the average domestic consumption during the study period. The coefficient of determination (R^2) was estimated at 0.91, which indicates that 91% of the changes occurring in domestic consumption are due to the influence of the time factor.

The same table showed that the minimum size of the food gap for meat was estimated at about 92 thousand tons in 2002, and the upper limit was

estimated at about 610 thousand tons in 2017, with an increase rate over the minimum by about 563% for the study period, and that the average size of the food gap for meat amounted to about 276.4 thousand tons, and Table (3) indicated The size of the food gap took a general increasing trend, statistically significant, amounting to about 18.7 thousand tons, with an annual increase rate of about 7% of the average size of the gap during the study period, and the coefficient of determination (R^2) was estimated at about 0.62, which indicates that 62% of the changes occurring in the size of the gap are due to the influence of time factor.

It is clear from the same table that the minimum self-sufficiency was estimated at about 58.3% in 2017, and the upper limit was estimated at about 89.9% in 2002, with an increase rate over the minimum by about 54.2% for the study period, and that the average self-sufficiency of meat amounted to about 78.2%, and Table (3) indicated The average self-sufficiency took a general statistically significant decreasing trend, amounting to about 1.1- at an annual decrease rate of about 1.4% of the average self-sufficiency during the study period, and the coefficient of determination (R^2) was estimated at about 0.49, which indicates that 49% of the changes occurring in self-sufficiency are due to the effect of time factor.

Table (2) The development of production, imports, domestic consumption, the size of the food gap, the self-sufficiency ratio, the quantity of exports, the number of population, the average share and value of red meat and the value of imports during the period (2000-2019).

Year	local production (thousand tons)	import quantity (thousand tons)	domestic consumption (thousand tons)	The size of the food gap (thousand tons)	Self-sufficiency %	Export Quantity (tons)	Population (millions)	Average per capita (kg)	Red meat value billions of dollars	The value of imports is million/dollars
2000	705	168	**873**	-168	80.8	227	67.59	13.67	2.554	505.98
2001	695	155	**788**	-93	88.2	100	69.91	12.09	2.275	199
2002	821	100	**903**	-92	89.9	139	71.23	13.59	1.911	201.13
2003	804	130	**942**	-98	89.1	179	72.59	13.87	2.002	323.45
2004	818	119	**916**	-98	89.3	151	73.98	13.22	2.316	308.8
2005	855	292	**1053**	-198	81.2	172	75.38	14.88	3.250	656.06
2006	880	298	**1178**	-298	74.7	434	76.78	16.31	3.501	1081.09
2007	916	328	**1247**	-331	73.5	463	78.16	16.93	3.720	1264.45
2008	921	442	**1251**	-330	73.6	430	79.54	16.63	4.523	1283.98
2009	1012	135	**1139**	-127	88.8	214	80.95	14.81	4.830	760.56
2010	960	315	**1232**	-272	77.9	318	82.47	15.65	5.561	1441.18
2011	989	396	**1203**	-214	82.2	294	84.11	10.4	5.437	1366.51
2012	990	412	**1255**	-165	85.7	382	85.9	9.7	5.262	1906.94
2013	965	430	**1270**	-333	74.3	428	87.81	11.2	5.422	2040.28
2014	941	475	**1289**	-367	71.9	388	89.81	10.8	6.109	2008.29
2015	975	545	**1340**	-320	75.3	440	91.92	13.6	5.171	2074.6
2016	788	656	**1354**	-432	64.6	493	93.78	9.6	4.480	2182.02
2017	852	698	**1430**	-610	58.3	583	97.55	10.6	3.640	1646.39
2018	953	723	**1480**	-442	68.3	611	99.21	11.5	3.933	1806.12
2019	1126	811	**1527**	-359	75.8	657	101.64	9.7	4.063	2259.54
Average	898.4	381.4	1184	-267.4	78.2	355.2	83.0	12.9	4	**1265.82**

Source:

1 - Central Agency for Public Mobilization and Statistics - Livestock Statistics - Miscellaneous Issues

2 - The Central Agency for Public Mobilization and Statistics, Annual Bulletin of the Movement of Production and Foreign Trade and Available for Consumption of Agricultural Commodities, Various Issues.

3 - International Monetary Fund website www.imf.org/external/data.htm

4- The website of the Food and Agriculture Organization. www.fao.org

It is also clear from the same table that the minimum amount of exports was estimated at about 100 tons in 2001, and the upper limit was estimated at about 657 tons in 2019 at an increase rate over the minimum by about 557%, and that the average amount of exports for red meat amounted to about 355.2 tons, and Table (3) indicated that the amount of exports took a general, statistically significant, increasing trend It amounted to about 24.1 tons at an annual increase rate of about 6.8% of the average amount of exports during the study period, and the coefficient of determination (R^2) was estimated at about 0.73, which indicates that 73% of the changes in the amount of exports are due to the influence of the time factor.

The same table shows that the minimum population was estimated at about 67.59 million people in 2000, and the upper limit was estimated at about 101.64 million people in 2019, at an increase rate over the minimum by about 50.4%, and the average population was about 83 million people, and Table (3) indicated that The population number took a general, increasing, and significant trend, amounting to about 1.710 million people, with an annual increase rate of about 2.8% of the average population during the study period, and the coefficient of determination (R^2) was estimated at about 0.98, which indicates that 98% of the changes occurring in the population are due to the influence of a factor time.

The same table also shows that the minimum per capita gain was estimated at 9.6 kg/year in 2007, and the upper limit was estimated at 16.93 kg/year in 2016, with an increase rate of about 76.4% over the minimum for the study period, and the average per capita share of red meat amounted to about 12.9 kg/year, and the table (3) indicated that the average per capita share took a general, statistically significant decreasing trend, amounting to about 0.232 - at an annual decrease rate of about 1.8% of the average per capita share during the study period, and the coefficient of determination (R^2) was estimated at about 0.32 which indicates that 32% of the changes occurring in per capita share It is due to the influence of time factor.

- It is also clear from the same table that the minimum value of red meat was estimated at about 1.911 billion dollars in 2002, and the upper limit was estimated at about 6.109 billion dollars in 2014, at an increase rate of about 220 percent over the minimum for the study period, and that the average value of red meat amounted to about 4 billion dollars, and Table (3) indicated that the average value of red meat took a general statistically significant increasing trend, amounting to about 0.184 billion dollars, with an annual increase rate of about 4.6% of the average value of red meat production during the study period, and the coefficient of determination (R^2) was estimated at about 0.46, which indicates that 46% of the changes occurring The value of meat is due to the influence of the time factor.

The same table showed that the minimum value of imports was estimated at about 199 million dollars in 2001, and the upper limit was estimated at about 2259.54 million dollars in 2019, an increase over the minimum by about 1036% for the period of study, that the average value of imports amounted to about 1265.82 million dollars, and Table (3) indicated The average value of imports took a general, significant, and statistical trend, amounting to about 111.97 million dollars, at an annual increase rate of about 8.84% of the average value of imports during the study period, and the coefficient of determination (R^2) was estimated at about 0.85, which indicates that 85% of the changes in the import value are due to the effect of time factor.

Secondly: Estimating the strategic stock and food security factor for red meat in Egypt.

Food security coefficient is one of the indicators used to identify the extent of the food security of a particular commodity, and its value ranges between zero and the correct one. Meat strategy is one of the most important aspects of achieving food security. The two periods of production adequacy and import coverage for domestic consumption of meat are one of the standard indicators in identifying the economic and strategic dimension of production and consumption of food commodities in Egypt. This part of the study deals with the exposure to the results of the economic equations used in estimating the strategic stock and the food security factor in Egypt by estimating the surplus and deficit of red meat allocated for local consumption in the light of Egyptian production, consumption and imports data of red meat during the period (2000-2019). Review the data in Table (4) as follows:

Table (3) Equations of the general time trend, the evolution of production, the quantity of imports, the domestic consumption, the size of the food gap, the self-sufficiency ratio, the quantity of exports, the number of population, the average per capita share, the value of red meat and the value of imports during the period (2000-2019).

variable	Equation of the general time trend	T	R2	F	Average	Annual rate of change%
Domestic production (in thousand tons)	Ŷi=23668.97 +12.23Xi	**(3.9)	0.46	**15.2	898.4	1.4
Import quantity (thousand tons)	Ŷi= 68213.6+34.14 Xi	**(101.4)	0.85	**105.8	381.4	9
Amount of local consumption (thousand tons)	Ŷi=66613.71+33.74 Xi	(13.2**)	0.91	173**	1184	2.9
Food gap size (in thousand tons)	Ŷi=37277.1 +18.7Xi	**(5.4)	0.62	**29.2	-267.4	7
Self-sufficiency rate (%)	Ŷi= 2178.9 –1.1Xi	**(-4.2)	0.49	**17.3	78.2	-1.4
Export Quantity (tons)	Ŷi= 47949.9 +24.1 Xi	**(7.1)	0.73	**49.22	355.2	6.8
Population (million people)	Ŷi=3352.27 +1.1710 Xi	**(35.93)	0.98	**1290.7	83	2.1
Average per capita (kg/year)	Ŷi=478.50-0.232 Xi	(-2.9*)	0.32	*8.38	12.9	-1.8
Red meat value (billion dollars)	Ŷi=293.31 +0.184 Xi	(3.83**)	0.46	**14.6	4	4.6
Imports value (millions of dollars)	Ŷi=223749.61 +111.97 Xi	**(10.01)	0.85	**100.25	1265.8	8.84

- Where yi is the value of the dependent variable represented in (domestic production and consumption, the size of the food gap, the self-sufficiency ratio, the quantity and value of imports, the quantity of exports, the population, the average per capita share, and the value of red meat)
- xi: Factor time in years as an independent variable, where i (20, ……., 3, 2, 1)
- The numbers in parentheses below the estimates indicate the calculated (t) value, ** denotes significance at the level (0.01), * indicates significance at the (0.05) level.

Source: It was collected and calculated from the data in Table (2).

1- The period of production sufficiency and import coverage for local consumption.

The period of covering local production for meat consumption during the study period ranged between a minimum of about 217.47 days (7.25 months) in 2017, and a maximum of about 331.85 days (11.06 months) in 2002, while the average period was about 283.08 days (9.43 months). The period of import coverage for meat consumption during the study period ranged between a minimum of about 35.17 days (1.17 months) in 2002, and a maximum of about 128.96 days (4.3 months) in 2008, while the average period was about 86.63 days. 2.88 months), the increase in the production adequacy period and the decrease in the import coverage period for domestic consumption is a good indicator in the interest of the Egyptian economy. By continuing to achieve this goal, it is possible to protect the Egyptian economy from the danger of imported inflation and reduce dependence on the outside, and thus reduce the deficit in the balance of payments, in addition to protecting Egypt's food security from economic, political and climatic fluctuations in countries that monopolize the production and export of meat in the world.

2- The volume of the strategic stock.

In light of the data on Egyptian production, consumption and imports of meat, the volume of the surplus and the deficit of meat allocated for consumption during the study period was estimated, which shows that there is a surplus of red meat over local consumption, originating from production and imports during the years 2001, 2002, 2004, 2008, 2009, 2011, 2012, 2013 2014, 2015, 2019, where the total surplus was estimated at 609.4 thousand tons, enough to cover the consumption of approximately 187 days (6.23 months). Where this surplus is directed to the development of the strategic stock of red meat to be withdrawn during other years in which

a deficit appears in meat intended for local consumption. While it was found that there was a deficit in red meat for local consumption during the rest of the other years of the study period (2000-2019), where the total deficit was estimated at 338.5 thousand tons, estimated at about 94 days (3.13 months), and it was covered by withdrawing from the strategic stock and importing from the outside.

3- The ratio of the surplus amount to the deficit.

It was found that the amount of surplus directed to the development of the strategic red meat stock increased over the amount of deficit or withdrawal from that stock, and then the ratio of the amount of deficit to surplus amounted to about 55.54% at the end of the study period, and according to the concept of strategic stock as the sum of both the surplus and the deficit during the study period, as it was estimated The strategic stock of red meat in Egypt is about 270.90 thousand tons, which is sufficient to cover local consumption for a period of about 93 days, or about 3.1 months.

4 - The value of the food security factor for red meat in Egypt.

In light of both the strategic stock and the average local consumption of red meat of about 1183.5 thousand tons, the coefficient of food security for meat in Egypt is estimated at 0.229 during the study period, and therefore it is required to increase the strategic stock of red meat for local consumption for a period of at least 6 months, until the value reaches Food security factor to 0.50 according to food security considerations.

Table (4): The development of indicators for the two periods of production adequacy and import coverage and the amount of surplus and deficit in red meat designated for local consumption in Egypt during the period (2000-2019).

Year	Daily consumption (thousand tons)	The period of sufficient production for consumption per day	Import coverage period for consumption per day	The sum of the two periods per day	surplus and deficit		
					Quantity in thousand tons	The period of adequacy of the surplus and deficit in domestic consumption per day	Food Security Coefficient Value**
2000	**2.39**	**294.76**	**69.40**	**364.16**	**2.23-**	**0.93-**	**0.003-**
2001	**2.16**	**321.92**	**71.80**	**393.72**	**61.90**	**28.67**	**0.079**
2002	**2.47**	**331.85**	**35.17**	**367.02**	**4.86**	**1.96**	**0.005**
2003	**2.58**	**311.53**	**50.37**	**361.90**	**8.18-**	**3.17-**	**0.009-**
2004	**2.51**	**325.95**	**47.42**	**373.37**	**20.85**	**8.31**	**0.023**
2005	**2.88**	**296.37**	**66.55**	**362.92**	**6.17-**	**2.14-**	**0.006-**
2006	**3.23**	**272.67**	**92.33**	**365.00**	**0.43-**	**0.13-**	**0.000**
2007	**3.42**	**268.12**	**96.01**	**364.12**	**3.46-**	**1.01-**	**0.003-**
2008	**3.43**	**268.72**	**128.96**	**397.68**	**111.57**	**32.55**	**0.089**
2009	**3.12**	**324.30**	**43.26**	**367.56**	**7.79**	**2.50**	**0.007**
2010	**3.38**	**284.42**	**40.00**	**324.41**	**137.32-**	**40.68-**	**0.111-**
2011	**3.30**	**300.07**	**96.48**	**396.55**	**103.71**	**31.47**	**0.086**
2012	**3.44**	**287.93**	**98.88**	**386.81**	**74.62**	**21.70**	**0.059**
2013	**3.48**	**277.34**	**104.90**	**382.24**	**59.57**	**17.12**	**0.047**
2014	**3.53**	**266.46**	**107.60**	**374.06**	**31.61**	**8.95**	**0.025**
2015	**3.67**	**265.58**	**111.68**	**377.26**	**44.56**	**12.14**	**0.033**
2016	**3.71**	**242.08**	**115.11**	**357.18**	**29.49-**	**7.95-**	**0.022-**
2017	**3.92**	**217.47**	**119.97**	**337.43**	**108.58-**	**27.72-**	**0.076-**
2018	**4.05**	**235.03**	**119.61**	**354.64**	**42.61-**	**10.51-**	**0.029-**
2019	**4.18**	**269.15**	**117.13**	**386.27**	**88.34**	**21.12**	**0.058**
Average	3.24	strategic stock= 270.90			food safety coefficient= **0.229**		

** The value of the food security coefficient = (the volume of the strategic stock (the sum of the surplus or deficit) ÷ the amount of local consumption).

Source: Calculated from the data of Table (2)

Thirdly: the standard estimate of the finite dependent variable regression model.

In this part, the econometric estimation of the finite dependent variable regression model will be made, as it turns out by analyzing the impact of the most important factors that are supposed to have an impact on the food security coefficient of red meat as a dependent variable, and the most important economic factors that can be considered as having an indirect effect on them as independent variables, which is the Agricultural investment value in billion pounds (x1), per capita income in thousand dollars (x2), amount of manufactured feed in million tons (x3), population in million people (x4), excluding variables that have a direct impact on the food security coefficient of red meat, which are the quantity of production and the quantity of imports, and the quantity Exports and consumption of red meat, because they are variables directly included in the calculations of the Food Security coefficient.

- Economic factors affecting the food security factor of red meat in Egypt:

With regard to analyzing the impact of the most important factors that are supposed to have an impact on the coefficient of food security for red meat as a dependent variable, and the most important economic factors that can be considered as having an indirect effect on them as independent variables, namely, the value of agricultural investment in billion pounds (x1), individual income in thousand dollars (x2), Amount of processed feed in million tons (x3), population in million people (x4), with the exclusion of the variables that have a direct impact on the food security factor of red meat, which are the quantity of production and the quantity of imports, the quantity of exports, and the quantity of consumption of red meat, because they are variables that enter directly In the calculations of the food security coefficient. The results of the econometric estimation of the regression model are presented as follows:

The results of the regression model estimation (Topit Model):

By performing multiple regression analysis in the linear image using the Tobit Model method, it is clear from the following table (5):

1 - The value of agricultural investment (x1):

Agricultural investment is the main engine and driver for sustainable agricultural development and thus achieving food security by narrowing the gap between production and consumption and raising the efficiency of using available resources. It also leads to the establishment of new projects that develop productive and human capacity, which leads to an increase in income growth rates and economic prosperity.

It is clear from the table in Appendix (1) the development of the value of agricultural investment in Egypt during the period (2000-2019), where it was found that the average value of agricultural investment amounted to about 1.63 billion dollars, and the minimum was estimated at about 1.1 billion dollars in 2000, and the upper limit was estimated at about 2.6 billion dollars in 2019 at an increase rate over The minimum is about 48.2%.

The results of the model estimated in Table (5) indicate that an increase in investment in the agricultural sector by one billion pounds leads to an increase in the food security factor for red meat by about 0.0992 units, and this shows that an increase in investment in the agricultural sector by 10% leads to the possibility of an increase in the value of the food security factor of red meat with a percentage of 0.37%, and the significant effect of agricultural investment on the food security coefficient of red meat was proven at a statistical significance level of 1%, and the regression coefficient and economic logic were in agreement.

Table (5): Showed the results of estimating the Tobit regression model for the food security coefficient of red meat on the most important economic variables affecting it during the period (2000-2019).

Variables	Regression coefficient	Std. Error	(z) value	Prob
Constant	-0.3004	0.159376	-1.88	0.0594
Agricultural investment value (x1) D	0.0992	0.037154	2.67 ***	0.0076
Per capita Income Value (x2)D	0.0733	0.028557	2.56 **	0.0102
Amount of processed feed (x3) D	0.1618	0.079007	2.04 **	0.0405
Population (x4) D	-0.0013	0.003328	-0.40*	0.6827
	Error Distribution			
SCALE:C(6)	0.060100	0.011168	5.381285	0.0000
Mean dependent var	0.107684	S.D. dependent var		0.093974
S.E. of regression	0.073800	Akaike info criterion		-1.527278
Sum squared resid	0.076250	Schwarz criterion		-1.228559
Log likelihood	21.27278	Hannan-Quinn criter.		-1.468965
Avg. log likelihood	1.063639			

Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

Source: It was calculated from the data in Table No. (1) and using the econometric program package E-views 6.

2 - The value of individual income (x2):

Food security is a state of food stability in which food production efforts are combined with the purchasing power of individuals who do not produce food, so that all members of society are in a condition that allows them to obtain their food in light of their purchasing power. Therefore, the importance of studying the relationship between real individual income and the coefficient of food security for red meat.

It is clear from the table in Appendix No. (1) That the average value of the individual income amounted to about 1,930 thousand dollars, and the minimum value was estimated at about 0.955 thousand dollars in 2002, and the maximum was estimated at about 3,885 thousand dollars in 2012, at an increase rate over the minimum by about 307% during the same period.

The results of the estimated model in Table (5) indicate that an increase in the value of individual income by a thousand dollars leads to an increase in the food security coefficient of red meat by about 0.0733 units, and this shows that an increase in individual income by 10% leads to the possibility of increasing the value of the food security coefficient of red meat by 0. 29%, and the effect of real per capita income on the red meat food security coefficient was significant at a statistical significance level of 5%, and the regression coefficient and economic logic were in agreement.

3- Quantity of processed feed (x3):

Manufactured feed is important in ruminant diets as it is a source of protein and energy and many minerals and vitamins, which are essential components of animal vitality and activity, which makes it give the best rates of production with a preference for the transformational efficiency of food for meat production from 12-17%.

Table (1) in Appendix shows that the average amount of manufactured feed amounted to about 1.63 million tons, and the minimum was estimated at about 1.1 million tons in 2000, and the upper limit was estimated at about 2.6 million tons in 2019 at an increase rate over the minimum by about 136.4% during the same period.

The results of the model estimated in Table (5) indicate that an increase in the amount of processed feed by one million tons leads to an increase in the food security factor of red meat by about 0.1618 units, and this shows that an increase in the amount of processed feed by 10% leads to a possible increase in the value of the food security factor of red meat By 0.79%, the effect of the amount of processed feed on the food security coefficient of red meat was significant at a statistical significance level of 1%, and the regression coefficient and economic logic agreed.

4 - Population (x4):

There is no doubt that the increase in the population is associated with an increase in the demand for food, including red meat, and the consequent imbalance between supply and demand for red meat, and thus the negative impact on food security.

It is clear from the table in Appendix No. (1) That the average population was about 83 million people and the minimum was estimated at 67.59 million people in 2000, and the upper limit was estimated at about 101.64 million people in 2019, an

increase over the minimum by about 50.4% during the same period.

The results of the model estimated in Table (5) indicate that an increase in the population by one million people leads to a decrease in the food security coefficient of red meat by about -0.00013 units, and this shows that an increase in the population by 10% leads to the possibility of a decrease in the value of the food security coefficient of red meat by 0.033%, while the significance of the effect of the population on the coefficient of food security for red meat was not proven at the level of statistical significance of 5%, while the significance of the effect was proven at the level of statistical significance of 10%, as the regression coefficient and economic logic indicated were in agreement.

It reflects the value of the total flexibility, which amounted to about 0.333, which means that the increase in the variables under study referred to by 10% leads to an increase in the food security factor by about 3.33%.

The estimated model is efficient, as the average values for the error distribution of the dependent variable towards S.D depenentvar were about 0.093, and the value of the Schwarz criterion was about -1.22.

Fourthly: Statistical estimation of demand and consumer spending functions for red meat in the study sample in Fayoum Governorate.

1- Factors affecting the demand function for red meat in the study sample.

This part of the study includes the results of the statistical estimation of the functions of demand for red meat in the study sample, by studying the relationship between the required quantity of red meat in the study sample as a dependent variable, and the most important independent factors affecting the dependent variable represented in (x1) the price of red meat, (x2) Family members, (X3), the monthly income of the family, (4X) the price of poultry, (5X) the price of fish, and phase regression was used, which shows the preference of the double logarithmic picture to determine the most important factors affecting the demand for meat in the countryside and urban Fayoum for the different groups in the study sample.

-Factors affecting the demand function for rural red meat (first category less than 2,200 pounds).

The function estimates shown in the equation indicate that the most important determinants of the required quantity of red meat for the families of the study sample in Fayoum countryside in the first category in the sample of the study, which were statistically proven to be significant, in the presence of a direct relationship between the required quantity of meat and both (x2) the number of family members, (x3) the monthly income of the family , (4X) the price of poultry, meaning that by increasing these variables by 1%, this leads to an increase in the required quantity of red meat by 0.375%, 0.582%, 0.854%, respectively, as it is clear from the results of the function estimates that there is an inverse relationship between the required quantity of meat and the average price of a kilogram of red meat, as an increase in this variable by 1% leads to a decrease in the required quantity of red meat by 0.587%, while the total elasticity is about 1.224, as the value of the coefficient of determination (R^2) indicates Which amounted to about 83% of the changes occurring in the required quantity on red meat due to independent factors, and the value of (F) indicates the significance of the model as a whole at the significance level (0.01), where its value reached about 112.

Log Y I = 2.125 – 0.587Log x1 + 0.375 Log x2+ 0.582 Log x3 +0.8 54 Log x4
(7.1)** (5.6)** (4.2)** (5.1-)**
R2 = 0.83F=112**

-Factors affecting the demand function for urban red meat (first category less than 2,200 pounds).

The function estimates shown in the equation show that the most important determinants of the required quantity of red meat for the families of the study sample are for urban Fayoum in the first category in the sample of the study, whose significance has been statistically proven by the existence of a direct relationship between the required quantity of meat and both of (x2) the number of family members, (x3) the monthly income of the family, meaning that it By increasing these variables by 1%, this leads to an increase in the required quantity of red meat by 0.858%, 0.587%, respectively. By increasing this variable by 1%, this leads to a decrease in the required quantity of red meat by 0.415%, while the total elasticity was about 1.12, and the value of the coefficient of determination (R^2), which amounted to about 78% of the changes in the required quantity on red meat, is due to the factors The value of (F) indicates the significance of

the model as a whole at the significance level (0.01), where its value is about 92.

Log Y i=1.963 - 0.415Log x1 + 0.858 Log x2 + 0.587 Log x3
(5.88)** (6.73)** (- 2.29)*
R^2 = 0.78F=92**

- Factors affecting the demand function for rural red meat (the second category from 2200-4200 pounds).

It is clear from the function estimates shown in the equation that the most important determinants of the required quantity of red meat for the families of the study sample in Fayoum rural in the second category in the study sample, whose significance was statistically proven that there is a direct relationship between the required quantity of meat and both (x2) the number of family members (4X) the price of poultry. By increasing these variables by 1%, this leads to an increase in the required quantity of red meat by 0.694% and 0.987%, respectively, as it is clear from the results of the function estimates that there is an inverse relationship between the required quantity of meat and the average price of a kilogram of red meat, where By increasing this variable by 1%, this leads to a decrease in the required quantity of red meat by 0.621%, while the total flexibility is about 1.06. For the independent factors, the value of (F) indicates the significance of the model as a whole at the probability level (0.01), where its value is about 105.

Log Y I = 3.24 - 0.621 Log x1 + 0.694 Log x2 + 0.987 Log x4
(7.95)** (4.6)** (5.9-)**
R2 = 0.77 F=105**

-Factors affecting the demand function for urban red meat (the second category from 2200-4200 pounds).

The function estimates shown in the equation show that the most important determinants of the required quantity of red meat for the families of the study sample were for Fayoum urban in the second category in the study sample, whose significance was statistically proven that there is a direct relationship between the required quantity of meat and both of which are (x2) the number of family members, (x5) the price of fish, That is, by increasing these variables by 1%, this leads to an increase in the required quantity of red meat by 0.782% and 0.838%, respectively, as it is clear from the results of the function estimates that there is an inverse relationship between the required quantity of meat and the average price of a kilogram of red meat, Whereas, by increasing this variable by 1%, this leads to a decrease in the required quantity of red meat by 0.512%, while the total flexibility amounted to about 1.108, and the value of the coefficient of determination (R^2), which amounted to about 69% of the changes occurring in the required quantity on red meat, indicates It is due to the independent factors, and the value of (F) indicates the significance of the model as a whole at the probability level (0.01), where its value is about 90.

Log Y i= 3.971 - 0.512 Log x1 + 0.782 Log x2 + 0.838 Log x5
(5.22)** (3.9)** (5.6-)**
R2 = 0.69 F=90**

- Factors affecting the demand function for rural red meat (third category 4200 pounds or more).

It is clear from the function estimates shown in the equation that the most important determinants of the required quantity of red meat for the families of the study sample in Fayoum rural in the third category in the sample of the study, whose significance was statistically proven by the existence of a direct relationship between the required quantity of meat and both (x2) the number of family members, (3X) the monthly income of the family , (X5) the price of fish, meaning that by increasing these variables by 1%, this leads to an increase in the required quantity of red meat by 736%, 0.765%, and 0.598%, respectively, as it is clear from the results of the function estimates that there is an inverse

relationship between the required amount of meat and the average price of a kilogram of red meat, as an increase in this variable by 1% leads to a decrease in the required quantity of red meat by 0.776%, while the total elasticity reached about 1.323, as indicated by the value of the coefficient of determination (R^2), which amounted to about 86% Of the changes occurring in the required quantity of red meat due to independent factors, the value of (F) indicates the significance of the model as a whole at the probability level (0.01), where its value reached about 119.

Log Y i=6.385 - 0.776 Log x1 + 0.736 Log x2 + 0.765 Log x3 + 0.598 Log x5
(7.6)** (8.2)** (5.8)** (6.38 -)**
R2 = 0.86 F=119**

-Factors affecting the demand function for urban red meat (the third category 4200 pounds or more).

It is evident from the estimations of the function shown in the equation that the most important determinants of the required quantity of red meat for the families of the study sample for the urban Fayoum in the third category in the study sample, whose significance was statistically proven by the existence of a direct relationship between the required quantity of meat and both (x2) number of people, (X3) the monthly income of the family, (X4) the price of poultry, that is, by increasing these variables by 1%, this leads to an increase in the required quantity of red meat by 0.685%, 0.896%, 0.598%, respectively, as shown by the results of estimates of The function is that there is an inverse relationship between the required quantity of meat and the average price of a kilogram of red meat, as by increasing this variable by 1%, this leads to a decrease in the required quantity of red meat by 0.818%, while the total flexibility is about 1.361, as indicated by The value of the coefficient of determination (R2), which amounted to about 79% of the changes in the required quantity on red meat, is due to independent factors, and the value of (F) indicates the significance of the model as a whole at the probability level (0.01), where its value reached about 96.

Log Y I = 5.214 - 0.818 Log x1 + 0.685Log x2 + 0.896 Log x3 + 0.598Log x4
(7.9)** (8.6)** (5.8)** (-7.25)**
R2 = 0.79 F = 96**

- Factors affecting the demand for red meat for rural areas (total sample).

It is clear from the function estimates shown in the equation that the most important determinants of the required quantity of red meat for the families of the study sample in Fayoum rural for the total sample, whose significance was statistically proven by the existence of a direct relationship between the required quantity of meat and (x2) number of family members, (x3) the monthly income of the family, (5x) The price of fish, meaning that by increasing these variables by 1%, this leads to an increase in the required quantity of red meat by 0.557%, 0.574%, 0.758%, respectively, as it is clear from the results of the function estimates that there is an inverse relationship between the required quantity of meat and the average The price of a kilogram of red meat, as an increase in this variable by 1% leads to a decrease in the required quantity of red meat by 0.635%, while the total elasticity reached about 1.254, as indicated by the value of the coefficient of determination (R^2), which amounted to about 76% Of the changes in the required quantity on red meat due to independent factors, the value of (F) indicates the significance of the model as a whole at the probability level (0.01), where its value reached about 85.

Log Y i= 4.22 - 0.635Log x1 + 0.557Log x2 + 0.574Log x3 + 0.758 Log x5
(9.11)** (6.74)** (5.93)** (-2.5)*
R2 = 0.76 F= 85**

- Factors affecting the demand for urban red meat (total sample).

The function estimates shown in the equation show that the most important determinants of the required quantity of red meat for the families of the study sample for the urban Fayoum for the total sample, which were statistically proven to be significant in the presence of a direct relationship between the required quantity of meat and (x2) the number of family members, (x3) the monthly income of the family, (4X). The price of poultry, meaning that by increasing these variables by 1%, this leads to an increase in the required quantity of red meat by 0.498%, 0.588%, 0.617%, respectively, as it is clear from the results of the function estimates that there is an inverse relationship between the required quantity of meat and the average The price of a kilogram of red meat, as an increase in this variable by 1% leads to a decrease in the required quantity of red meat by 0.614%, while the total flexibility amounted to about 1.139, as indicated by the value of the coefficient of determination (R^2), which amounted to about 65% of the changes in the required quantity of red meat due to independent factors, the value of (F) indicates the significance of the model as a whole at the probability level (0.01), where its value is about 79.

Log Y I = 3.14 - 0.564 Log x1+ 0.498 Log x2 + 0.588Log x3 + 0.617 Log x4
(7.34)** (5.32)** (3.7)** (2.2-)*
R2 = 0.65 F=79**

2- Factors affecting the consumer spending function of red meat in the study sample.

This part of the study includes the results of the statistical estimation of consumer spending functions on red meat in the study sample, by studying the most important factors affecting consumption spending on meat as a dependent factor (y), and the most important independent factors affecting the dependent variable represented in (x1) red meat price,(x2) The number of family members, (X3) the monthly income of the family, (4X) the price of poultry, (5X) the price of fish, and phase regression was used, which shows the preference of the double logarithmic picture to determine the most important factors affecting expenditure on meat in the rural and urban Fayoum for the different categories included in the study sample.

- Factors affecting the consumer spending function of rural red meat (first category less than 2,200 pounds).

The function estimates shown in the equation indicate the positive and statistically significant relationship between consumer spending (y) for red meat in the Fayoum countryside for the first category in the study sample and between X2) the number of family members, (X3) the monthly income of the family, (5X) the price of fish, where the expenditure flexibility was estimated at about 0. 645%, 0.549% and 0.749% for these factors, respectively, which means that spending on red meat increases with the increase of the number of family members, the monthly income of the family, the price of fish by 1%, while the total flexibility amounted to about 1.356, and it became clear that there is an inverse relationship between Expenditure on red meat and the price of a kilo of meat (X1), which means that by increasing this variable by 1%, this leads to a decrease in consumer spending on red meat by 0.367%, as indicated by the value of the coefficient of determination (R2), which amounted to about 82% of the changes in spending The consumption of red meat is due to the independent factors, and the value of (F) indicates the significance of the model as a whole at the probabilistic level (0.01), where its value is about 122.2.

Log Y i= 1.58 - 0.367 Log x1+ 0.645 Log x2 + 0.549 Log x3+ 0.749 Log x5
(6.2)** (5.1)** (6.1)** (2.6 -)*
R2 = 0.82 F=122.2**

- Factors affecting the consumer spending function of urban red meat (first category less than 2,200 pounds).

It is clear from the significant estimates shown by the equation to the positive and statistically significant relationship between consumer spending (y) for red meat for urban Fayoum for the first category in the study sample and between X2) the number of family members, (X3) the family's monthly income, (5X) the price of poultry, where the spending flexibility was estimated at about 0.357% , 0.445% and 645% for these factors, respectively, which means that spending on red meat increases with an increase in the number of family members,

the monthly income of the family, the price of poultry by 1%, while the total flexibility is about 1.128, and it became clear that there is an inverse relationship between spending on Red meat and the price of a kilo of meat (X1), which means that by increasing this variable by 1%, this leads to a decrease in consumer spending on red meat by 0.419%, as indicated by the value of the coefficient of determination (R^2), which amounted to about 77% of the changes in consumer spending on red meat due to the independent factors, as the value of (F) indicates significant at the level of the model (0.01) where the probability of the whole model reached 64 .8 .

Log Y i= 2.4 - 0.419 Log x1 + 0.357 Log x2 + 0.545Log x3 + 0.645Log x4
(-2.9)* (2.68)* (4.8)** (5.1)**
R^2 = 0.77 F= 64.8**

- Factors affecting the consumer spending function of red meat for the countryside (the second category from 2200-4200 pounds).

The estimates show the function shown in the equation to the positive and statistically significant relationship between consumer spending (y) for red meat in the countryside of Fayoum for the second category in the study sample and between (X2) the number of family members, (X3) the monthly income of the family, where the spending flexibility was estimated at about 0. 487%, 0.659% for those factors, respectively, which means that spending on red meat increases with the increase of each of the number of family members, the monthly income of the family by 1%, while the total flexibility amounted to about 0.819, and it became clear that there is an inverse relationship between spending on red meat and the price of the kilo of meat (X1), which means that by increasing this variable by 1%, this leads to a decrease in consumer spending on red meat by 0.327%, as indicated by the value of the determination coefficient (R^2), which amounted to about 84% of the changes in consumer spending on red meat due to independent factors, as the value of (F) indicates the significance of the model as a whole at the level of (0.01) where its value is about (25).

Log Y i= 3.17 - 0.327Log x1 + 0.487 Log x2 + 0.659 Log x3
(4.31.)** (3.1)** (-2.6)*

R^2 = 0.84 F=258**

- Factors affecting the consumer spending function of urban red meat (the second category from 2200-4200 pounds).

It is clear from the significant estimates shown by the equation to the positive and statistically significant relationship between consumer spending (y) for red meat for urban Fayoum for the second category in the study sample and between (X2) the number of family members, (5X) the price of fish, where the spending flexibility was estimated at 0.675 %, 0.858% for those factors, respectively. , which means that spending on red meat increases with the increase of each of the number of family members, the price of fish by 1%, while the total elasticity is about 0.996, and it turns out that there is an inverse relationship between spending on red meat and the price of a kilo of meat (X1), which means that by increasing this variable of 1% leads to a decrease in consumer spending on red meat by 0.537%, as indicated by the value of the determination coefficient (R^2), which amounted to about 80% of the changes in consumer spending on red meat due to independent factors, as the value (F) indicates the significance of the model as a whole at the probability level (0.01), where its value was about 158.

Log Y i= 3.9- 0.537 Log x1 + 0.675 Log x2 + 0.858Log x5
(6.1)** (5.2)** (3.58-)**
R^2 = 0.80 F= 158**

- Factors affecting the consumer spending function of red meat for rural areas (the third category, 4200 pounds or more).

The function estimates shown in the equation indicate the positive and statistically significant relationship between consumer spending (y) for red meat in the Fayoum countryside for the third category in the study sample and between (X2) the number of family members, (X3) the monthly income of the family, (4X) the price of poultry, where the spending flexibility was estimated at about 0.225%, 0.347%, 0.467% for these factors, respectively, which means that spending on red meat increases with an increase in the number of family

members, the monthly income of the family, the price of fish by 1%, while the total flexibility amounted to about 1.039, as indicated by the value of The coefficient of determination (R^2), which amounted to about 81% of the changes in consumer spending on red meat, is due to independent factors, and the value of (F) indicates the significance of the model as a whole at the probability level (0.01), where its value is about 131.

Log Y i= 4.3 + 0.225 Log x2 + 0. 347 Log x3 + 0.467 Log x4
(6.4)** (5.1)** (2.87.)*

R2 = 0.81 F= 131**

- Factors affecting the consumer spending function of urban red meat (third category 4200 pounds or more).

It is clear from the significant estimates shown by the equation to the positive and statistically significant relationship between consumer spending (y) for red meat for urban Fayoum for the third category in the study sample and between X1)) the price of red meat, X2)) the number of family members, (X3) the monthly income of the family, where the spending flexibility was estimated at about 0.358% , 0.326% and 0.571% for those factors, respectively, which means that spending on red meat increases with an increase in the price of red meat, the number of family members, and the monthly income of the family by 1%, while the total flexibility amounted to about 1.255, as indicated by the value of the determination coefficient (R^2), which amounted to about 87 % of the changes occurring in consumer spending on red meat are due to independent factors, as the value of (F) indicates the significance of the model as a whole at the probability level (0.01), where its value is about 101.

Log Y i=5.1 + 0.358 Log x1+ 0.326 Log x2 +0.571 Log x3
(4.6)** (4.2)** (3.5) **
R^2 = 0.87 F=101**

- Factors affecting the consumer spending function of rural red meat (total sample).

The estimates show the function shown in the equation to the positive and statistically significant relationship between consumer spending (y) for red meat in the Fayoum countryside for the total sample and between each of (X1) red meat price, X2) the number of family members, (X3) the family's monthly income, (5X) the price of poultry, where spending flexibility was estimated at about 0 311%, 0.347%, 0.414%, 0.461% for these factors, respectively, which means that spending on red meat increases with the increase of the number of family members, the monthly income of the family, the price of poultry by 1%, while the total flexibility amounted to about 1.533, as indicated by the value of the determination factor. (R^2), which amounted to about 85% of the changes in consumer spending on red meat due to independent factors, as the value of (F) indicates the significance of the model as a whole at the probability level (0.01), where its value is about 123.

Log Y i= 5.5 + 0.311 Log x1 + 0.347 Log x2 + 0.414 Log x3 + 0.461Log x4
(6.3)** (.14)** (5.2)** (3.8)**
**123R2 = 0.85F=

- Factors affecting the consumer spending function of urban red meat (total sample).

It is clear from the significant estimates shown in the equation to the positive and statistically significant relationship between consumer spending (y) for red meat for urban Fayoum for the total sample and between (X1) the price of red meat, (X2) the number of family members, (X3) the monthly income of the family, (X5) the price of fish, which was estimated Expenditure flexibility by about 0.252%, 0.421%, 0.334%, 0.614% for these factors, respectively, which means that spending on red meat increases with the increase of the number of family members, the monthly income of the family, the price of fish by 1%, while the total flexibility amounted to about 1. 621, the value of the coefficient of determination (R^2), which amounted to about 76% of the changes in consumer spending on red meat, is due to the independent factors, and the value of (F) indicates the significance of the model as a whole at the probability level (0.01), where its value is about 91.

Log Y I = 6.1 + 0.252 Log x1 + 0.421 Log x2 + 0.334 Log x3 + 0.614 Log x5
(5.1)** (4.6)** (4.9)** (2.56)*
R^2 = 0.76 F= 91**

Recommendations:

The study reached a set of recommendations in light of the results that have been reached, as follows:

1- The necessity of increasing the food security factor of red meat for the country until a strategic stock is formed that suffices local consumption for at least six months, through appropriate strategies, the most important of which is encouraging investment in the animal production sector by providing the appropriate investment climate in order to increase local production of meat.

2- Procuring the necessary resources to support the state's ability to communicate with global markets and foreign trade relations to ensure the import of red meat to achieve the targeted levels of food security coefficients.

3- Providing various aspects of support to producers by providing soft loans and providing veterinary campaigns for livestock.

4- Expanding the production of red meat in light of an appropriate agricultural strategy by increasing local production of processed feed.

5- Expanding the production of non-traditional animal feed in new lands, such as millet crops, fodder cowpea, sorghum weed.

6- Providing appropriate forms of food subsidies for those eligible for support to families with limited income.

7- Attention to directing food consumption patterns to reach a balanced diet by spreading cultural and health awareness for Egyptian families and rationalizing the consumption of red meat, especially in rural areas.

References:

[1]. Adel Mohamed Khalifa Ghanem, Sahar Abdel-Moneim El-Sayed Qamra (PhD): Studying the economic factors determining the food security factors for sugar in Egypt, Conference on Agricultural Development Strategy and Food Security Challenges, Alexandria University, Faculty of Agriculture, Department of Agricultural Economics, July 28-29, 2010 .

[2]. Adel Muhammad Khalifa Ghanem (Doctor): The issue of food security in Egypt, an analytical study, Mansha'at al-Maaref, Alexandria, 1997.

[3]. Alaa Ahmed Qutb, Doaa Ismail Morsi (PhD) "A Standard Model for Food Security Factors for Red Meat in Egypt" The Egyptian Journal of Agricultural Economics, Volume Twenty-four, Issue One, March 2014, pg 4.

[4]. Ali Assem Abdel Aziz, Mohamed Salem Meshaal, Nagwa Mohamed Massad (Dr.) Alia Abdullah Hussein, an analytical study of the demand for red meat in Egypt "" The Egyptian Journal of Agricultural Economics – Volume 29 – Issue (2) June (b) 2019.

[5]. Asim Karim Abdel Hamid, Ali Abu Dhaif Muhammad Mutawa, Yahya Shaaban Yahya Bagheit, An Economic Study of the Demand for Red Meat and Its Alternatives in the Arab Republic of Egypt, Journal of Agricultural Economics and Social Sciences, Mansoura University, Volume (9), Issue (8), 2018 .

[6]. Asmaa Ahmed Mahmoud (Doctor) Analytical study of red meat prices in Egypt, The Egyptian Journal of Agricultural Economics - Volume Fourteen - Issue (4) 2004.

[7]. Central Agency for Public Mobilization and Statistics, Annual Bulletin of the Movement of Production and Foreign Trade and Available for Consumption of Agricultural Commodities, Various Issues.

[8]. Fry T. A Generalized Logistic Tobit Model, Memo, Department of Econometrics, Monash University, Clayton, Australia.1991.

[9]. Hisham Ahmed Mohamed Sabra, The Evolution of Food Consumption in the Light of Economic Liberalization, Master Thesis, Department of Agricultural Economics, Faculty of Agriculture, Al-Azhar University 2001.

[10]. Ibrahim Suleiman (Doctor): Arab Food Security and Regional and Global Changes, The Egyptian Journal of Development and Planning, Institute of National Planning, Volume (10), Number (2), pp. 124-152, Cairo, 2002 AD.

[11]. International Monetary Fund website www.imf.org/external/data.htm

[12]. Muhammad Muhammad Hafez Al-Mahi (Doctor): The most important features and indicators of current and future production and consumption of red meat in the Arab Republic of Egypt, Alexandria Journal of

Agricultural Research, 45, issue (1), Cairo, 2000 AD.

[13]. The website of the Food and Agriculture Organization. www.fao.org

[14]. Wael Ahmed Ezzat Al-Abed, Kamal Ibrahim Ahmed and Tamer Muhammad Al-Santarisi (PhD): Analytical study of the nutritional gap of red meat and its determinants in Egypt, Journal of Agricultural Economic and Social Sciences, Mansoura University, Volume (3), Issue (6), June 2012 AD.

[15]. World Bank website www.data.worldbank.org/country/egypt

Appendix:

Appendix (1): Evolution of the local national product, the value of agricultural production, the value of animal production, agricultural investment, the exchange rate, the individual income, the consumer price, the import price and the quantity of feed during the period (2000-2109).

Year	GDP (billion dollars)	The value of agricultural production is billions of dollars	The value of animal production is billion dollars	Agricultural investment (billion dollars)	Exchange rate EGP/Dollar	Individual income (thousand dollars)	Consumer price thousand dollars / ton	import price thousand dollars/ton	Feed quantity (million tons)
2000	**100.31**	**20.475**	**6.322**	**1.1**	**3.5**	**1.514**	**4.457**	**2.229**	**1,1**
2001	**97.76**	**14.114**	**6.002**	**1.6**	**4**	**1.375**	**3.980**	**1.99**	**1,6**
2002	**85.24**	**18.685**	**4.951**	**1.5**	**5.97**	**0.955**	**2.894**	**1.447**	**1,5**
2003	**80.2**	**15.472**	**5.528**	**1.3**	**6.26**	**0.974**	**3.613**	**1.807**	**1,3**
2004	**78.57**	**19.263**	**6.789**	**1.4**	**5.79**	**1.209**	**4.090**	**2.045**	**1,4**
2005	**89.34**	**21.929**	**8.160**	**1.5**	**5.79**	**1.313**	**4.824**	**2.412**	**1,5**
2006	**107.95**	**23.899**	**8.642**	**1.4**	**5.75**	**1.391**	**4.983**	**2.491**	**1,4**
2007	**131.61**	**26.934**	**9.544**	**1.4**	**5.79**	**1.744**	**5.461**	**2.731**	**1,4**
2008	**146.2**	**34.067**	**11.938**	**1.2**	**5.45**	**2.183**	**5.972**	**2.986**	**1,2**
2009	**189.3**	**32.889**	**12.000**	**1.7**	**5.76**	**2.292**	**7.108**	**3.554**	**1,7**
2010	**214.62**	**36.923**	**13.648**	**1.6**	**5.67**	**2.663**	**9.063**	**4.532**	**1,6**
2011	**229.94**	**41.874**	**14.182**	**1.5**	**5.97**	**2.864**	**9.296**	**4.648**	**1,5**
2012	**272.63**	**43.840**	**14.585**	**1.6**	**6.1**	**3.049**	**9.984**	**4.992**	**1,6**
2013	**281.03**	**41.051**	**14.225**	**1.6**	**6.88**	**2.885**	**9.535**	**4.767**	**1,6**
2014	**298.33**	**43.077**	**15.822**	**1.5**	**7.09**	**2.870**	**10.353**	**5.176**	**1,5**
2015	**323.66**	**36.244**	**13.600**	**1.6**	**8.78**	**2.477**	**9.431**	**4.715**	**1,6**
2016	**327.97**	**32.055**	**19.886**	**1.7**	**10.2**	**2.172**	**8.853**	**4.426**	**1,7**
2017	**231.16**	**20.407**	**13.829**	**2.2**	**17.85**	**1.417**	**5.647**	**2.824**	**2.2**
2018	**243.43**	**23.392**	**16.015**	**2.5**	**17.88**	**1.521**	**5.912**	**2.956**	**2.5**
2019	**292.1**	**27.261**	**17.468**	**2.6**	**16.8**	**1.699**	**6.577**	**3.289**	**2,6**
Average	**191.1**	**28.7**	**11.7**	**1.63**	**7.86**	**1.93**	**6.602**	**3.30**	**1.63**

Source:

1 - Central Agency for Public Mobilization and Statistics - Livestock Statistics - Miscellaneous Issues

2 - Central Agency for Public Mobilization and Statistics, Annual Bulletin of the Movement of Production and Foreign Trade and Available for Consumption of Agricultural Commodities, Various Issues.

3 - International Monetary Fund website www.imf.org/external/data.htm

4- The website of the Food and Agriculture Organization. www.fao.org

6/22/2022