# Simultaneous Econometric Model for determine the most important Determinants of Integration between Egypt and Sudan in the Production and Consumption of Red Meat

Rabab Gomaa Galal Abdallatif [1]; Abdallah Mahmoud Abdelmaqsoud[2]; Hussein El -Sayed Sarhan[2]

## ABSTRACT

**Sudan is the largest Arab and African country in livestock wealth, and it possesses the greatest potential to develop this wealth to broad horizons, making it one of the most important resources of all time. The livestock sector in Sudan has contributed to supporting the Sudanese economy by providing hard currency and increasing exports, with this sector contributing 15%-22% of the total gross domestic product in 2023.**

**The red meat sector is one of the most important agricultural production activities in Egypt, as it is a major source of agricultural income and a primary source of animal protein needed to feed the population. Red meat production is of particular importance in Egypt, as it is a source of income for many rural and urban families and a primary source of animal protein needs. The sector is considered a distinct investment area on a commercial scale.**

**Egyptian red meat production increases by approximately 1.65% and 3.11% for each 1% increase in the quantity of dry straw (per thousand tons) and the farm price (per kilogram), respectively. Meanwhile, Egyptian consumption decreases by approximately 1.03% and 1.01% for each 1% increase in imports, while production increases by approximately 0.23% over time.**

**Keywords: Simultaneous model, determinants of demand and supply, forecasting**

## INTRODUCTION

The issue of food has received considerable attention from numerous scholars at both regional and global levels, as it is regarded as one of the most critical and strategic concerns in Egypt due to its economic, social, and political dimensions. Food security is considered a key pillar of national strategic security. The Egyptian food basket is characterized by a deficiency in animal protein products (Soliman, 1997).

The value of agricultural production has been increasing during the period (2005-2023) with an average of about 447.09 billion pounds, as the minimum value of agricultural production reached about 126.9 billion pounds in 2005, and a maximum of about 1797.03 billion pounds in 2023, (http://www.fao.org).

Livestock production represents a significant component of agricultural activity. The crop production sector relies on the livestock sector to supply organic manure necessary for fertilizing agricultural lands and enhancing soil fertility, in addition to supporting various farming operations. Conversely, the livestock sector depends on the crop production sector for the provision of fodder crops cultivated exclusively for animal consumption (Morsi, 2013). Furthermore, agricultural residues and crop by-products serve as important sources of animal feed, which livestock can convert into high-value food products such as meat and milk (El-Saify & El-Mahi, 1996 and Amin, 2024).

The value of red meat is increasing during the period (2005-2023) with an average of about 49.41 billion pounds, with a minimum of about 18.8 billion pounds in 2005, and a maximum of about 136.21 billion pounds in 2023.

Sudan is considered the largest Arab and African country in terms of livestock resources, possessing the most extensive potential for developing this sector to broader horizons, which could render it one of the most valuable national assets. The livestock sector has played a significant role in supporting the Sudanese economy by generating foreign currency and increasing exports. In 2019, this sector contributed approximately 15% to 22% of the country's total Gross Domestic Product (GDP) (Ahmed et al., 2007 and Mohamed, 2015).

Sudan possesses untapped economic resources, such as livestock, which have not been utilized efficiently. This sector faces numerous challenges that have negatively impacted the country's economic development performance. A review of previous studies conducted in Sudan related to the subject of this research reveals the absence of a comprehensive study that clearly identifies the shortcomings and outlines potential development pathways in the livestock production sector in general, and in red meat production in particular (Saeed, 2012).

The red meat sector is considered one of the important agricultural production activities in Egypt, serving as a major source of agricultural income and a

**DOI: 10.21608/asejaiqjsae.2025.434579**
[1] PhD student of Agricultural Economics, Department of Agricultural Economics, Faculty of Agriculture, Ain Shams University
[2] Prof. of Agricultural Economics, Department of Agricultural Economics, Faculty of Agriculture, Ain Shams University
Received May 20, 2025, Accepted, June 19, 2025.

primary provider of animal protein essential for human nutrition. Red meat production holds particular significance in Egypt, as it represents a source of income for many households in both rural and urban areas and fulfills a fundamental part of the family's dietary protein requirements (Soliman *et al.*, 2012). Moreover, the sector constitutes a prominent area for intensive commercial investment (Metwally, 2002 and Mahmoud, 2013).

**Research Problem:**

The main problem addressed in this study lies in the insufficiency of production capacity to meet the growing consumption demand for red meat. The total consumption of red meat amounts to approximately 0.945 million tons, compared to a production volume of around 0.56 million tons. This has resulted in a production-consumption gap estimated at about 0.384 million tons in 2023, with a self-sufficiency rate of only 59.37%. Therefore, it is essential to examine the key factors influencing red meat production in order to reduce the food gap.

**Research Objectives**:

The primary objective of this study is to analyze the key factors influencing the quantity of production, consumption, and imports of red meat using a multiple equation model covering the period from 2005 to 2023. Additionally, the study employs simultaneous equations models in an attempt to utilize them for forecasting in the upcoming period. The ultimate aim is to provide recommendations for enhancing integration between Egypt and Sudan, and to emphasize the most critical factors necessary for increasing the value of livestock production, thereby contributing significantly to economic growth.

**Research Methodology and Data Sources**:

To achieve the objectives of the study, both descriptive and quantitative analytical methods were employed to address the research topics. A simultaneous econometric model was developed to identify the key determinants of the supply and demand for red meat and to forecast the behavior of the study variables (Abdelkader, 1990).

The research relies on data available from online sources such as (http://www.trademap.org), (http://www.worldbank.org), and (http://www.fao.org), as well as from publications of the Central Agency for Public Mobilization and Statistics (CAPMAS), the Ministry of Agriculture and Land Reclamation, the Economic Affairs Sector, the Arab Organization for Agricultural Development, and the Annual Statistical Yearbook. In addition, relevant academic studies and research papers were consulted to support the analysis.

**Research Findings** :

This section presents the statistical estimation of the macroeconomic econometric model for the supply and demand variables of red meat during the period 2005–2023, using multiple-equation models. Given that economic phenomena are often complex and cannot be adequately described or analyzed using a single equation, there is a consistent need to represent such phenomena as multifaceted, involving numerous interrelated economic relationships.

Multiple-equation models capture the mutual influence between dependent and independent variables within the system, unlike single-equation models, which typically reflect only a one-way effect from the independent to the dependent variable and fail to account for reverse causality. Accordingly, this study conducted a statistical estimation of the components of red meat supply and demand using multiple-equation models to better reflect the intricate interdependencies among the variables.

The estimation of a multiple-equation econometric model is relatively more complex than that of single-equation models, due to the numerous stages and key steps it requires. These begin with the formulation of economic relationships based on sound economic logic, followed by the identification of the most relevant variables through the simple correlation matrix. Next is the determination of the most suitable functional forms to be used in statistical analysis. Once the model parameters are specified, the model's identification status is assessed, and the most appropriate estimation methods are selected.

In this context, the study employed both aggregate and per capita forms of variables, in addition to using logarithmic transformations of each. National production value and national consumption value were also used in both their total and per capita forms. These various combinations and configurations of model variables were selected based on specific criteria: economic logic, statistical significance, and minimizing econometric measurement problems as much as possible. This approach was adopted to ensure the highest possible accuracy in the estimated results, thereby enhancing their reliability for future forecasting purposes.

Specification of the Econometric Model for Red Meat Demand and Supply Using Multiple-Equation Models:

The key economic relationships that constitute the econometric model for red meat demand and supply can be identified through the formulation of both the

demand function (consumption) and the supply function (production and imports).

**First: Estimation of the Simultaneous Econometric Model Parameters for the Red Meat Sector in Egypt**

**1 .Supply Function** :

The supply side in the Egyptian red meat demand model comprises two main relationships. The first relates to the factors influencing red meat production, while the second addresses the factors affecting the quantity of red meat imports into Egypt. The persistent and increasing annual deficit in domestic red meat supply relative to demand has necessitated a continual rise in import volumes.

**1- The Import Function Equation:**

The following equation represents the import function:

| |
|---|
| Where : $Y_{1t} = f(Y_{3(t-1)}, x_1, x_2, x_3, x_4, Y_{5(t-1)}, t)$ |
| $\mathbf{Y_1 t}$ = Quantity of red meat imports (in thousand tons) |
| $\mathbf{Y_3(t-1)}$ = Quantity of red meat consumption in the previous year (in thousand tons) |
| $\mathbf{X_1}$ = Egypt's national income (in USD) |
| $\mathbf{X_2}$ = Exchange rate |
| $\mathbf{X_3}$ = Population (in thousands) |
| $\mathbf{X_4}$ = Import price of red meat (USD per ton) |
| **T** = Time (trend variable) |
| $\mathbf{Y_5(t-1)}$ = Quantity of red meat production in Sudan in the previous year (in thousand tons) |

2- **Production Function:**

The production function for red meat can be represented by the following equation:

| |
|---|
| Where: $Y_{2t} = f(Y_{1(t-1)}, x_5, x_6, x_7, x_8, x_9, x_{10}, x_{11}, t)$ |
| $\mathbf{Y_2 t}$ = Volume of red meat production (in thousand tons) |
| $\mathbf{Y_1(t-1)}$ = Quantity of red meat imports in the previous year (in thousand tons) |
| $\mathbf{X_5}$ = Number of livestock heads for red meat production (in thousand heads) |
| $\mathbf{X_6}$ = Total quantity of dry fodder (in thousand tons) |
| $\mathbf{X_7}$ = Total quantity of concentrated feed (in thousand tons) |
| $\mathbf{X_8}$ = Total quantity of green forage crops (in thousand tons) |
| $\mathbf{X_9}$ = Total area of green forage crops (in thousand feddans) |
| $\mathbf{X_{10}}$ = Farm-gate price of red meat (in EGP per kilogram) |
| $\mathbf{X_{11}}$ = Livestock sector loans (in million EGP) |
| **T** = Time (trend variable) |

**2. Demand Function**

The demand side for red meat is represented through the consumption function, which can be expressed in the following mathematical form:

**1. The Consumption Function Equation:**

The following equation represents the consumption function for red meat:

| |
|---|
| Where: $Y_{3t} = f(Y_{2(t-1)}, x_1, x_3, x_{1\text{٢}}, Y_{4(t-1)}, t)$ |
| $\mathbf{Y_3 t}$ = Quantity of red meat consumption (in thousand tons) |
| $\mathbf{Y_2(t-1)}$ = Quantity of red meat production in the previous year (in thousand tons) |
| $\mathbf{X_1}$ = Egypt's national income (in USD) |
| $\mathbf{X_3}$ = Population (in thousands) |
| $\mathbf{X_{12}}$ = Retail price of red meat (in EGP per kilogram) |
| $\mathbf{Y_4(t-1)}$ = Quantity of Sudanese red meat exports in the previous year (in thousand tons) |
| **T** = Time (trend variable) |

**Second: Estimation of the Parameters of the Simultaneous Standard Model for the Red Meat Sector in Sudan**

**1- Supply Function:**

The supply side of the Sudanese demand model for red meat includes two main relationships. The first concerns the factors affecting red meat production, while the second pertains to the factors influencing the volume of Sudanese exports, which have led to an increase in exports.

**1 .Production Function**:

This can be expressed in the following equation:

| Where: $Y_{5t}= f(Y_{4(t-1)},x_{17}, x_{18},x_{19},t)$ |
|---|
| **$Y_5$t**: Volume of red meat production (in thousand tons) |
| **$Y_4$(t−1)**: Quantity of Sudanese red meat exports in the previous year (in thousand tons) |
| **$X_{17}$**: Number of livestock heads used for red meat production (in thousand heads) |
| **$X_{18}$**: Total area of green fodder crops (in thousand feddans) |
| **$X_{19}$**: Farm-gate price of red meat (in Sudanese pounds per kilogram) |
| **T**: Time (trend variable) |

**2. Demand Function:**

The demand side for meat is represented in the form of a consumption function for red meat. These functions can be expressed in the following mathematical form for consumption and exports:

**1. The following equation represents the consumption function:**

| Where : $Y_{3t} = f(Y_{1(t-1)},x_{13},x_{15},x_{20}, Y_{5(t-1)},t)$ |
|---|
| **$Y_6$t**: Quantity of red meat consumption (in thousand tons) |
| **$Y_5$(t−1)**: Quantity of Sudanese red meat production in the previous year (in thousand tons) |
| **$X_{13}$**: Sudan's national income (in US dollars) |
| **$X_{15}$**: Population (in thousand persons) |
| **$X_{20}$**: Retail price of red meat (in Sudanese pounds per kilogram) |
| **T**: Time (trend variable) |
| **$Y_1$(t−1)**: Quantity of Egypt's red meat imports in the previous year (in thousand tons) |

2. The following equation represents the export function:

| $Y_{4t} = f(Y_{5(t-1)},x_{13}, x_{14},x_{15},x_{16},Y_{3(t-1)},t)$ |
|---|
| **$Y_4$t**: Quantity of red meat exports (in thousand tons) |
| **$Y_5$(t−1)**: Quantity of Sudanese red meat production in the previous year (in thousand tons) |
| **$Y_3$(t−1)**: Quantity of Egyptian red meat consumption in the previous year (in thousand tons) |
| **$X_{13}$**: Sudan's national income (in US dollars) |
| **$X_{14}$**: Sudanese exchange rate |
| **$X_{15}$**: Sudan's population (in thousand persons) |
| **$X_{16}$**: Export price of Sudanese red meat (in US dollars per ton) |
| **T**: Time (trend variable) |

**Statistical Estimation Results:**

The previous results indicate that the model is **over-identified**, and therefore, the **Three-Stage Least Squares (3SLS)** method was the most appropriate technique used for estimating the following econometric model. The statistical analysis results were as follows:

**1. Import Equation**

$$\ln Y_{1t} = 4.22 - 0.23 \ln X_2 - 1.01 \ln X_4 + 1.32 \ln Y_{3(t-1)} + 2.11 \ln Y_{5(t-1)}$$

(2.87)* (-3.24)* (-5.01)** (3.44)* (3.11)*

$R^{-2} = 0.71$ D.W=1.78 F=14.66**

**2. Egypt's Production Equation:**

$$\ln Y_{2t} = 1.19 + 1.65 \ln X_6 + 3.11 \ln X_{10} - 1.03 \ln Y_{1(t-1)} + 0.23 T$$

(3.12)* (3.46)* (5.12)** (-2.12)* (2.03)*

$R^{-2} = 0.91$ D.W=1.88 F=18.33**

**3. Egypt's Consumption Equation:**

$$\ln Y_{3t} = 0.23 + 0.56 X_3 - 0.33 X_{12} + 0.12 \ln Y_{2(t-1)} + 0.31 \ln Y_{1(t-1)}$$

(4.2)** (2.78)* (-4.02)** (3.11)* (4.94)**

$R^{-2} = 0.79$ D.W=1.91 F=13.08**

**4. Sudan Export Equation**

$$\ln Y_{4t} = 1.45 - 0.55 \ln X_{15} + 0.21 \ln X_{16} + 1.11 \ln Y_{3(t-1)}$$

(3.11)* (-3.43)* (5.81)** (5.11)**

$R^{-2} = 0.88$ D.W=1.68 F=18.33**

**5. Sudan's Production Equation**

$$\ln Y_{5t} = 0.22 + 1.12 \ln X_{17} + 2.34 \ln X_{18} + 1.06 \ln Y_{4(t-1)}$$

$(1.21)^{ns}$ $(3.12)^{*}$ $(4.04)^{**}$ $(5.11)^{**}$

$R^{-2} = 0.66$ D.W=1.56 $F=11.34^{**}$

### 6. Sudan's Consumption Equation

$$LnY_{6t} = 0.45 - 0.23\ X_{20} - 0.\ lnY_{1(t-1)}$$
$$(1.23)^{ns} \quad (-6.12)^{**} \quad (-4.21)^{**}$$
$$R^{-2} = 0.77 \quad D.W=1.89 \quad F=12.39^{*}$$

where :

**: Indicates the significance of the regression coefficients and the model as a whole at a significance level of 0.05

*: Indicates the significance of the regression coefficients and the model as a whole at a significance level of 0.05

ns. Indicates the insignificance of the regression coefficients and the model as a whole.

$R^{-2}$: refers to the adjusted coefficient of determination value.

F: indicates the significance of the model as a whole.

Source: Collected and calculated (http://www.fao.org, http://www.trademap.org, http://www.world bank.com).

As shown in Equation (1), the quantity of red meat imports into Egypt increases by approximately 1.32% and 2.11% for every 1% increase in the previous year's consumption and Sudanese red meat production, respectively. Conversely, the quantity of Egyptian red meat imports decreases by about 0.23% and 1.01% for every 1% increase in the exchange rate and the import price of red meat, respectively. This indicates that the most influential variables affecting the quantity of red meat imports in a given year are, in order of impact: the previous year's consumption, followed by the exchange rate, import price, and Sudanese red meat production

The statistical significance was confirmed at the 0.05 level, and the overall model was found to be statistically significant. It was also revealed that approximately 71% of the variation in the quantity of red meat imports can be attributed to changes in the independent variables under study.

As shown by Equation (2), the quantity of red meat production in Egypt increases by approximately 1.65% and 3.11% for every 1% increase in the quantity of dry roughage (in thousand tons) and the farm-gate price of red meat (in EGP per kilogram), respectively. Conversely, the quantity of production decreases by about 1.03% and 1.01% for every 1% increase in the volume of imports. Production also increases by approximately 0.23% over time. Thus, the most influential variables affecting the quantity of red meat production in a given year are the quantity of dry roughage, the farm-gate price in EGP per kilogram, the volume of imports, and time, respectively.

The model demonstrated statistical significance at the 0.05 level, and the overall model was also statistically significant. It was found that approximately 91% of the variations in red meat production are explained by the independent variables included in the study.

Based on the above, Equation (3) indicates that the quantity of red meat consumption in Egypt increases by approximately 0.56%, 0.12%, and 0.31% for every 1% increase in the population (in thousands), the quantity of production in the previous year, and the volume of red meat exports from Sudan (in thousand tons) in the previous year, respectively. In contrast, the quantity of consumption decreases by about 0.33% for every 1% increase in the retail price of red meat. Therefore, the most influential variables affecting the quantity of red meat consumption in a given year are population, retail price of red meat, quantity of production in the previous year, and red meat exports from Sudan.

The model was statistically significant at the 0.05 level, and the overall model also proved to be statistically significant. It was found that approximately 79% of the variations in red meat consumption are attributed to the changes in the independent variables under study.

As shown in Equation (4), the quantity of Sudanese red meat exports increases by approximately 0.21% and 1.11% for every 1% increase in the export price of meat and Egypt's red meat consumption in the previous year, respectively. In contrast, the quantity of Sudanese exports decreases by approximately 0.55% for every 1% increase in population. Thus, the most influential variables affecting the volume of red meat exports in a given year were the previous year's Egyptian consumption, followed by the export price and Egyptian red meat consumption levels.

The model was statistically significant at the 0.05 level, and the overall model also proved to be statistically significant. It was found that approximately 88% of the variation in Sudanese red meat export volumes can be attributed to changes in the independent variables under study.

As also indicated by Equation (5), the quantity of Sudanese red meat production increases by approximately 1.12%, 2.34%, and 1.06% for every 1% increase in the number of Sudanese livestock heads, the area of green fodder (in thousand feddans), and the volume of Sudanese meat exports in the previous year, respectively. Thus, the most influential variables affecting red meat production in a given year are, in order of importance, the number of Sudanese livestock heads, the area of green fodder, and the volume of Sudanese meat exports in the previous year.

The model was statistically significant at the 0.05 level, and the overall model also proved to be significant. It was found that approximately 66% of the variation in Sudanese red meat production can be attributed to changes in the independent variables under study.

As demonstrated by Equation (6), the quantity of Sudanese red meat consumption decreases by approximately 0.23% and 0.43% for every 1% increase in the retail price of red meat and the volume of Egyptian imports of red meat in the previous year, respectively. This indicates that the most influential variables affecting Sudanese red meat consumption in a given year are the retail price of red meat and the previous year's volume of Egyptian red meat imports.

The statistical significance of the model was confirmed at the 0.05 level, and the overall model was found to be statistically significant. It was also revealed that approximately 77% of the variation in Sudanese red meat consumption can be explained by changes in the independent variables considered in the study.

**Third: The Use of Simultaneous Equations Models in Forecasting Future Expected Values for Red Meat**

Future forecasts of economic conditions are instrumental in shaping state policies and determining the necessary directions to align with anticipated developments. These forecasts enable the identification of the economic outlook for key commodities, and based on this insight, the government can formulate appropriate policies concerning such goods. The proposed econometric model can be utilized to estimate the expected future values of the endogenous variables included within the model.

**Forecast Using Simultaneous Models for Future Expected Values of Egyptian and Sudanese Red Meat during the Period (2024–2028):**

It is evident from Table (1) that the average quantities of production, imports, and consumption of Egyptian red meat during the period (2024–2028) amounted to approximately 498.57, 207.15, and 914.46 thousand tons, respectively.

The forecast using simultaneous models for the future expected values of Sudanese red meat during the period (2024–2028) shows that the average quantities of production, exports, and consumption of Sudanese red meat amounted to approximately 878.46, 21.47, and 917.62 thousand tons, respectively.

**Table 1. Forecast of Demand and Supply for the Red Meat Sector (in thousand tons) during the period (2024–2028)**

| Years | Egypt | | | Sudan | | |
|---|---|---|---|---|---|---|
| | Import Quantity (1000 tons) | Consumption (1000 tons) | Red Meat Production (1000 tons) | Exports (1000 tons) | Consumption (1000 tons) | Red Meat Production (1000 tons) |
| 2024 | 171.76 | 931.52 | 543.68 | 21.15 | 915.16 | 912.67 |
| 2025 | 196.09 | 923.11 | 520.09 | 21.55 | 916.39 | 900.56 |
| 2026 | 214.00 | 915.67 | 489.89 | 20.95 | 917.62 | 888.46 |
| 2027 | 222.00 | 909.22 | 479.68 | 21.49 | 918.84 | 866.36 |
| 2028 | 231.91 | 892.78 | 459.48 | 22.18 | 920.07 | 824.26 |
| **Average** | **207.15** | **914.46** | **498.57** | **21.47** | **917.62** | **878.46** |

Source: The data were compiled and calculated from Table (1) in the appendices.

**Recommendations** :

1- Reducing farm production costs for producers by regulating the feed trade and preventing monopolistic practices.

2- Importing high-yield meat breeds from countries with proven advancements in livestock production.

3- Directing agricultural policies toward the increased allocation of substantial portions of newly reclaimed lands for the cultivation of forage crops.

4- Activating the system of agricultural waste recycling to increase on-farm production of livestock feed.

5- Expanding the cultivation of alfalfa (Medic ago sativa), especially in newly reclaimed lands being prioritized by the state, to help reduce the fodder gap.

6- Introducing incentives to increase the cultivated area of quinoa, given its promise as a potential forage crop.

7- Expanding the establishment of farms, slaughterhouses, and cold storage facilities along the Egyptian-Sudanese border to reduce costs and preserve meat quality.

## REFERENCES


Abdelkader, M.A. 1990. Methods of measuring economic relationships, Alexandria Library.

Ahmed, N.A., M.A. Marai and A.S. Abdel Wahab. 2007. An analytical study for the positive effects of the integration between Egypt and Sudan in the field of red meat and its effect on the price meat in Egypt, Journal of Agricultural Sciences Al-Mansoura University, 32: 431 - 441.

Amin, M.H.M. 2024. An economic and analytical study of the red meat sector in Sudan, Journal of African and Nile Basin Research and Studies, 8: 713-730.

Arab Organization for Agricultural Development, Annual Statistical Book, various issues.

Central Agency for Public Mobilization and Statistics (CAPMAS), Annual Bulletin of Food Prices (Producer, Wholesale, Retail Prices), various issues.

Central Agency for Public Mobilization and Statistics (CAPMAS), Annual Statistical Book, various issues.

El-Saify, E.A. and M.M. El-Mahi. 1996. An analytical study of the key determinants of livestock development and marketing of its products in new lands in the Arab republic of Egypt, College of Economics and Administration, King Saud University, Qassim Branch, 1417 AH.

Mahmoud, D.H.I. 2013. Economics of livestock production in Nahda Area, Alexandria, PhD Dissertation, Department of Agricultural Economics, Faculty of Agriculture, University of Alexandria.

Metwally, L.A. 2002. An economic study of the production and marketing of red meat in Egypt., Diploma, National Planning Institute, Agricultural Planning Center.

Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Livestock Statistics, various issues.

Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Central Administration of Agricultural Economics, Agricultural Prices Bulletin, various issues.

Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Economics Bulletin, various issues.

Mohamed, S.I.A. 2015. An economic study of some small agricultural projects in the field of livestock production in Menoufia governorate, Master's Thesis, Department of Agricultural Economics, Faculty of Agriculture, Ain Shams University.

Morsi, O.I.M. 2013. Economics of livestock production, Master's Thesis, Department of Agricultural Economics and Agribusiness Management, Faculty of Agriculture, University of Alexandria.

Saeed, M.A. 2012. An economic study of the efficiency of red meat production in Fayoum governorate, Egyptian Journal of Agricultural Economics, 22.

Soliman, I. 1997. Estimation of simulation models for food animal products markets, Journal of Contemporary Egypt, The Egyptian society for political economy, Statistics and legislation, 88: 1-27

Soliman, I., S.M. Ahmed and H.A. Fawzy. 2012. Spatial advantage and economic efficiency of livestock production activities on small Egyptian farms, Egyptian Journal of Agricultural Economics, 22: 679-686.

http://www.fao.org

http://www.trademap.org

http://www.worldbank.org

https://www.fao.org/faostat/en

## Appendices

**Table 1. Shows the quantities of production, consumption, exports, and imports of red meat in Egypt and Sudan during the period 2005–2023**

| Years | Egypt | | | Sudan | | |
|---|---|---|---|---|---|---|
| | Import Quantity (1000 tons) | Consumption (1000 tons) | Red Meat Production (1000 tons) | Exports (1000 tons) | Consumption (1000 tons) | Red Meat Production (1000 tons) |
| 2005 | 151.9 | 1133.0 | 853.0 | 5.65 | 1687.48 | 1692.62 |
| 2006 | 224.0 | 1312.0 | 877.0 | 0.02 | 1704.95 | 1714.44 |
| 2007 | 256.8 | 1382.0 | 915.0 | 2.17 | 1872.91 | 1891.53 |
| 2008 | 114.1 | 1176.0 | 959.0 | 6.69 | 1955.21 | 1956.70 |
| 2009 | 103.8 | 1196.0 | 980.0 | 6.00 | 2008.70 | 2008.90 |
| 2010 | 499.7 | 1052.0 | 791.0 | 8.35 | 2004.66 | 2008.90 |
| 2011 | 154.2 | 1033.0 | 787.0 | 8.10 | 1922.30 | 1930.20 |
| 2012 | 192.0 | 1052.0 | 788.0 | 61.40 | 1901.30 | 1962.20 |
| 2013 | 101.0 | 1118.0 | 780.0 | 3.52 | 964.70 | 968.01 |
| 2014 | 63.5 | 1223.0 | 769.0 | 36.40 | 1000.99 | 1037.39 |
| 2015 | 315.2 | 1408.0 | 793.0 | 36.93 | 1007.24 | 1043.45 |
| 2016 | 269.4 | 1167.0 | 791.0 | 8.30 | 1047.75 | 1055.19 |
| 2017 | 231.7 | 1155.0 | 792.0 | 15.01 | 1091.39 | 1105.80 |
| 2018 | 236.4 | 1263.0 | 639.0 | 12.74 | 903.31 | 915.30 |
| 2019 | 292.0 | 1003.0 | 544.0 | 10.05 | 910.35 | 919.30 |
| 2020 | 267.5 | 924.0 | 512.0 | 13.65 | 910.23 | 923.39 |
| 2021 | 190.4 | 1021.0 | 589.0 | 16.32 | 907.82 | 923.98 |
| 2022 | 170.4 | 960.0 | 612.0 | 17.85 | 914.87 | 932.43 |
| 2023 | 125.7 | 945.0 | 561.0 | 20.99 | 914.16 | 934.77 |

Source: http://www.trademap.org

https://www.fao.org/faostat/en

Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Livestock Statistics, various issues.

## الملخص العربي

# نموذج قياسي آني لتحديد أهم محددات التكامل بين مصر والسودان في إنتاج واستهلاك اللحوم الحمراء

رباب جمعة جلال عبد اللطيف؛عبد الله محمود عبد المقصود؛ حسين السيد سرحان

تعتبر دولة السودان هي أكبر الدول العربية والأفريقية امتلاكا للثروة الحيوانية وتتوفر فيها أكبر الإمكانيات اللازمة لتطوير هذه الثروة إلى أفاق رحبة تجعلها أحد أهم الثروات علي الإطلاق، ولقد ساهم قطاع الثروة الحيوانية في دولة السودان في دعم الاقتصاد السوداني من خلال توفير العملة الصعبة وزيادة الصادرت حيث يساهم هذا القطاع بنسبة من ١٥%-٢٢% من جملة الناتج الإجمالي المحلي لعام ٢٠٢٣.

ويعد قطاع اللحوم الحمراء أحد الأنشطة الإنتاجية الزراعية المهمة في مصر، حيث تعد من المصادر الرئيسة المهمة للدخل الزراعي، ومصدراً رئيساً من مصادر البروتين الحيواني اللازمة لتغذية السكان. ويشكل إنتاج اللحوم الحمراء أهمية خاصة في مصر؛ حيث يعد مصدر دخل للكثير من الأسر في الريف والحضر، ومصدراً أساسياً لاحتياجات الأسرة من البروتين الحيواني، ويدخل القطاع ضمن المجالات الاستثمارية المتميزة على النطاق التجاري المكثف.

إن كمية الإنتاج للحوم الحمراء المصرية إلى تزايد كمية الإنتاج بنحو ١,٦٥ % ، ٣,١١% لكل زيادة بنسبة ١% في كلا من كمية الأتبان الجافة بالألف طن والسعر المزرعي بالجنيه للكيلو جرام لكل منهم على الترتيب. بينما يتناقص كمية الاستهلاك المصري بنسبة بلغت حوالي ١,٠٣%، ١,٠١% في لكل زيادة في كمية الاستيراد بنسبة ١% ، ويزداد الإنتاج بنحو ٠,٢٣ مع الزمن.

الكلمات المفتاحية: النموذج الآني، محددات الطلب والعرض، التنبؤ.