



## An analytical study for the Egyptian Sorghum market

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**Abstract:** The sorghum crop is one of the strategic crops that has many uses and food industries, as it is the main component of concentrated feed and one of the most important grain crops in the world. And the problem of sorghum in Egypt is limited to Low productivity per acre, limited cultivated areas, and competition for unit area for other summer crops such as soybeans, sunflowers and summer green fodder for livestock. Statistical estimates showed an increase in the areas of yellow corn over white corn in Egypt due to the demand for yellow more and necessary for feed factories, in addition to its higher price than white corn in Egypt. Despite that, the increase in production for the yellow corn crop is due to the increase in areas, not to develop new varieties or higher productivity. It was also shown that the consumption of feed annually increased by about 0.4 million tons, on the other hand, the low self-sufficiency rates and the increase in the size of the gap, which led to the owners of the poultry industry in Egypt increased the volume of imports of yellow corn and due to the Corona pandemic, it faced some obstacles, such as the delay of trucks in front of Egyptian imports, which led to an increase in the local price of corn and the control of some traders over the market. It also showed the concentration of corn production in Egypt in the governorates of Upper Egypt more than in Lower Egypt, where the governorates of Upper Egypt were represented by about 12.3%, 9.1%, 7.2%, 7.1%, for the governorates of Minya, Assiut, Beni Suef, Sohag, where the weather suitable for agriculture and suitable for drying prevails. Not infected with pests and diseases. The most important countries exporting yellow corn to Egypt showed that Ukraine occupied the first place by about 31%, and Argentina, the United States and Brazil came with about 21.1%, 18.8%, 13.3% of Egypt's total imports from the world's exporting yellow corn countries. Estimates of the Simultaneous model indicate an increase in the amount of production and consumption of sorghum, reaching about 7.43 million tons, and about 3.46 million tons, respectively, in 2023, while it reached about 7.58 million tons, and about 3.56 million tons in 2025. The estimates showed an increase in the volume of imports of yellow corn, which amounted to about 17,537 million tons in 2023 and took an increasing trend towards 17.80 million tons in 2025, which requires us to take all measures and strategies to increase local production and find solutions as alternatives in the feed industry in order to save the hard currency incurred by the state in the volume of imports.

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### Introduction

The sorghum is considered one of the strategic crops that has many uses and is involved in many industries. White corn is used in the manufacture of flour and oil, which is used as food for humans, and yellow corn is used in the manufacture of concentrated feed and is used as food for livestock and birds, and the by-products of the oil and flour industry used in the manufacture of livestock and poultry feed, as it contains vitamin A, the keratin, pantothenic acid. There is no doubt that the prices of white meat and the production of eggs and red meat are directly affected by the movement of international

prices for yellow corn, as it is the main component of concentrated feed, and is considered one of the most important cereal crops in the world and sorghum ranks third in terms of relative importance among the world's cereal crop, Whether from cultivated area or total global production and that after wheat and rice crops.

### The problem

The problem of yellow corn in Egypt is limited to the low productivity of acres, the limited cultivated areas, and competition for the unit area for other summer crops such as soybeans, sunflowers,

medicinal and aromatic plants, and summer green fodder for livestock. The researchers also study the problem from the production side only without addressing the demand side.

A summation of all aspects of demand and all aspects of supply, and since the study of the market from one angle leads to biased results and far from reality and economic logic, so it is required to study the supply and demand side simultaneously so that these results can be used in the interpretation and explanation of the local market structure and the interrelationships between all variables Which is a good basis for studying the Egyptian market for the adequacy of its aspects of the yellow corn crop, and Egypt occupies the fourth place in the world in importing yellow corn, as it estimated the average quantity of imports of yellow corn about 10.32 million tons of the total world imports of yellow corn, which was estimated at 172.3 on average for the period (2016-2020), representing approximately 6% of the total world imports for the same period, which made Egypt one of the countries most affected by global changes in the global corn market.

#### The target of the research

The research aimed to identify the local market for the yellow corn crop in terms of its shape and characteristics, and the real controller in it, in order to allow how to deal with it, and to choose the appropriate time to import corn during the period assigned to it. This is through making a standard economic model consisting of the most important intertwined and mutual variables that make up the corn market. In the world, whether production, consumption, import, export or stock, which are the components of the economic model of the corn crop, which is based on a set of relationships and variables that have an impact on the yellow corn market in the world.

#### The research method

In its economic analysis, the research relied on descriptive and quantitative statistical methods of analysis, in addition to the econometric methods represented in the estimation of some models such as simple and multiple linear regression, as well as the use of the phase regression method, and the correlation coefficients matrix, in addition to the use of a Simultaneous standard model to study the local corn market and refer to the global market.

#### Data sources

The study relied on published and unpublished secondary data from various sources such as the Central Agency for Public Mobilization and Statistics, the Food and Agriculture Organization of the World, and the bulletins of the economic affairs sector, and the use of global databases of the Internet, in addition to economic studies and scientific messages related to the subject of the study.

#### The research results

##### First: - The economic importance of the sorghum crop in Egypt.

White and yellow corn contain the same composition in general, except for the increase in the content of yellow corn from vitamin A, and some acids, but yellow corn is more efficient in increasing the weight of animals compared to white corn. The product of grinding its grain is also used in animal feed and green fodder. This is what makes yellow corn of great economic importance, despite this, but the percentage of the cultivated areas of it does not exceed approximately 39% of the total cultivated areas of sorghum, throughout the Republic, unlike white corn, whose cultivated areas were estimated at approximately 62% of the total area Cultivated from sorghum, and this is illustrated by the results of Table (1) and the graph.

Table (1): The ratio of the area of yellow and white corn to the area of sorghum in Egypt for the period (2017-2020)(Area in thousands of acres)

The years	White area	Yellow area	Total area of sorghum	% Yellow corn to total sorghum	% White corn to total sorghum
2017	1457.6	842.2	2299.7	36.6	63.4
2018	1488.8	846.8	2335.6	36.3	63.7
2019	1365.5	782.7	2148.2	36.4	63.6
2020	1471.8	917.3	2389.1	38.4	61.6

Source: Economic Affairs Sector–Ministry of Agriculture–Agricultural Statistics Bulletins, various issues.

Second: - Some economic indicators of the Egyptian yellow corn crop.

### 1- The development of the Egyptian production of yellow corn

Estimating the general time trend of the area development of the yellow corn crop for the period (It was shown from Table (2) that the cultivated area increased annually by about 55 acres, and the coefficient of determination reached about 0.93, which means that 93% of the changes occurring in the area of the crop are due to factors whose impact reflects the variable of time, and statistical estimates indicated stability the relative average acre productivity of the corn crop in Egypt, while the results also showed that the increase in production for the yellow corn crop is due to the annual increase in area, where the annual increase in production was estimated at about 180 tons and the coefficient of determination was estimated at about 0.91, which means that 91% of the changes in production is due to the factors whose effects reflect the change of time.

### 2-The development of the Egyptian production of white corn

By estimating the general time trend of development area for white corn for interval (2005-2020)Table (2) shows that the cultivated area decreases annually by about 157.6 acre, the coefficient of determination reached about 0.29, which means that 29% of the changes that occur in crop area is due to the factors whose impact reflects the change of time ,Statistical estimates indicated the relative stability of the average feddan productivity of the white corn crop in Egypt, while the results also showed that there is an annual decrease in the production of the white corn crop and this is due to the annual decrease in the area. Factors whose effects reflect the change of time.

The decrease was estimated at about 88 tons annually, and the coefficient of determination was estimated at 0.58, which means that 58% of the changes in production are due to factors that reflect the effects of time variable.

### 3- Evolution of the planting price of the Egyptian sorghum.

It turns out from table (2)Time trend estimation For the agricultural price of the sorghum for interval (2005-2020)The results showed that the annual increase in the agricultural price of the sorghum increased by 21.8 pounds per ardeb, the coefficient of

determination reached about 0.94, which means that 94% of the changes that occur in farm price of the crop is due to the factors whose impact reflects the change of time ,The estimates indicated the extent to which the results matched the economic logic.

### - The Internet network of the Food and Agriculture Organization of the World.

### 4- The development of national consumption of sorghum in Egypt.

The development of appreciated Time trend of National consumption of sorghum for interval (2005-2020) show from table (2) The national consumption increased by about 0.4 million tons annually, the coefficient of determination reached about 0.80, which means that 80% of the changes in national consumption of the crop is due to the factors whose impact reflects the change of time. Statistical estimates indicated a decrease in the self-sufficiency rate of Egyptian sorghum, by about 0.8% annually, which negatively affects the nutritional gap of sorghum, so the gap increases annually by 0.32 million tons, while the results also indicated that the increase in the size of the nutritional gap for crop is due to the production of the yellow corn crop is characterized by stability and the increase in it is not noticeable, as there are many uses for the Egyptian sorghum crop, and the coefficient of determination was estimated at about 0.40, 0.66, which means that 40% and 66% of the changes in the self-sufficiency ratio and the size of the food gap for the sorghum are due to the factors Which reflects its effects over time.

From the above, it is clear that the increase in the areas of yellow corn over white in Egypt is due to the demand for yellow is more and necessary for feed factories, in addition to its higher price than its white counterpart in Egypt. Despite that, the increase in production for the yellow corn crop is due to the increase in areas, not to develop new varieties or higher productivity, as It was also shown that the consumption of feed increased annually by about 0.4 million tons, on the other hand, the low rates of self-sufficiency and the increase in the size of the gap, which led the owners of the poultry industry in Egypt to increase the volume of imports of yellow corn and because of the Corona pandemic, they faced some obstacles such as the delay of trucks in front of Egyptian imports, which led to increase the local price of corn and control some traders over the market.

Table (2): General time trends of some economic indicators to yellow and white corn for the period (2005 - 2020)

Dependent variables	The equation	R <sup>2</sup>	F
Cultivated area of yellow corn in acres	$Y = 1099.75 + 55.065 X (13.28)^{***}$	0.93	176.5
Average yield of yellow corn	$Y = 3.13 + 0.0064 X (0.987)$	0.65	0.975
yellow corn production in ton	$Y = 66716.4 + 180,034 X (11.87)^{**}$	0.91	140.97
The cultivated area of white corn in acres	$Y = 1748968.3 - 157.57 X (2.426)^{**}$	0.29	5.89
average yield of white corn	$Y = 3.53 + 23.22 X (0.528)$	0.195	0.279
White corn production in ton	$Y = 6155680.2 - 88.345 X (4,379)^{**}$	0.58	19.18
The average farm price of the Egyptian sorghum crop L.E/ ardeb	$Y = 116.34 + 21.85 X (14.74)^{**}$	0.94	217.2
National consumption of corn million / ton	$Y = 10.5 + 0.395 X (7.21)^{**}$	0.80	52.05
self-sufficiency ratio	$Y = 57.02 - 0.791 X (-2.96)^*$	0.40	8.79
The size of the nutritional gap in corn million/ton	$Y = 4.3 + 0.32 X (5.05)^{**}$	0.66	25.5

Source: It was calculated from the data- Agricultural Affairs Sector, Egyptian Ministry of Agriculture

### Third: - The relative importance of the Egyptian sorghum-producing governorates.

The data in table (3) showed the relative importance of the average production of sorghum in the governorates of the Republic, as it was found that the crop is based on cultivation in the governorates of Upper Egypt more than in Lower Egypt, where it is characterized by the climate and soil suitable for that, where its cultivation is early and can be grown on two arrows, as well as the weather condition enriches about the entry of the corn crop into the stage of dryers, and this leads to a decrease in cost, in the case

of the feed industry. Minya governorate came in the first place, where the relative importance in corn production was estimated at 12.3% for Minya Governorate, while it came in the second and third place in the governorates of Beheira and Sharqia, estimated at 11.8%, 10.6% While the governorates of Assiut, Menoufia and Beni Suef came in the order by about 9.1%, 8.1%, 7.2%, and Sohag governorate and the rest of the governorates of the Republic came in with about 7.1%, 33.8% of the total production of the corn crop in Egypt.

Table (3): The relative importance of the productive governorates to sorghum for the average period (2015-2019) (thousand tons)

provinces	2015	2016	2017	2018	2019	average	%
El-mania	278.9	282.9	280.8	268.4	277.6	277.72	12.3
El-Behera	270.3	265.4	273.8	290.6	227.1	265.44	11.8
El-sharkia	254.2	219.8	224.9	295.2	201.8	239.18	10.6
Assiut	198.7	201.4	204.1	208.1	211.7	204.8	9.1
El-Menoufia	210.6	166.6	185.3	168.7	178.5	181.94	8.1
Beni Suef	180.3	176.5	170.4	132.7	149.1	161.8	7.2
Suhag	159.6	160.6	160.4	162.5	160.4	160.7	7.1
The rest of the provinces	707	741.5	799.8	809.5	742	759.96	33.8
Total	2259.7	2214.7	2299.7	2335.6	2148.2	2251.58	100

Source: -Agricultural Affairs Sector, Egyptian Ministry of Agriculture

**Fourth: - Development of the quantity and value of Egypt's imports of yellow corn.**

Shown from table (4) Statistical estimate the general time trend for quantity and value of Egyptian imports of yellow corn crop per interval (2005-2020). The quantity and value of Egyptian imports of corn increased annually by 2.4 thousand tons and 6.6

thousand dollars, respectively, the coefficient of determination reached about 0.82, 0.57, and This means that 82%, 57% of the changes that occurred in quantity and value of Egyptian imports of sorghum is due to the factors whose impact reflects the change of time. The estimates also showed that there is a relative stability of the import price in dollars per ton.

Table (4) Time trends for the development of the quantity and value of Egypt's imports yellow and white corn for the period (2005 - 2020)

Dependent variables	The equation	R <sup>2</sup>	F
The quantity of imports is thousand tons	$Y = 7.79 + 0.0024$ <b>** (7.8)</b>	0.82	61.4
The value of imports is thousand dollars	$Y = 1.716 + 0.0066$ <b>** (4.17)</b>	0.57	17.44
Import price dollars / ton	$Y = 4.36 + 0.0163$ (0.832)	0.051	0.692

Calculated from the data-Network the Internet of the Food and Agriculture Organization of the World.

**Fifth: The relative importance of the most important yellow corn exporting countries to Egypt.**

The data in table (5) showed the most important producing and exporting countries of the sorghum crop to Egypt, where the average period (2016-2019) was estimated for the most important exporting countries and it was found that Ukraine is one of the most important global markets that provides crop to the Egyptian market, as it occupied the first place in

exporting to Egypt, representing about 31% of Egypt's total imports from the world. While the Egyptian market absorbs about 21.1% of the Argentine market of Egypt's total imports from the world's most important corn exporting countries, Egypt imports about 18.8% of the US market of Egypt's total imports from the world, while Brazil ranks fourth for exporting yellow corn to the market. It was estimated at 13.3% of Egypt's total imports from the world's exporting countries to Egypt.

Table (5): The relative importance of the most important countries exporting to Egypt for yellow corn for the average period (2016-2019) (Million tons)

Exporting countries	2016	2017	2018	2019	Average period (2016-2019)	%
Ukraine	3	2.9	2.4	3.6	3.0	31.0
Argentina	1.9	1.7	2.1	2.4	2.0	21.1
United State	1.4	1.3	1.8	2.7	1.8	18.8
Brazil	0.9	1.3	1.4	1.5	1.3	13.3
Other	1	1.9	1.8	1.4	1.5	15.9
Egypt's total imports	8.2	9.1	9.5	11.6	9.6	100

Source: - the Internet network of the Food and Agriculture Organization of the World.

From the above it was found that the concentration of corn production in Egypt in the governorates of Upper Egypt is more than in Lower Egypt, where the governorates of Upper Egypt were represented by about 12.3%, 9.1%, 7.2%, 7.1%, for the governorates of Minya, Assiut, Beni Suef, Suhag, where the favorable weather for agriculture and

favorable conditions prevails. For drying and not to be infected with pests and diseases.

The data of the Ministry of Foreign Trade also showed that the most important corn-exporting countries to Egypt were Ukraine, which ranked first by about 31%, and Argentina comes (it is considered the only competitor after Ukraine to export yellow corn to Egypt), the United States and Brazil come in

about 21.1%, 18.8% and 13.3% of Egypt's total imports from the world's yellow corn-exporting countries.

#### Sixth: Statistical estimation for the economic simultaneous equations model for the Egyptian market of sorghum.

In Egypt, there is dependence on the cultivation and production of white corn in all villages for human consumption and animal and poultry consumption. The country has recently moved to expand the cultivation of yellow corn due to what the country incurs in the import bill and because it is a major component of concentrated fodder. Due to the weak data of yellow corn, it was relied on the data of white and yellow corn in the estimation and analysis. Since the model under study is over-defined (consists of four variables, and since Egypt does not export yellow corn, the model consists of only three equations, the production equation, the consumption equation, the imports equation), the over-defined equations over identified models: If  $K$  is greater than  $M-1$ , that is, the number of variables that did not appear in the equation to be distinguished (endogenous variables + predetermined variables) > the number of model equations or the number of internal variables of the model, and thus there is more than one value for some estimated parameters, The two-stage least squares method (SLS) is the most appropriate method used. The results of the analysis were as follows:

#### The first stage of simultaneous equations model: comparison between estimated value in model by actual value for variables in the study.

##### 1- A function of the Egyptian sorghum production.

The estimates of the production function in Table (6) show that there is a statistically significant direct relationship between the planting price and the production of white corn, where the yellow corn production increases by about 0.46%, 0.72%, for each increase in the planted price of the yellow corn, and the production of white corn as a competitive crop over the area of yellow corn production by 1%, and this may explain that the increase in yellow corn production is necessarily due to the increase in the area of it, which in turn is due to the farmers' response to the increase in the farm price to it, as it is clear that the production of yellow corn decreased by 0.18% compared to an increase of 1%, Which encourages an increase in production to reduce import and thus provide foreign currency to buy from the foreign market, and this indicates the value of  $R^2$  That about 0.79 of the factors affecting the model are due to the independent factors in the model and that about 0.21 are due to other factors that were not included in the estimated model, as indicated by the value of  $(F)$  to the occasion of the picture double logarithmic at appreciation The equation sports for convenience nature data statistic used.

As it is clear from graph (1) of the relationship between the estimates of the actual and estimated production equation for Egyptian sorghum that there is no difference between the actual and estimated values for it.



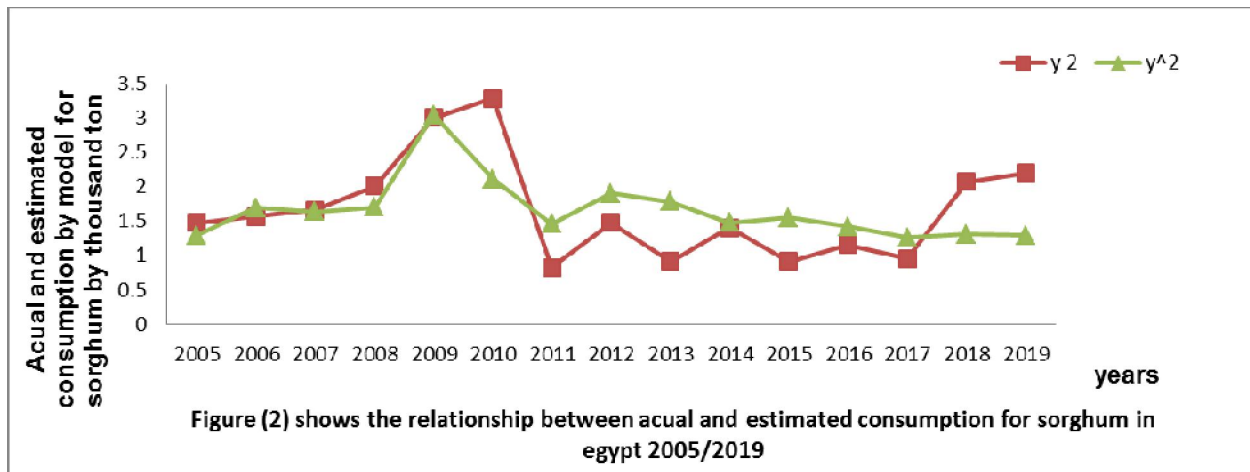
Source: Actual values: Agricultural Economics Bulletins, Ministry of Agriculture, various issues.  
Estimated values: Equation (1) was calculated from the model estimates.

**2- The Egyptian yellow corn consumption function.**

The consumption function estimates in Table (6) showed a statistically significant direct relationship between the volume of consumption, the number of laying hens, the consumer price of feed and production of yellow corn, where the volume of consumption of yellow corn increased by 2.17%, 1.35%, for each increase in the number of laying hens, and corn production. Yellow corn increased by 1%, while the volume of yellow corn consumption increased by 2616.9 for each increase in consumer

price (1/ consumer price in pounds per ton). R2 That about 0.37 of the factors affecting the model are due to the independent factors in the model, as indicated by the value of (F) to the occasion of the picture double logarithmic at appreciation the equation sports to fit nature data statistic used.

As shown in graph (2), the relationship between the actual and estimated consumption equation estimates for Egyptian sorghum, there is no difference between the actual and estimated values for the consumption of sorghum.



Source: Actual values: Agricultural Economics Bulletins, Ministry of Agriculture, various issues. Estimated values: Equation (2) was calculated from the model estimates.

Table (6): Statistical estimate for the Simultaneous equations model For the Egyptian market of yellow corn for the period (2005-2019).

Dependent variables	The equation	R <sup>2</sup>	F
Y <sup>1</sup> Egyptian sorghum production	LN Y1 = 10.43 + 0.46 LNx1 + 0.72 LNx2 – 0.18 LNy3 **(-3.27)   **(4.28)   **(5.68)	0.79	14.46
Y <sup>2</sup> Egyptian consumption of sorghum	LN Y2 = 9.09 + 2.18 LNx3 + 2616.9 LNx4 + 1.35 LNy1 (0.560)           **(2.34)   *(1.96)	0.37	2.18
Y <sup>3</sup> yellow corn imports	LN Y3 = 6.36 + 3.24 LNy2 – 7.5 LNx5 – 0.58 D *(-1.95)   (-1.75)   **(3.61)	0.69	8.34

calculated from the data-Network the Internet of the Food and Agriculture Organization of the World.

Whereas: -

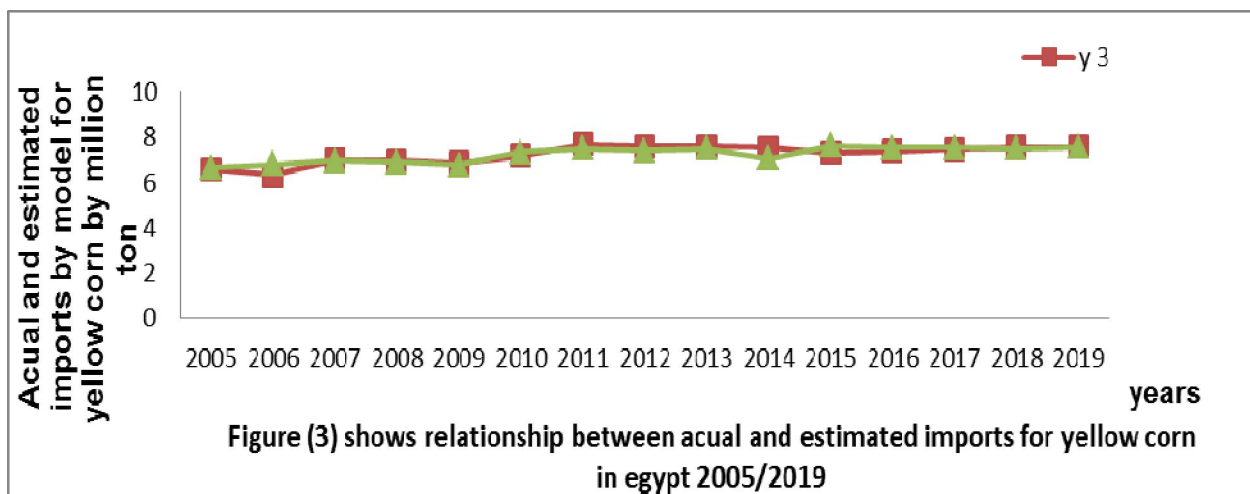
- Y1 expresses the production of sorghum in thousand tons.
- Y2 expresses the consumption of sorghum in thousand tons.
- Y3 expresses the quantity of imports of yellow corn in thousand tons.
- X1 expresses the agricultural price of yellow corn in Egyptian pounds per ton.
- X2 expresses the production of white corn in thousand tons.
- X3 expresses the export price (the price of Ukraine dollars per ton divided by the price of Argentina dollars per ton).
- X4 expresses the number of laying hens in thousand chickens.
- X5 expresses the reciprocal of the Egyptian consumer price.
- D expresses a transitional variable that expresses the decision to float the Egyptian pound, as it takes its zero value (2005-2015) and its value one (2016-2019).

### 3- The function of imports of yellow corn.

Estimates of the import function of yellow corn show that there is a positive, significant, statistically direct relationship between the amount of yellow corn imports and the volume of consumption, as the volume of Egyptian imports of yellow corn increases by about 3.2% for each increase in the volume of consumption by 1%, which indicates that the Union of Poultry and Companies Feed and forage importers and yellow corn depend entirely on imports from foreign markets. It was also found that there is a statistically significant inverse relationship between (the export price of Ukraine divided by the price of Brazil) and the volume of imports, where the volume of imports decreases by 7.5% for each increase in price (the result of dividing the price of Ukrainian export divided by the Argentine price) by 1%, which shows that when the volume of imports decreases, the price of Ukrainian export to Egypt increases, since the Ukrainian market is the most important export of yellow corn to Egypt, and the Argentine market is the first competitor Ukraine has exported yellow corn to the Egyptian import market, and a dummy variable was introduced to reflect the period before the flotation of the pound and after the flotation, as this

indicates that the countries bear its great difficult work after flotation about it before the flotation in 2016, which necessitates the government to develop production, agricultural and marketing policies and incentives that support yellow corn farmers to increase the cropped and cultivated area, and this indicates the value of agricultural, marketing and promotional ones that support yellow corn farmers to increase the cropped and cultivated area, and this indicates the value of agricultural, marketing and promotional ones that support corn farmers to increase the cropped and cultivated area, and this indicates the value of R2 about 0.69 of the factors affecting the model are due to the independent factors in the model, and the value of (F) indicates the suitability of the double logarithmic picture in estimating the mathematical equation for its suitability to the nature of the statistical data used.

It is also clear from graph (3) of the relationship between the estimates of the equation of the actual and estimated imports of Egyptian yellow corn that there is no difference between the actual and estimated values of the volume of Egyptian imports of yellow cor.



Source: Actual values: Agricultural Economics Bulletins, Ministry of Agriculture, various issues.  
Estimated values: Equation (3) was calculated from the model estimates.

#### Forecasting the estimated values of the Simultaneous equations model for the period (2023-2025).

Table (7) indicates the estimates of the Simultaneous model. It is expected that the amount of production of yellow corn will increase, reaching about 7.43 million tons in 2023, while it reached about 7.58 million tons in 2025. The forecast estimates indicated an increase in the consumption of yellow corn, which amounted to about 34.6 million

tons in 2023 until it reached about 35 million tons in 2025, which indicates the state's tendency to use alternatives to yellow corn in the manufacture of concentrated feed. The estimates also showed an increase in the volume of Egyptian imports of yellow corn, reaching about 17.5 million tons in 2023, while it increased to about 17.8 million tons in 2025, which requires us to take all measures and strategies to increase local production and find solutions as alternatives in the feed industry in order to save the



hard currency that it incurs the country in the volume of imports. In view of the recent changes and the plan of the state and the Ministry of Agriculture to rise to fill the food gap of commodities strategy (corn–soybean–sunflower–Wheat and beans–Others) the forecast for the year has been estimated 2025 only to

be in line with reality data, and given what the Egyptian economic conditions are witnessing of rapid changes in recent times, when the government takes strict measures to grow and import corn, the corn gap will shrink the rate of self-sufficiency rises and imports fall to less than half.

Table (7): Predicting the variables of the Simultaneous model of sorghum in Egypt and the imports of yellow corn in Egypt (2023-2025)

The years	production quantity	national consumption	import quantity
2023	7.43	34.6	17.5
2024	7.51	33.3	17.6
2025	7.58	35.0	17.8

Source: - Estimated from the results of the Simultaneous model in the research.

#### Actual nutritional needs and production policies for feed in Egypt:

Table (8) shows the food needs of sorghum , where the area of sorghum was estimated at about 2.2 million feddans, with a total production of about 7.6 million tons, and imports were estimated at about 9.37 million tons, and the volume of consumption was about 16.95 million tons, which generated a gap between production and consumption that amounted to about 9.36 million tons, which affected the self-sufficiency rate, which amounted to about 44.8% in

2020, and this shows us the nutritional needs of sorghum, especially yellow, ranging from 20 to 25 million tons annually and increasing annually due to the increase in the volume of food consumption, which results in the increase in the size of the population and the size of the livestock. Hence, the decision-makers must search for some production policies that would provide sufficient fodder for livestock, taking into account reducing the burden on the state budget.

Table (8): The actual nutritional needs of maize in Egypt in the year 2020

Area / thousand acres		million production tons	Imports million tons	Consumption million tons	Gap Mt	self-sufficiency ratio
yellow	white					
746.1	1406.4	7.593	9.371	16.953	9.36	44.8
2.2						

Source: Agricultural Economics Bulletin - Economic Affairs Sector - Ministry of Agriculture.

#### Policies and mechanisms for providing animal feed:

- 1- Expansion of yellow corn cultivation in new areas such as reclamation areas (Minya - Nubaria - Sharkia - Dakahlia).
- 2- The research center improves and selects new varieties with high productivity.
- 3- The extension agency educates farmers on making silage without the cobs, with the development of some alternative ingredients to compensate for the nutritional value.
- 4- Awareness on making rice straw silage with some nutrients to increase its nutritional value.
- 5- Encouraging vegetable producers to grow vegetables in greenhouses, and providing open spaces for corn cultivation.

#### Recommendations

1. Develop production and promotional policies for the purpose of Expanding the cultivation of the yellow corn crop in the new lands Encouraging sorghum producers especially in the new lands by watching in the province of Minya, Nubaria, Farafra, East Owainat and Toshka.
2. Supporting the requirements of yellow corn production of fertilizers and providing high-yield seeds at an appropriate price for the farmer.
3. Encouraging farmers to engage in contract farming through the Contract farming Center at the Ministry of Agriculture.
4. Activating the role of agricultural extension in agricultural departments and increasing seminars and field schools in villages and all regions to urge farmers to cultivate sorghum and its importance in the feed industry.

5. The government adopts mechanisms to activate the center of contract farming and make it a national center, and remove all obstacles toe.
6. The government builds all strategic goods and makes them national security, and urges all parties to make them national food security.
7. Countries intervene in the form of banning imports at the time of importing the Egyptian yellow corn crop.

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