Standard Modeling of the Food Gap of Chickpeas Crop in Syria and Levels Forecasting

M.Alawee Ali [1] and Dr. Ibrahim HamdanSaqr[2] and Dr.Mohamed Mahmoud [3.]

(1): PhD student, Faculty of Agriculture, Tishreen University, Latakia, Syria.
(2) : Professor, Agricultural Economics department, Faculty of Agriculture, Tishreen University, Latakia, Syria.
(3): Professor, Department of Economics and Planning, Faculty of Economics, Tishreen University, Lattakia, Syria.

Abstract

This research sheds light upon the topic of the food gap of chickpeas crops in Syria ,with the purpose of laying out the proper standard model for the food gap for this crop, and forecasting their levels through 2025, utilizing the descriptive analytic method , standard quantitative analysis , and resorting to secondary data taken from official and non-official data with the Ministry of Agriculture and Agrarian Reform, Central Bureau for Statistics, and data of the Food and Agriculture Organization (FAO); the National Center for Agricultural Policies, Arab Monetary Fund, International Trade Organization, and functionalizing Box et Jenkins models to forecast food gap levels. It was found out that the prospective values of the food gap (deficit) for the chickpeas will keep the same value , the matter which necessitates importing circa 15.8 thousand tons yearly over the years to come (2019-2025), using ARIMA (0,1,2) model.

Key words: *food gap, crop, chickpeas, forecasting.*

I. INTRODUCTION

Food security formed a main and substantial target to the agricultural strategy in Syria. (In the early sixties through mid-eighties,) agricultural strategies and policies were centrally directed towards achieving self-satisfaction of the important strategic food commodities, which was accompanied by agricultural products support programs, necessities, pricing, and building infrastructuresThis method realized positive results in production increase and securing prices; however, that led to some negative effects through pressure on the treasury resources, and exhausting natural resources. The policy modification program, which was later implemented, purposed to abolish or minimize those deformities , hence securing efficiency of utilizing domestic resources, where the exigencies support has been decreased, and lessening governmental intervention in the planning process began .During the nineties, the process of commercial liberalization started taking an accelerated character. Moreover, crop diversification had been encouraged, and more attention paid for more effective Syrian participation in international trade (National Center for Agricultural Policies, 2013).

Food deficit problem is regarded among the most prominent aspects of the economic crisis in developing countries, particularly in the current circumstances of Syria, after this deficit became aggravating year after another. The food deficit in strategic chickpeas crop constitutes one of the most important constituents of the food gap in Syria (Al Dailemy, 2016).

II. RESEARCH PROBLEM

There is a real problem , which is that the basic chickpeas- dependent food , is no longer sufficient to fulfill thebasic needs , particularly amidst the current Syrian circumstances on the one hand, and the increasing domestic demand on food, on the other, which will negatively affect the food security levels . The research problem , which the research is seeking handle can be summed up as per the following question:

What are the prospective trends for the chickpeas crop food gap in Syria?

III. RESEARCH IMPORTANCE ANDOBJECTIVES

This research sheds lights on the topic of food gap of the strategic chickpeas crop in Syria, to show the drawbacks that have to be dealt with, and investigate the reasons behind the deteriorated agricultural real status ,via measuring the lack occurring in producing those crops, and volume of annual demand, to achieve food security standards, and look into the ways to establish a balance between consumptive demand and domestic production.

Based upon the aforementioned, the objectives of this research are as follows:

1- To analyze the chickpeas crop food gap in Syria, being regarded a main cause of the food security problem.

2- Standard modeling of the studied crop and forecasting its levels through 2025.

IV. MATERIALS AND METHODS

A-This research was carried out in Syria, whose area is about 125,180 km, and characterized by diverse climatic and geographic nature, besides possessing six basic regions for agricultural systems. These systems vary between the irrigated thickening in coastal regions to pastoral and semi-pastoral systems in arid regions east of the country (Wattenbach, 2006).

B- It has been depended on the principle of integration between the analytical descriptive method, and standardized quantitative analysis, together with resorting to secondary data taken from official and non-official data in the Ministry of Agriculture and Agricultural Reform , Central Bureau for Statistics, data of the UN Food and Agriculture Organization (FAO), National Center for Agricultural Policies, Arab Monetary Fund, International Trade Organization, The United Nations Conference on Trade and Development (UNCTAD).

C- A set of descriptive and standard statistical techniques, and models of "Box et Jenkins" were used for forecasting the chronological series levels of the food gap during the period /1986-2018), using the statistical package for social sciences program (SPss) , as well as the following economic indexes:

- Proportional self-satisfaction equation, adopted by the State Planning Authority in the Syrian Arab Republic (Bakkour, 1985)

Self-satisfaction ratio = production / available for consumption x 100

Where: the available for consumption = (production +import)-(export).

- Food Gap: is measured by the amount of difference between total various food needs and gross domestic product thereof.

V. RESULTS AND DISCUSSION

A. Measuring the Strategic Chickpeas Crop Food Gap in Syria

The economic policy works for providing what cannot be locally produced, by achieving abundance in producing what can be produced. Covering the commodities imports is a basic problem manifested in determining the self-satisfaction concept, which this research is required to know the way it is calculated. The economic literature distinguished between two kinds of self-satisfaction:

1- Absolute self-satisfaction:, which reflects the state's capability to produce agricultural products and dispense with import.

2- Partial self-satisfaction : which reflects the state's ability to produce food together with import so as to fulfil some food needs, covered by domestic food production surplus . As for the food gap, it expresses the extent to which domestic food production is capable of facing domestic consumption needs thereof. Most often, this deficit is redressed by import, and the more the difference, the more it denotes domestic economy's inability to satisfy the community's needs (Rajab, 2014). By tracking the production development, import and export of the studied strategic crops, we identified that which is available for production, and determined self-satisfaction rates and import dependency for each individual crop, following taking the average for each five years, as in Table (1).

Commodity	Description	(1986-1995)	(1996-2000)	(2001-2005)	(2006-2010)	(2011-2015)	(2016-2018)
Chick peas	Production	41.1	56.5	69.3	45.9	47.8	32
	Import	0	0	5.8	5.8	15.9	15.9
	Export	12.6	9.3	11.4	1.1	0.1	0.1
	Available	28.5	47.2	63.7	50.6	63.6	47.8
	Food Gap	12.6	9.3	5.6	-4.7	-15.8	-15.8
	Self-satisfaction	144.2	119.7	108.8	90.7	75.2	67.1
	Imports Dependency	0	0	7.7	11.2	25.1	33.2

Source: Annual Agricultural Statistical Group for various issues, International Trade Center (ITC) database, and the Arab Organization for Agricultural Development for different issues.

From the previous table, its noted that the map drawn during the period 1986-1995 for lentils crop achieved a self-satisfaction rate of 144.2%, i.e. with a surplus of 44.2% over the local country's need thereof, and the food gap volume (surplus) amounted to about 12.6 thousand tons of chickpeas, due to the increase of production to consumption rate , and the increase of exported chickpeas amount , without importing any quantity thereof.

In the period 1996-2000, the amount of self-satisfaction mounted to 119.7 % , i.e. with a surplus of 19.7 % over the country's domestic need, and the volume of food gap (surplus) about 9.3 tons of chickpeas. In the two periods 2001-2005 and 2006-2010, self-satisfaction rate totaled 108.8% and 90.7%, respectively; and the amount of food gap circa 5.6 (surplus), and 4.78- (deficit) thousand tons of chickpeas, respectively.

In the years of crisis, the rate of self-satisfaction in the period 2011-2015 reached about

75.2%, and a food gap deficit of 15.8-thousand tons, and self-satisfaction rate in 2016-2018 reached about 67.1% with a food gap surplus of 15.8- thousand tons of chickpeas, owing to the great damage to the chickpeas crop all through the Syrian crisis period. The main cause for the exclusion of wide areas from production is attributed to their being located within unstable regions, particularly in Aleppo and Edlib governorates , forming the largest two of the total areas planted with this stuff, which resulted in a decline in the unit area productiveness , hence, impact on the food security level.

B. Modeling the Food Gap (Supply and Demand) Gap

The food gap originates from the difference between the domestically produced quantities (Supply) and total of the quantities needed for local consumption of food commodities and stuffs (domestic demand). According to what was listed in the report of the Arab Organization for Agricultural Development in 2009, a set of factors and determinants controlling agricultural production quantities and food gap volume in the Arab countries, including Syria, represented by the scant planted area , scarcity of water resources, decline of irrigation efficiency, scarcity of irrigated land area (Tarqo,2014). In addition to the previous reasons for the aggravation of food gap of the Arab World , "Ahmad Al Utheim" adds the following reasons :

1. Prevalence of the consumptive style in the Arab World, in which food represents the main consumptive stuff, the matter which leads to directing any rise in income to the demand for food more than any other commodity.
2. Mal investment of agricultural resources available in the Arab World, where volume of the lands actually utilized in agricultural production totals about one third of the area of cultivatable lands.
3. Weak utilization in the field of Arabic agricultural research, and fluctuating agricultural policies, the matter, which leads to weak investments, directed to the agricultural sector (Al Utheim, 2014).

This aspect aims at trying to model the behavior of the food gap for strategic crops in Syria, and forecasting their levels through 2025 using "Box et Jenkins" method for each crop separately as follows:

C. Forecasting the Supply and Demand Gap for Chickpeas crop in Syria

When testing the stability of the lentils crop food gap in Syria, it was found from figure (1) that the chronological series is unstable and periodically changing, therefore, taking the differences series is inevitable, and the first difference is usually sufficient to handle this problem.
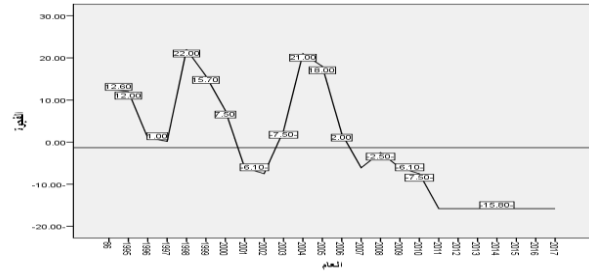

Figure (1) Food gap series for chickpeas crop in Syria.

To recognize the preliminary model to describe the series, the two autocorrelation functions as per Figure (2).
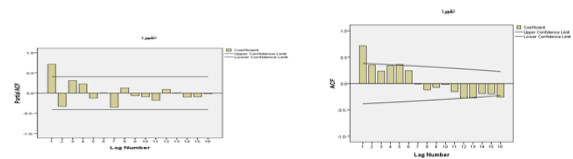

Table (2) Two autocorrelation functions of Food gap series for chickpeas crop in Syria.

From the previous figure, following nominating more than one model, it is clear that the regression model (0, 1, 2) is the most appropriate for the chickpeas crop food gap data. The features of the suggested model, which is appropriate for representation of the chronological series , and total results achieved have been estimated in Figure (8).

Table (2) Estimations of the Suggested Model Features

AR)Model (Lag2	Estimate	t	sig
(Constant)	-0.557	-3.188	0.004

Source: results of statistical analysis in accordance with spss software at 5% significance level.

The foregoing table shows the self-regression feature significance. This indicates that the suggested model is statistically appropriate. Remnants of the model ARIMA (0, 1,2) by drawing the autocorrelation function for the remnants to verify if they are purely random changes or not.

Figure (3) shows the two autocorrelation and partial autocorrelation functions for the model remnants. From the figure we observe no violation to the hypotheses of the model, which has been conformed to the data. i.e. all autocorrelation coefficients are within 95% certainty limits, meaning that the remnants are purely random changes , hence the model is suitable

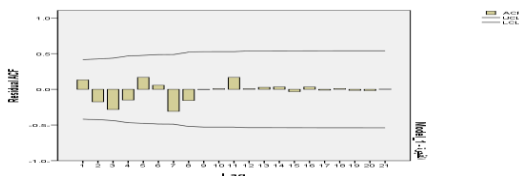for the data and can be used for forecasting the chickpeas crop food gap.

Figure (3) The two autocorrelation functions(ACF) and partial autocorrelation functions (PACF) for the model remnants.

SPSS program was given a command to forecast seven prospective values, and it was found that the prospective values for the chickpeas crop food gap (deficit) would keep the same value , which necessitates importing about 15.8 thousand tons yearly in the years to come (2019-2025). It can be noticed from figure (4) the estimated values approximate actual values.
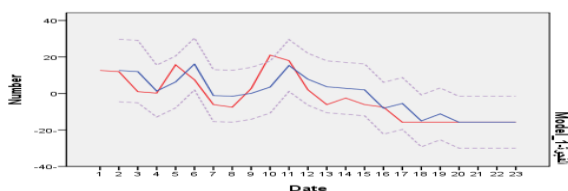

Figure (4). Estimated and actual values of the food gap of chickpea crop.

VI. CONCLUSIONSAND SUGGESTIONS

A. Conclusions

1. Self-satisfaction rate in the two periods 2001-2005 and 2006-2010 totaled circa 108.8% , and 7.7- thousand tons ,respectively , and the food gap amount circa 5.6 (surplus) , and 4.7- (deficit) thousand tons , respectively.
2. In the period 2011-2015, self-satisfaction rate totaled about 75.2%, achieving a deficit of 15.8 – thousand tons in the food gap. Self-satisfaction rate in 2016-2018 also totaled circa 67.1 %, with a surplus in the food gap of 15.8-thousand tons.
3. The main reason for the damage to chickpeas crop production is attributed to wide production areas being located in unstable regions, particularly in the governorates of Aleppo and Idlib, where they constitute the largest planted areas of the total areas planted with this stuff.
4. The prospective values for the chickpeas food gap (deficit) will keep maintaining the same value, which will call for importing about 15.8 thousand tons of chickpeas in the years to come (2019-2025).

B. Suggestions

1. Endeavoring to draw plans to satisfy domestic production of this food to face increasing domestic consumption needs.
2. Seeking to restore stability in the unstable regions to avoid importing the forecasted quantity during the forthcoming years.
3. Employing the suggested Box – Jenkins Models in forecasting processes.

REFERENCES

[1] Bakkour, Yahya, 1985. Food Security in the Syrian Arab Territory, Tuesday's fourth economic symposium 19/2. P2.
[2] Al Dailemy, Ameer, 2016. Food Deficit of Strategic Cereal Crops in Iraq (2011-2012) , Al Qadisiyeh Journal for Administrative & Economic Sciences, Volume 18, issue 1 p. 126.
[3] Rajab, Marwan 2014. Measuring Volume of the Self-satisfaction Gap for Wheat Crop in Iraq(2011-2020), Journal of Baghdad College for Omnibus Economic Science ,Issue 38, p. 164.
[4] Mohammad Tarqo, Mohammad, 2014. Standardized Modeling and Prospective Trends for the Food Gap in Algeria – Horizons 2, Ninth International Gathering on: In the Light of International Economic Changes and Challenges, Algeria, Al Shalf, on 23 & 24 November, p5.
[5] National Center for Agricultural Policies , 2013. Real Status of Food and Agriculture in Syria, Damascus, Syria,p.103.
[6] Al Utheim, Ahmad, 2014. Arabic Food Gap and Endeavoring towards Achieving Food Security , Al Jazirah Newspaper, issued on Monday 29 Safar 142812590 issue 12590 published on the website: www.al-jazirah.com.sa.
[7] Wattenbcah, H. 2006. "Farming Systems of the Syrian Arab Republic". FAO Project GCP/SYR/006/ITA, the National Agricultural Policy Center (NAPC),Damascus, 145 pp