

## Means of Eliminating Red Meat Food Gap in The Arab World

<sup>1</sup>S.M. El-Seretty and <sup>2</sup>M.H. Shabbara

<sup>1</sup>Scientific Research & Technological Applications City, Alexandria, Egypt.

<sup>2</sup>Department of Agriculture Economic, National Research Center, Cairo

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### ABSTRACT

This research aims to answer the question about the ability of eliminating the food gap of red meat in the Arab world. In order to achieve this objective, evolution of the Arab food gap and pastureland, identifying the most important factors that help the widening food gap size of red meat in the Arab world and ways and means of eliminating the food gap of red meat in the Arab world, were studied. It was done by using multiple and simple regression analyses and making many attempts showing that double and simple logarithmic forms gave the best economical results. It was shown from the study that, increasing both population, consumption of red meat, the quantity of importing red meat, importing price of living cape of sheep and goats, exporting price of living cape of sheep and goats of 10% claimed to increase the size of the food gap of red meat in the Arab world by 31.5% , 19.1% , 13.3%, 12%, 10.5% respectively. The recommendation was to adjust the population increase at Arab world at the rate of 1% annually. This leads to shrinking food gap of red meat by 3.15% equivalent to about 29,000 tons of meat annually, in conjunction with adjusting red meat consumption by 10% results in shrinking the gap of about 174 thousand tons of meat annually, in reducing the quantity imported from red meat, 10% lead shrinking gap of about 121 000 tones of meat annually. This command would decline food gap of red meat by 35% annually and therefore can be eliminated within three years remaining.

**Key words:** Natural pastures, productivity, red meat, food gap, Arab world.

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### Introduction

Growth of livestock in the Arab world is strongly linked with available feed from different sources, particularly in natural pastures which provides approximately 39.5% of the total requirements of forage for livestock. In spite of the large size of these pastures (about 35.5%) of the total area of Arabic States, they have low productivity and exposed to erosion and misuse for being located in the arid and semi-arid areas and sponsored by about 48.43% of animal units that represent the livestock. (Unified Arab report, 2011)

The research problem is shown in the inability of rangeland forage resources on the coverage requirements of livestock feed, which in turn reflected negatively on the preparation of livestock and productivity of red meat (Al-Sriti S.M.; 2012). It is shown also in the decline in average per capita in consumption of red meat in the Arab world. In the last 10 years the entry of individuals and population have been doubled leading to increase consumption growth rates of red meat at rates above that of increase in production, resulting in widening food gap size of meat and grow great rates, and naturally the degradation levels of self-sufficiency of meat.

Because of not keeping pace with growth in livestock and then meat production to increase in red meat consumption in the Arab world, research aims to answer the question about the ability of eliminating the food gap of red meat in the Arab world. And in order to achieve this objective, the following subsidiary goals targeted research:

- 1- Evolution of the Arab food gap and pastureland.
- 2- Identifying the most important factors that help to widening food gap size of red meat in the Arab world.
- 3- Ways and means of eliminating the food gap of red meat in the Arab world.

### Materials and Methods

Descriptive statistical analysis was used to explain and display various theoretical aspects, as well as to study the evolution of red meat food gap and pastureland in Arab world. Also, annual growth rates were used for the food gap and pastureland to identify future prospects for variables basing on exponential equation model. As well as, multiple and simple regression methods were used to estimate parameters of models of the delimiters food gap of red meat in the Arab world. And appreciation was by using of a single equation models and they were estimated in the appropriate picture of developments in time. (Al-Mallah J.,1991)

This research was adopted on several sources of data as secondary data which was published by the Unified Arab Report, Yearbook of Arabic Agricultural Statistics as well as some researches and economic studies relevant to the topic of study.

### Results:

#### 1-Economic analysis of food gap, productivity energy and consumption energy of red meat and area of rangelands in the Arab world:

I: status quo and future of red meat food gap in the Arab world: the study shows that food gap of red meat in the Arab world has been on the rise during the period (1998-2010), and ranged from a minimum of approximately 539 thousand tons in 1999, and up to a maximum of approximately 1.37 million tones in 2009 (Table 1). And an annual average of meat food gap in the Arab world during the period was approximately 219 000 tons. Studying growth rate of food gap of red meat in the Arab world shows that it was approximately 7.66% and is equivalent to an annual increase of about 70,000 tons. Therefore, it is expected to reach food gap of red meat in Arab countries in the year 2012 to about 1.50 million tons.

II: status quo and future of red meat production in the Arab world: the domestic production of red meat in the Arab world has been on the rise during the period (1998-2010), ranging from a minimum of approximately 3.26 million tones in 1999, and a maximum at some 5.02 million tones in 2009 and an annual average of about 4.16 million tones (Table 1). While the growth rate of domestic production of red meat in the Arab world was about 3.16%, during the period, which is equivalent to an annual increment of approximately 131.51 thousand tons, therefore expected domestic production of red meat in Arab countries in the year 2012 is about 5.24 million tones.

III: status quo and future of red meat consumption in the Arab world: the domestic consumption of red meat in the Arab world has been on the rise during the period (1998-2010), ranging from a minimum of around 3.79 million tonnes in 1999, and maximum around 6.39 million tonnes in 2009 and an annual average of approximately 5.07 million tons. (Table 1).

**Table 1:** Main economic indicators for red meat in the Arab countries through the period (1998-2010).

years	Production in thousand tones	Consumption in thousand tones	Food gap in thousand tones	Self-sustainment rate (%)	Pastureland in million hectares
1998	3445	4120.81	675.81	83.6	337.53
1999	3255	3793.71	538.71	85.8	331
2000	3923	4566.94	643.94	85.9	420.94
2001	3823	4465.58	638.58	85.7	393.1
2002	3900	4566.74	666.74	85.4	415.7
2003	4080	4933.49	853.49	82.7	416
2004	4072	4906.02	834.02	83	468.58
2005	4184	5171.82	987.82	80.9	468.65
2006	4284	5269.37	985.37	81.3	468.59
2007	4477	5486.52	1009.52	81.6	480.87
2008	4675	5955.41	1280.41	78.5	497.99
2009	5017	6391.08	1374.08	78.5	498.46
2010	4977	6340.13	1363.13	78.5	498.46
Mean	4163	5074.1	911.6	82.4	438.14

\* Consumption and food gap were calculated on the basis of self-sufficiency in livestock production.

Source: unified Arab report, 2011.

**Table 2:** Estimation of growth functions of most economic indicators for the food gap of red meat in the Arab world through the period (1998-2010).

Statement	Growth function	F value	R <sup>2</sup> value	Annual growth rate%	Average values of variables
Production in thousand tones	$\text{Ln } Y = 3310.37 + 0.0316 X1$ (11.33)**	128	0.92	3.16	4163
Consumption in thousand tones	$\text{Ln } Y = 3800.86 + 0.0396 X2$ (13.33)**	178	0.94	3.96	5074
The food gap in thousand tones	$\text{Ln } Y = 509.71 + 0.0766 X3$ (10.93)**	119	0.92	7.66	912
Area of rangelands in million hectare	$\text{Ln } Y = 344.53 + 0.0331 X5$ (7.68)**	59	0.84	3.31	438.14

Figure between brackets refers to the value of the calculated T.

\*\* Significant at 0.01 probability level

Source: compiled and calculated from table (1)

While the rate of growth in domestic consumption of red meat in the Arab world during the period was nearly 3.96% and is equivalent to an annual increment of approximately 201 thousand tones, therefore expected domestic consumption of red meat in Arab 2012 is about 6.74 million tons (Table 2).

IV: current status of self-sufficiency ratios of red meat in the Arab world: ratios of self-sufficiency of meat during the study period fluctuated increases and decreases, with a minimum of approximately 78.5% in the last three years, starting in 2008, up to a maximum of approximately 85.9% in 2000 and an annual average of approximately 82.4% (Table 1). Generally the ratio of self-sufficiency during the period (1998-2010) dropped from approximately 83.6% in 1998 to around 78.5% in 2010, an annual average of about (-0.43%). While, if it continued to deteriorate in the proportion of self-sufficiency as such be expected that this proportion will be about 77.64% in 2012.

VI: status quo and future of natural pastureland in the Arab world: Area of pastureland was hesitated during the period of study, with a minimum of approximately 331 million hectares in 1999, and up to a maximum of approximately 498.46 million hectares in 2009, 2010 and an annual average of about 438.14 million hectares (Table 1). While the growth rate of pastureland in the Arab world during this period was nearly 3.31%, which is equivalent to amount of the annual increase of approximately 14.5 million hectares and thus expected pastureland nature in Arab world 2012 will be about 527.5 million hectares (Table 2).

## 2- Determinants of food gap of red meat in the Arab world:

I: economic determinants of food gap of red meat in the Arab world: it is expected that value of food gap of red meat in the Arab world was determined by many economic variables which determine the feasibility of eliminating it. The most notably ones are not keeping pace with the growth in production of red meat in the Arab world for the increase in the consumption of red meat in addition to total population in million inhabitants (X1), total consumption of red meat in Arab world by thousand tones (X2), the imported quantity of red meat by thousand tones (X3), price of cape of living buffalo and cattle exported in dollar terms (X4), price of cape of living sheep and goats exported in dollar terms (X5), price of cape of living buffalo and cattle imported in dollar terms (X6) and price of cape of living sheep and goats imported in dollar terms (X7). Also, the relationship between the size of the food gap of red meat (by 1,000 tones) as the dependent variable (Y) and the aforementioned variables during the period (1998-2009) was calculated by using multiple and simple regression analyses and making many attempts showing that double and simple logarithmic forms give the best economical results. (Yearbook of agricultural statistics, 2009, Abd El Fatah et al., 2010).

It is clear from table (3) that the main determinants of the food gap of red meat in the Arab world (according to their relative importance) are the total population by millions (Equation 1), total consumption of red meat in the Arab world by 1,000 tones (equation 2), the imported quantity of red meat by 1,000 tones (Equation 3), the price of cape of imported living sheep and goats in dollars (equation 4) and the price of cape of exported living sheep and goats in dollars (equation 5).

It was shown that productive flexibility for variable were 3.15 for the total population and 1.91 for total consumption of red meat in the Arab world and 1.33 for the quantity imported of red meat and 1.20 for the price of living imported cape of sheep and goats and 1.05 for the price of living exported cape of sheep and goats. In the sense that the population increase of 10% claimed to increase the size of the food gap of red meat in the Arab world by 31.5% , increased consumption of red meat in the Arab world of 10% claimed to increase the size of the food gap of red meat in the Arab world by 19.1% , increased the quantity of red meat-importing of 10% claimed to increase the size of the food gap of red meat in the Arab world by 13.3% , increased importing price of living cape of sheep and goats by 10 % claims to increase the food gap of red meat in the Arab world by 12% and the increase exporting price of living cape of sheep and goats by 10% claimed to increase the food gap of red meat in the Arab world by 10.5%.

**Table 3:** Statistical analysis of the determinants of the food gap of red meat in the Arab world in period (1998-2010).

Equation number	Double Logarithmic functions	F value	R <sup>2</sup> value
1	$\text{Ln } Y = \text{Ln} - 11.28 + 3.15 \text{ Ln } X_1$ (7.67)**	59	0.86
2	$\text{Ln } Y = \text{Ln} - 9.54 + 1.91 \text{ Ln } X_2$ (12.43)**	155	0.94
3	$\text{Ln } Y = \text{Ln} - 1.79 + 1.33 \text{ Ln } X_3$ (4.76)**	23	0.69
4	$\text{Ln } Y = \text{Ln} 1.77 + 1.20 \text{ Ln } X_4$ **(3.85)	15	0.6
5	$\text{Ln } Y = \text{Ln} 2.45 + 1.05 \text{ Ln } X_5$ (4.43)**	20	0.66

Source: compiled and calculated from the unified Arab report, various issues.

*Discussions and Recommendations:*

The most important results of the search are:

- 1- Although natural pasture area are approximately (35.5%) of the Arab world, it is relatively poor for low productivity and exposed to erosion and misuse. (Sriti S.M., 2012)
- 2- Inability of rangeland forage resources and other natural ones on the coverage requirements of livestock feed, which reflected negatively on productivity of red meat.
- 3- Inadequate production of red meat in the Arab coverage of consumption which increasing with increasing growth rates in population growth and consumption and increase the quantity imported from red meat.

Based on these research results, research recommends ways and means of reducing the size of the food gap of red meat in the Arab world or eliminated and those ways are:

- 1- Application of all or some grazing systems, whether deferred grazing, periodic grazing or periodic rest grazing alongside the traditional system (continuous grazing systems). That in conjunction with the instructional management of the Bedouins, where it is difficult to enter one of these systems forcibly and gave up the traditional pastoral system easily. There are a number of precautions must be followed; intervention in case of increased payload pastures that circumstances warrant under development, upgrading of available water resources, and taking into account that the system appropriate to the situation of existing vegetation and animals, to be more resilient to environmental and economic variables and take into account productive forage primarily. other precautions must be also followed for the successful management of these pastures; livestock must be distributed in specific areas in conjunction with the distribution of water points provided by the distribution of mineral salts cubes, grazing time avoiding both early grazing (that lead to output to a few and harmful plants in the start-up phase of growth) and delayed grazing having low nutritious and palatable.

Some observations were also shown via some studies on the effect of periodic grazing to improve the situation of natural pastures and increase animal production. A relative high percentage (24%) increasing in green fodder productivity rate was shown in periodic grazing in Golan, in comparable with productivity in free grazing (Daoud N., 2006). Thus, There is a possibility of increased live weight of animal from hectare by about 1.28 kg or about 588 million tons of red meat at the level of the Arab world (Unified Arab report, 2011), with an annual increase rate by approximately 1.32 million animal plus the increase in livestock grazing traditional system 1.72 million animal and be a plus 3.01 million animal unit is equivalent to an annual growth rate of approximately 2.95% to 1.68%. (Al-Sriti S.M., 2012)

Thus, the growth rate of output of livestock by periodic grazing would exceed that by free grazing by (75%). If these were to increase production for the added rate be 2.37% equals plus former 3.16% rate, and thus become a growth rate of red meat production output of approximately 5.53% annually in periodic grazing, a rate that beats the rate of increase in consumption (4%). confirming that there is the possibility to eliminate the food gap of red meat in the Arab world and achieve rates of self-sufficiency of meat for more than 100%.

- 2- Other methods can be applied to improve the productivity of pastures and then the productivity of grazing animals. The most important one is aquaculture and replant the areas of overgrazing and exposed to climatic changes, planted trees and saplings high-density for supplements for meals and to provide shade in areas which suffer from very high temperatures or trees and bushes fast growth using as fences and at the same time as barriers to wind in desert environments and also combat harmful plants. Also, orientation training pastoralists to silage for using in animal feed in dry seasons, as well as taking advantage of any plant residues for unconventional feeds. That work must be under scientific knowledge of grazing animal's nutrition needs.

The optimal management of natural pastures in arid and semi-arid lands is undoubtedly managed for livestock development. In such circumstances only 6 hectares are allocated for each animal unit per year. Arab pastures can be divided into three types; excellent pastures (representing about 10% of all pastureland area) Good (20%) and almost poor (70%). But, if all were as poor maintenance it will ensure around 83 million animal unit under optimum management which do not lead to land degradation or overgrazing. This will lead to the absence of overloading and pastoral capacity to absorb additional livestock units are estimated to be around 70% of current loads. ( Unified Arab report, 2011). This in turn, would double the rates of growth of livestock and meat productivity and eliminate the food gap and achieve high rates of self-sustainment. In Addition, other targets such as sport fishing and tourism will be flourished as natural pastures increased.

- 3- Transfer the experience of India in artificial insemination with the carnal and the hippopotami as coincided with experience on the use of DNA to choose many sheep breeding, as well as undertaken counseling and training activities by government organizations in conjunction with the development of infrastructure and improvement of animal feed. ( Food and Agriculture Organization of the United Nations, 2010)

- 4- The need to develop infrastructure, technical capacity and developed marketing system in Arabic States evolving under the building markets for final animal products and preservation for the possibility of applying genetic improvement programmes for local breeds and increase competitiveness and help ensuring the preservation in situ. In addition of, using biotechnology to increase the capacity of the animal feed digestibility

by discharge of certain hormones and enzymes to improve nutrient utilization and SIC using sterile insect technique to improve animal health in a specific geographical area against the insect that causes certain diseases affecting livestock. Thereby, increasing the productivity of red meat. (Food and Agriculture Organization of the United Nations, 2010)

5- The inevitability of using biotechnology to obtain best quality in feed production which increases productivity and meat and reduces the secretion of environmental contaminants in animal-based agriculture. (Food and Agriculture Organization of the United Nations, 2010)

6- Adjust the population increase at Arab world at the rate of 1% annually. This leads to shrinking food gap of red meat by 3.15% equivalent to about 29,000 tons of meat annually, in conjunction with adjusting red meat consumption by 10% results in shrinking the gap of about 174 thousand tons of meat annually, in reducing the quantity imported from red meat, 10% lead shrinking gap of about 121 000 tones of meat annually. This command would decline food gap of red meat by 35% annually and therefore can be eliminated within three years remaining.

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