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## **Supply and Demand for Fresh Locally Produced Poultry Products in United Arab Emirates**

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### **Abstract**

Domestically produced poultry products in United Arab Emirates (UAE) are mostly marketed fresh. The objective of this research was to analyze the economic performance of the production supply chain and estimate consumers' Willingness to Pay (WTP) higher prices for fresh/chilled and locally-produced products such as fresh/chilled whole chicken and eggs. The authors conclude that increases in productivity are possible by adapting "best practices." Applying "best practices" is expected to increase market share for locally produced poultry products against fresh imported poultry products. Results of the cross-section survey data collected, analyzing the demand side, found that WTP is significantly affected by explanatory households' socio-economic characteristics variables such as income, nationality, head of household age and gender.

**Keywords:** locally produced poultry, production economic performance, Willingness to Pay, premium, United Arab Emirates.

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## **Background**

Local poultry production in United Arab Emirates (hereafter UAE) includes the production of both poultry meat and eggs. Local poultry meat production is estimated to be about 40 thousand tons in 2011 or 12% of the total poultry meat available for consumption in the country, down from 20% in 2000. Poultry meat is mostly marked fresh. Meanwhile, UAE imported 298 thousand tons of poultry meat in 2011. Local eggs production is estimated to be 28.5 thousand tons (518 thousand eggs) in 2011 or 60% of the eggs available for consumption. Meanwhile, UAE imported about 32 thousand tons of eggs (581 thousand eggs). Domestic producers face significant challenges mainly due to strong competition from subsidized poultry production in neighboring countries Saudi Arabia and Sultanate of Oman. The number of poultry production plants in UAE has declined from 20 in 2006 to only 12 plants in 2011 (USDA, Foreign Agricultural Services, 2014). However, the total production for eggs has increased over the last three decades, from 1980 to the present. The Arab Organization for Agricultural Development (AOAD 2013) showed that UAE Self Sufficiency Ratios (SSRs) for poultry meat and eggs are 23%, and 50% respectively on average during the period 2000 to 2011. This research investigates factors that may increase locally produced meat and eggs market share on the supply side and highlights important socio-economic variables that impact the demand for fresh locally produced poultry products on the demand side.

## **Research Objectives**

The objective of this research is twofold; to analyze the production's supply side economic performance for producers, on the one hand; and to estimate the consumers' Willingness to Pay (WTP) for fresh locally produced poultry products such as fresh whole chicken and eggs, on the other hand. Primary data was collected through interviews with the poultry plants' managers; whereas consumers' data was collected via surveying 500 householders in Al-Ain City, UAE. This research used poultry plants' gross margin (total revenue – variable costs) as an indicator for the supply side analysis; whilst Logit model was used for the demand side analysis to analyze the consumers' higher WTP (a premium) for locally fresh produced poultry products. Supply side challenges were investigated and issues such as high feed cost impacts on operational costs were found to be highly influential on the local production performance, using plants' gross margins as an economic efficiency indicator. The consumers' WTP a higher price, compared to imported fresh poultry products, for locally produced fresh poultry products was regressed against selected explanatory variables such as income, family size, head household's age and respondent's nationality and their impacts on the interpretation of consumers' WTP variability among the consumers interviewed were analyzed for the study area.

## Supply Side Analysis

To analyze the locally produced poultry meat and eggs production in United Arab Emirates, the authors conducted a field survey of the nine largest poultry production firms in the country out of the twelve firms in the country, by conducting direct interviews with the poultry plant managers. Results of the survey showed that meat (broilers), eggs (layers), and (meat and eggs) producers represent 56%, 11%, and 33 % of the total plants, respectively. On average poultry farm's annual production of meat was found to be 2,880 tons. On average poultry farm's annual production of eggs was found to be 49 million eggs. Average output price per kg of poultry meat was found to be 15 Arab Emirates Dirham (AED). Where AED is Arab Emirates Dirham = \$ 0.272. Average output price per dozen of eggs = AED 5.275. Feed costs represent 70-75% of total poultry farm's variable costs. About 60 % of broiler producers and 75% of layers producers indicated to having marketing challenges. Research results showed high feed price variability from one region to the other in UAE. However, differences among various producers in terms of the feed quality were found to be negligible (Hussein et al. 2014).

Table (1) below shows descriptive statistics of the UAE poultry production in 2012, as retrieved from the poultry producer's survey. The Coefficient of Variation (CV), which is calculated as percentage of the standard deviation divided by the average as well as the range of per plant production for the nine poultry farms interviewed, showed that both meat production as well as egg production, poultry meat, and the egg industry in UAE includes both large and very small scale operations. The small scale operations, especially due to the high feed cost and fierce competition from neighboring countries' producers, have declined in the last three decades, from 1980 to the present (as indicated by the poultry plant interviewed managers). This caused small firms to exit the poultry industry due to lack of production efficiency and due to fierce competition from poultry producers in the neighboring countries.

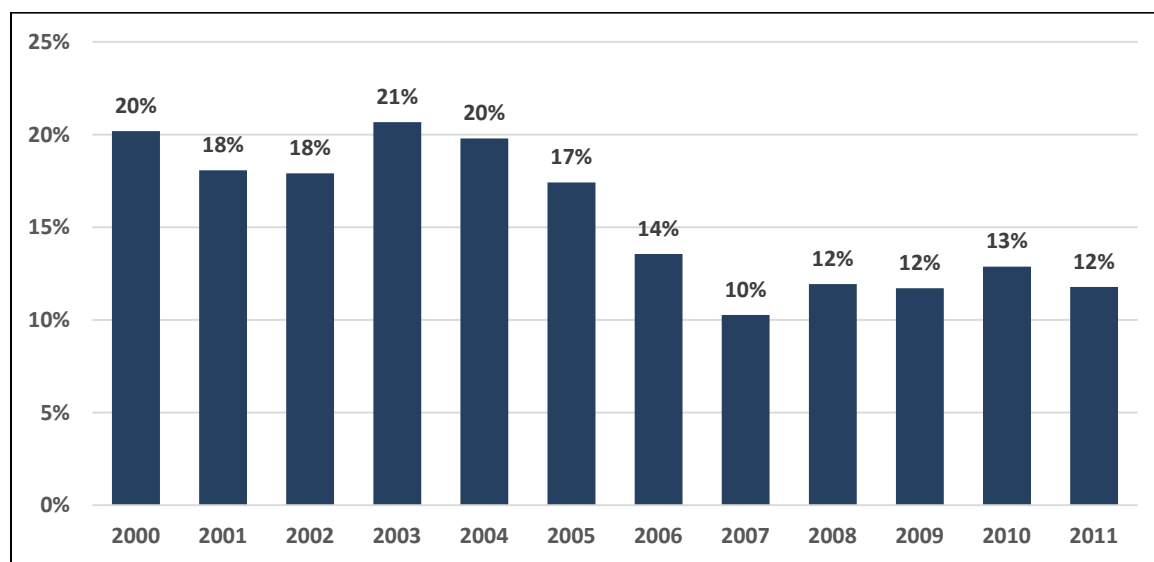
**Table 1.** Poultry Meat and Egg Production Descriptive Statistics in United Arab Emirates, 2012

Poultry Meat		Poultry Eggs	
Annual Average (Ton)	2,880	Average (Million Eggs)	49
Standard Deviation (Ton)	1,799	Standard Deviation (Million eggs)	28
Coefficient of Variation (%)	62%	Coefficient of Variation (%)	1
Maximum (Ton)	5,400	Maximum (Million Eggs)	65
Minimum (Ton)	1,200	Minimum (Million Eggs)	7
Range (Max. - Min)	4,200	Range (Max. - Min.)	58

The survey also investigated issues and technical barriers that face the poultry production industry in UAE including, birds healthcare issues, workers' healthcare training/practices, routine bird healthcare checkup on farm, healthcare records information, dead birds' disposal procedure, biosecurity management and practices, workers' hygiene practices, farm isolation and visitor guidelines, disease prevention practices, incoming new birds and feed handling and practices, biosecurity measurement in case of crises, assessment of the poultry farms' biosecurity benefits and costs. The survey concluded that the majority of the poultry production plants considered these issues and challenges of high importance, all of which impact productivity and, consequently, poultry farms' economic efficiency. All poultry production plant managers

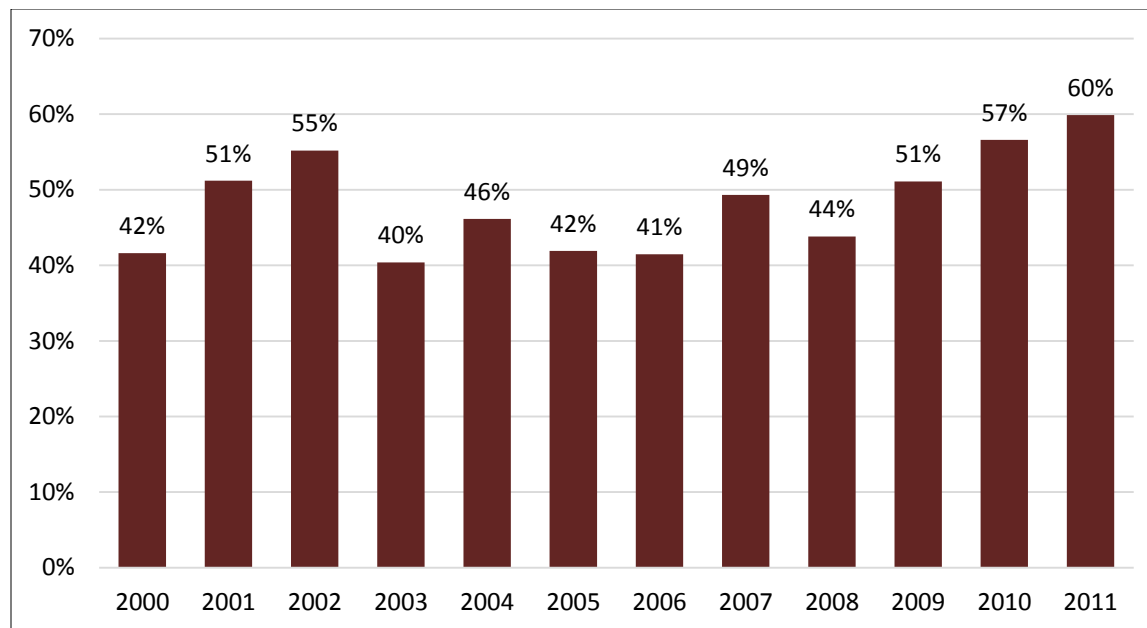
interviewed agreed that such mentioned “best practices” are necessary to enhance productivity and would increase their production efficiency, leading to increased market shares in United Arab Emirates (UAE).

Figure (1) below shows the contribution of locally produced poultry meat to the total supply available for consumption declined in recent years to reach 12% in the year 2011, down from 20% in the year 2000. Meanwhile, Figure (2) shows that produced eggs’ total supply available for consumption has increased recently from 42% in year 2000 to reach 60% in year 2011 ( Arab Organization Agricultural Development (AOAD), 2013). This is due to increased imports of poultry meat in United Arab Emirates that competes with local production. However, increased local production of eggs may lead to lower overall eggs prices and so it increases both its competitiveness and market share position against imported meat and eggs. On the supply side of poultry meat and eggs in UAE, the authors conclude that increases in production efficiency is possible by adapting “best practices”. Applying “best practices” such as feed rationing and safety standards would increase locally produced poultry products production efficiency and expected to lead to increasing competitiveness and possibility of increasing of local poultry producers’ market share in UAE.



**Figure 1.** Share of Locally Produced Poultry Meat from Total Supply Available for Consumption in United Arab Emirates 2000-2011.

**Source.** Arab Organization Agricultural Development (AOAD). 2013. Arab Agricultural Statistics Yearbook. Volumes 26 - 33. <http://www.aoad.org/AASYXX.htm>.



**Figure 2.** Locally Produced Eggs from Total Supply Available for Consumption in United Arab Emirates 2000-2011

**Source.** Arab Organization Agricultural Development (AOAD). 2013. Arab Agricultural Statistics Yearbook. Volumes 26 - 33. <http://www.aoad.org/AASYXX.htm>.

## Demand Side Analysis

The model used in this study is the Logit model to study the relationship between the willingness to purchase fresh locally produced poultry meat and eggs as the dependent, regressed against selected households r's socio-economic characteristics. Al Ain City, United Arab Emirates was selected as the study area for this research. The Logit Model' regression can be algebraically represented as follow (Kennedy 2008):

$$(1) \quad Y_i = \alpha + \beta X_i + e_i$$

Where

$Y_i$  is 1 if the first option purchasing locally produced poultry and eggs is chosen and 0 if the imported products are chosen.

$X_i$  = value of the respondents' socio-economic characteristics (e.g. income for ith individual).

The logit model is based on the cumulative logistic probability function and is specified as:

$$(2) \quad P_i = F(Z_i) = F(\alpha + \beta X_i) = \frac{1}{1 + e^{-Z_i}} = \frac{1}{1 + e^{-(\alpha + \beta X_i)}}$$

In equation 2, e represents the base of natural logarithms, which is approximately equal to 2.718,  $P_i$  is the probability that an individual makes a certain choice.

A survey was carried out in January to May, 2014 in United Arab Emirates that covered a sample of 500 households. Data was obtained from direct face-to-face interviews with five hundred householders. Data obtained was tabulated and analyzed using Simetar © software. Survey results showed that Willingness to Pay (WTP) for locally produced poultry meat products that is less than 100 AED per month represents 17% of the sample. Meanwhile, consumers who showed WTP to pay more than 100 AED to 500 AED per month are 50% of the sample. A smaller percentage of households (33%) revealed that they are willing to pay more than 500 AED monthly. Survey results on WTP for fresh locally produced eggs varied between 40 AED per month up to more than 132 AED per month. About 18% of such consumers indicated that they are willing to pay between 40 AED to 88 AED per month. The percentage of those who said that they are willing to pay between 89 AED to 132 to buy locally produced eggs was found to be 55% of the sample. UAE consumers who showed a willingness to pay of more than 132 AED per month to buy eggs represent 27% of the sample. The respondents were asked to answer a question that reveal their willingness to pay some higher price (premium) to purchase locally produced poultry fresh products (as opposed to imported fresh poultry products including imports from neighboring countries). Specific locally fresh produce brands names were revealed as an example of locally produced fresh poultry products.

Table 2. Summarizes the Willingness to Pay for locally produced poultry meat and eggs regression analysis results. The table shows the results of the Logit Model. The dependent variable is a binary variable that takes the value 1 for those who are willing to pay higher price (a premium) for locally produced poultry products and zero value for the respondents who are not willing to pay higher price for locally produce poultry products. Results indicated a strong fitness of the model representing the survey's data of the Willingness to Pay for locally produced poultry meat and eggs in United Arab Emirates. Three out of the seven model's explanatory variables; namely, gender and nationality of the head households, as well as the household level of income were found to be highly significant showing large student's T statistic value and very small P-values. The Beta coefficients show the likelihood of change in the dependent variable (willingness to buy locally produced poultry meat and eggs) when the corresponding explanatory variable changes by 1%. For example, results indicated that when income changes by 1% it is likely that WTP to pay higher premium for locally produced meat and eggs will increase by 0.316 %.

**Table 2.** Willingness to Pay Regression against Head Household and Family Socio-Economic Characteristics

Variable	Intercept	Age	Gender	Nationality	Marital Status	Education	Household Income	Family Size
<b>Beta Coefficient</b>	0.662	-0.328	-0.517	1.255	-0.392	0.091	0.316	0.024
<b>Standard Error</b>	0.637	0.167	0.253	0.297	0.271	0.115	0.100	0.036
<b>T-test</b>	1.040	-1.961	-2.046	4.225	-1.445	0.790	3.146	0.658
<b>P-Value</b>	0.299	0.050	0.041	0.000	0.149	0.430	0.002	0.511

## Conclusions

United Arab Emirates faces challenging questions in relation to food security in the country, including food quality. Local poultry fresh meat and eggs production faces a fierce competition

from subsidized industries in neighboring countries. This study used primary data that were collected by directly interviewing the poultry meat and eggs largest nine producers in the country. Supply side challenges were investigated in this research and issues such adaptation of production “best practices” were found to be highly influential on the local production’s economic performance. This finding was reached using interviewed poultry firms’ production economic indicators (i.e. gross margin = total revenue – variable operational cost). On the demand side, it was found, based on consumers survey, that Willingness to WTP for paying a higher premium to purchase locally produced poultry products is highly affected by explanatory variables such as household income, family size, and nationality. Market researchers and local poultry production in UAE would benefit from understanding the factors that influence both the supply and demand sides of their products in order to expand their market share in the country.

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## Appendix

**Table A1.** Logit model socio-economic variables where the dependent variable is 1 if the respondent is willing to pay a higher price (premium) for locally fresh produced poultry products and 0 if not. Explanatory variables are as follows:

Explanatory Variables	Respondent Categories				
Age (years old)	19 or younger	20 to 29	30 to 40	41 to 50	More than 50
Gender	Male	Female			
Citizenship	Emirates	Expatriate			
Marital Status	Single	Married			
Education Level	Elementary or less	High school	Diploma or Associate degree	College degree	Graduate degree
Monthly Income (AED) - \$1= 3.67 AED	> than 5,000	5,000 to 10,000	>10,000 to 15,000	>15,000	
Family Size	Open-ended question				