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Technical and Economic Analyses of Poultry Production in the UAE: Utilizing an Evaluation of Poultry Industry Feeds and a Cross-Section Survey

A. Hussein^{a*}, S. Sherif^a, A. Al-Juboori^b, A. Al-Mansorri^b, and K. Alsharafi^b.

^a*UAE University, College of Food and Agriculture, Al-Ain, P.O. Box 15551, UAE*

^b*Abu Dhabi Food Control Authority, Abu Dhabi, P.O. Box 52150, Abu Dhabi, UAE*

Abstract

The project objective is to closely investigate select UAE poultry industry production issues as well as technical and marketing aspects. A comprehensive cross-sectional survey was conducted of UAE poultry farms using PDA (Portable Data Assistant) technology. Study objectives include: (1) obtaining baseline information on existing broiler and layer farm subsectors; (2) quantifying the amount of input used in the production process and the outputs obtained, and to identify some main and by-products that might have some economic value; (3) and assessment of feed-utilization produced by the feed industry. Economic characteristics of a typical poultry farm in UAE include: average broiler production at about 2,880 tons; average layer production at about 49 million eggs; and feed cost share of the average farm's operational cost estimated at 95%. This indicates the importance of expanding investment in UAE poultry sector. Efficiency of feed utilization of birds fed feeds from one company was slightly better (1.68 vs. 1.71) than birds fed feeds from the other company. Feed utilization efficiency of selected major feed producers in the UAE could meet the standards of high quality, commonly used meat-type strains. Such results are useful to the decision-maker at both the farm and policy levels.

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* Corresponding author. Tel.: +97137644017.

E-mail address: ahussein@uaeu.ac.ae.

1. Introduction and Objectives

The Arab Organization for Agriculture Development (2012) statistics showed that United Arab Emirates (hereafter UAE) self-sufficiency (local production/total supply) reached 23% and 54% on poultry meat and eggs respectively [1]. The UAE self-sufficiency on broiler meat increased from 9% in 1982 to 23% in 2010. The UAE self-sufficiency of eggs more than doubled from 23% in 1982 to 54% in 2010 – Fig. 1. However, one would argue that significant investment opportunities exist because 77% and 46% of poultry meat and eggs consumed are imported from other countries. Such a gap between production and consumption creates large future investment possibilities to substitute imports. It is well known that feed represents about 70-75% of operational costs at any typical broiler and layer farm. It is also commonly assumed, sometimes erroneously, that any unknown problems in commercial poultry management and production are by default due to the nutrient composition of poultry feed. Thus, it is important to evaluate the nutrient requirements of poultry feed produced in the UAE feed industry, along with conducting an economic analysis of the poultry production. The economic analysis focuses on country self-sufficiency and the need to expand investment in order to contribute towards covering local demand of poultry products. Also, another objective of this research paper is to discuss exploratory results regarding the poultry industry enterprise profitability and feed quality differences, as well as the poultry industry future possibilities of investment expansion in the Emirate of Abu-Dhabi, UAE. These exploratory results are based on a survey of broiler and layer operations in the Emirate of Abu-Dhabi carried out by a research team during 2012. The efficiency of (high quality) feed-utilization ratio in the poultry industry, i.e. feed amounts consumed by the chicken's final body weight, is an excellent indicator to measure the efficiency of a poultry farm's performance and management, as well as an indicator to measure farm profitability. In other words, the less feed used to produce chicken meat the better it is from a production perspective [2] and [3]. Consequently, the study's questionnaire was designed to collect information on commercial poultry farms regarding feed sources, quality, cost, and efficiency of feed-utilization ratio. Evaluation of nutrient requirements and cost of poultry feed produced by the UAE feed industry provided an excellent source of information to establish whether or not the industry produces feed in accordance with the National Research Council (NRC) recommendations and guidelines [4].

2. Data and Methods

This study was carried out to evaluate the nutrient composition of local poultry feeds compared to international standards published & outlined in the NRC Publication: Nutrient Requirement for Poultry, revised edition (1994). Three major UAE local poultry feed companies were selected in this study. Also, different type feeds for broiler production (starter and finisher) and egg production (starter, grower and layer) were selected from each company. Then, laboratory feed chemical analyses were performed on crude protein, fat, and ash levels as determined by methods described by AOAC [5]. Minerals analyses of total calcium, magnesium, copper, phosphorus and others were determined using procedures for the Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-OES) as described by Varian [6]. Another study was designed to investigate and compare the effect of two different feed types produced by the UAE feed industry (from two major feed mill companies, B and C) on broiler feed efficiency (chicken meat production), considering the available market price of feeds utilized in this trial. One-day old Cobb-500 commercial broiler chicks were randomly assigned to two (2) different feed treatments, six replicate groups per treatment of 10 chicks per cage. The chicks were housed in Petersime battery brooders, 10 chicks per cage. Experimental treatments consisted of feeding broiler starter feeds from two different feed companies for three weeks, followed by feeding broiler finisher feeds to the same replicate groups for another week in order to produce consumer market size chickens. Body weight gain and feed intake were measured periodically and efficiency of feed

utilization of broiler feeds was calculated. The collected data were subjected to statistical analysis using the T-Test [7] A probability level of <0.05 was required for significance.

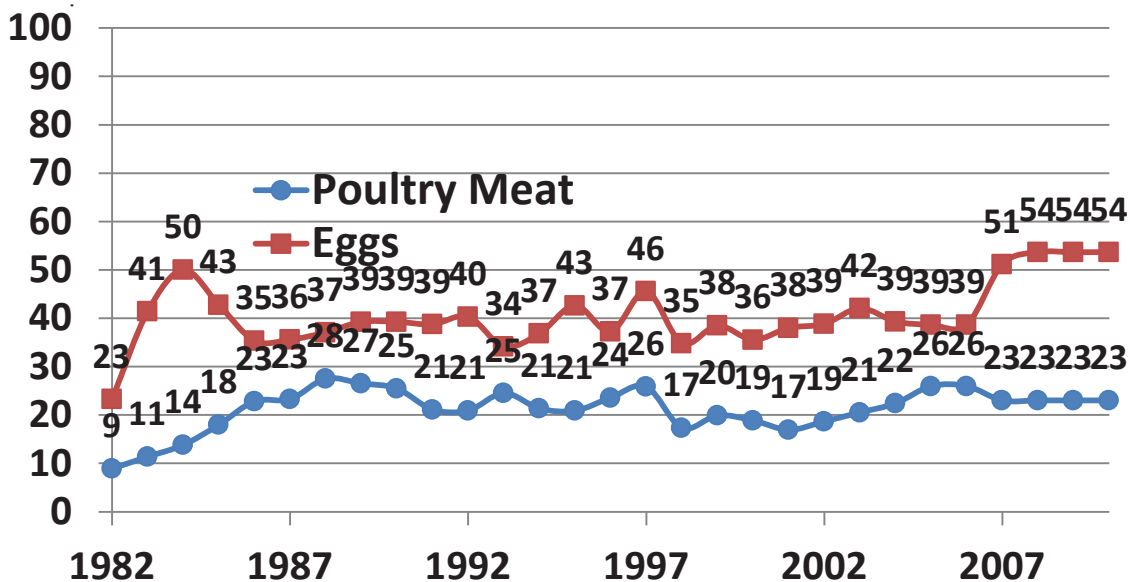


Fig. 1. United Arab Emirates Self-Sufficiency Ratios (SSRs) in Poultry Meat and Eggs 1982-2010.

3. Analysis and Results

3.1. Technical Analysis of Poultry Feeds

The data in Table 1 shows that there were some differences between UAE factories’ feed products and the international standards of NRC (1994 revised edition) with regards to the nutrient requirements provided in their feeds. The crude protein, fat, calcium, zinc and phosphorus percentages in the broiler starter feeds produced by the UAE feed industry were similar to the international standards of NRC. Feed mill B produced broiler finisher feed containing nutrients similar to the minimum nutrient requirements set by the NRC. However, the magnesium and copper percentages of broiler starter and finisher feeds were higher and lower than the minimum requirements set by the NRC, respectively. Table 2 shows the nutrient composition of pullet starter & grower and layer feeds produced by the UAE feed industry compared to the minimum nutrient requirements of the NRC. Similar trends were observed with the pullet starter feeds produced by UAE feed companies, i.e., the crude protein, fat, calcium, zinc and phosphorus percentages were similar to the international standards of the NRC. Pullet grower feeds produced by UAE feed companies were different in the crude protein, calcium, magnesium, copper and zinc compared to the minimum requirements set by the NRC. The largest differences in feed composition for layers were in the crude protein percentage, followed by calcium, magnesium and copper percentages. Poultry feeds produced by only one of the three companies (feed mill B) gave the nearest chemical analysis to the international standards of the NRC (1994 revised edition).

The results of the second study showed that broiler body weight and body weight gain at 14 and 21 days of age were not significantly different between the two feed treatments. However, at 28 days of age, body weight (1080 vs. 1138 g/bird) and body weight gain (1031 vs. 1091g/bird) were significantly different (p<0.05) between feed treatments B and C. There were no significant effects of feed treatments on feed intake or dressing percentage. Efficiency of feed utilization of birds fed feeds from one company was slightly better but

not significantly different (1.68 vs. 1.71) than birds fed feeds from the other company.

Table 1. Nutrient Composition of Broiler Feeds Produced by UAE Feed Industry Compared to Minimum Nutrient Requirement of NRC1.

Feed Type	Feed mill Name	Dry Matter %	Crude Protein %	Fat %	Calcium %	Magnesium mg	Copper mg	Zinc mg	Phosphorus %
Starter	A (23% CP ²)	89.17	23.15	4.35	1.04	1862	<0.002	94	0.71
Starter	B (23% CP)	90.60	23.17	5.05	1.19	1793	<0.002	121	0.62
Starter	C (21% CP)	91.17	20.93	6.94	0.90	1757	<0.002	58	0.75
Starter	NRC Nutrient Requirements	90.00	23.00	4.00	1.00	600	8	40	0.45
Finisher	A (18% CP)	88.92	17.30	3.82		2240	<0.002	141	0.625
Finisher	B (21% CP)	93.01	21.35	6.36		1780	<0.002	87	0.642
Finisher	C (18% CP)	90.91	19.46	5.81		1617	<0.002	124	0.928
Finisher	NRC Nutrient Requirements	90.00	20.00	4.00		600	8	40	0.30

¹Percentage or mg/kg feed

²CP: Crude Protein

Table 2. Nutrient Composition of Pullet Starter & Grower and Layer Feeds Produced by the UAE Feed Industry Compared to Minimum Nutrient Requirement of the NRC1.

Feed Type	Feed mill Name	Dry Matter %	Crude Protein %	Fat %	Calcium %	Magnesium mg	Copper mg	Zinc mg	Phosphorus %
Starter	A (21% CP ²)	88.48	20.64	3.91	1.36	1672	0.65	130	0.63
Starter	C (21% CP)	90.40	21.29	4.67	1.34	1778	<0.002	146	0.79
Starter	NRC Nutrient Requirements	90.00	18.00	4.00	0.90	600	5	40	0.40
Grower	A (15% CP)	88.39	15.69	3.98	1.06	2107	<0.002	146	0.67
Grower	B (17% CP)	91.99	17.68	6.02	1.95	1615	0.58	167	0.78
Grower	C (18% CP)	90.20	19.00	3.77	1.19	1793	<0.002	87	0.62
Grower	NRC Nutrient Requirements	90.00	16.00		0.80	500	4	40	0.35
Layer	B (16% CP)	92.66	16.33	4.48	5.12	1856	<0.002	128	0.66
Layer	C (18% CP)	91.27	19.67	7.09	3.18	1859	<0.002	44	0.75
Layer	C (16% CP)	91.11	16.23	3.96	4.14	2095	1.02	60	0.71
Layer	NRC Nutrient Requirements	90.00	18.80		4.06	625		44	0.31

¹Percentage or mg/kg feed

²CP: Crude Protein

3.2. Poultry Industry Enterprise Analysis

This research surveyed poultry operations in the Emirate of Abu Dhabi, United Arab Emirates. Analysis of

the survey indicates that within a typical broiler operation, annual meat poultry production is 2,880 tons. Meanwhile, a typical layer farm operation produces 49 million eggs annually. Survey results also indicated that average output price per kg meat is estimated to be about 15 AED and average price per dozen eggs is estimated to be 5.275 AED. The survey included a number of questions related to issues and concerns of poultry producers in Abu Dhabi Emirate, including that 60 % of broiler producers and 75% of layer producers indicating they are having marketing problems. Research results showed high feed price variability by providers from one region to another in the UAE. Survey results also showed that feed cost is a very important factor in determining poultry enterprise profitability in UAE.

Table 3. Total Revenue and Three Levels of Feed Costs for Nine Poultry Operations in the Emirate of Abu Dhabi

Broilers Operations	Total Revenue (TR)	Feed Costs High	Feed Costs Middle	Feed Cost Low
A	19,353,600	16,601,425	16,412,055	16,222,685
B	60,300,000	48,276,712	47,726,027	47,175,342
C	36,000,000	28,821,918	28,493,151	28,164,384
D	16,800,000	14,410,959	14,246,575	14,082,192
E	86,400,000	64,849,315	64,109,589	63,369,863
Layers Operations	Total Revenue (TR)	Feed Costs High	Feed Costs Middle	Feed Cost Low
F	1,567,500	1,513,818	1,491,272	1,468,726
G	14,895,833	14,385,702	14,171,447	13,957,192
H	14,895,833	14,385,702	14,171,447	13,957,192
I	13,750,000	13,279,110	13,081,336	12,883,562

Source: Poultry Industry Survey and Personal Contacts with Facilities Managers

To analyze the Abu Dhabi poultry enterprise, mark-ups between total revenue (quantities sold X sales average price) and feed cost were calculated for the major poultry producers in the Emirate of Abu Dhabi. This research assumed feed cost to be about 95% of the variables costs as indicated from personal interviews with the poultry operational managers in five broilers meat production facilities and four layers (eggs production) facilities in the Emirate of Abu Dhabi. Table 3 shows the Total Revenue (TR) and three levels of feed costs (high, medium, and low). Feed costs per kg data sets were provided by the poultry operational managers during the poultry survey. Mark-ups of total revenue minus the three levels of feed costs are estimated for broiler and layer operations in the Emirate of Abu Dhabi. Such mark-ups of revenue over feed costs are used as approximation of the poultry enterprises' ability to cover their variable costs and create possibilities for profitability.

It is noticeable from the results that poultry operation (both broilers and layers) are profitable operations considering the costs of feed. It is expected that poultry operation is generating a large enough gross margin that contributes towards covering fix cost and produces positive net returns. These results indicate the possibilities of further investment in such an important subsector to achieve higher levels of self-sufficiency at the country level. The survey results indicated that poultry producers are facing a number of marketing problems. Such remarks necessitate a further detailed marketing study to further understand the causes of having a large range of feed costs and the specific gross margins throughout the poultry industry in the UAE.

4. Conclusions

In conclusion, this research paper identified the possibility to expand poultry industry investment to contribute towards increasing UAE self-sufficiency in both poultry meat and egg production. Self-sufficiency

was found to be 23% for poultry meat and 54% for layer production (i.e., eggs). Economic characteristics of a typical poultry farm in the UAE show an average broiler production of about 2,880 tons. Meanwhile, average layer production was found to be about 49 million eggs. The technical quality analysis indicated that chemical analysis of nutrient composition of broiler and layer chicken feed produce by the UAE feed industry when compared to the minimum nutrient requirements of the NRC were nearly identical. The research experimental trials indicated that efficiency of feed utilization of selected major feed producers in the UAE meet the standards of high quality feeds to support growth performance in one of the fastest growing broiler strain (Cobb-500). Finally, this research project resulted in achieving one of its major objectives -- that of obtaining selected baseline information on existing broiler and layer farms in the UAE.

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