Effect of some Dietary Supplementation on Economic Efficiency of Laying Japanese Quail

Seham Fawzy Shehata[1*], Eman Ramadan Kamel[1], Mohammed El-Sayed Abo-Salem[2] and Sanad Talaat Atallah[3]

[1]*Department of Animal Wealth Development, Faculty of Veterinary Medicine, Benha University*
[2]*Department of Forensic Medicine and Toxicology, Faculty of Veterinary Medicine, Benha University.*
[3]*Department of Animal Husbandry and Animal Wealth Development, Faculty of Veterinary Medicine, Alexandria University.*

[*]*To whom correspondence should be addressed.* E-mail: seham.shehata@fvtm.bu. edu.eg

A B S T R A C T

This work was conducted to study the effect of sun dried tomato pomace (SDTP) with or without enzymes supplementation on economic efficiency of laying Japanese quail. A total of 144 forty-five days-old female Japanese quails were used. The hens were randomly allocatted into 6 groups (24 hens per each group which subdivided into 3 replicates each one contains 8females.). Group 1 was fed on the basal diet (BD) (control), group 2 were fed on the BD containing AveMix® 02 CS enzyme 0.2g/kg diet. While hens of group 3 were fed BD containing 2.5% SDTP). Group 4 received BD containing 2.5% SDTP with AveMix® 02 CS enzyme. Group 5 received BD containing 5% SDTP. Group 6 received BD containing 5% SDTP with AveMix® 02 CS enzyme. From the obtained results it was observed that, the increasing 2.5% SDTP resulted in an increase of egg mass by 11.08%. In addition to, enzymes addition leads to increasing weight of egg mass and decrease of TC by 0.82%.

Keywords: Japanese quail, tomato pomace, Enzymes, economic efficiency.

(http://www.bvmj.bu.edu.eg) **(BVMJ-34(1): 209-218, 2018)**

1. INTRODUCTION:

In Southeast Asia and Japan. But meat is the main product in Europe. Also, Japanese quails cheracterized by low maintenance cost associated with its small body size (80-300 g) plus its short generation interval, resistance to diseases and high egg production, and laboratory animal. *Tunsaringkarn et al., (2013)* stated that quail eggs are the good source of nutrients for human health. Regular consumption of quail eggs helps fight against many diseases which are a natural combatant against digestive tract disorders such as gasteritis. Quail eggs improve the immune system, promote memory health, increase brain activity and stabilize the nervous system. They are excellent sources of protein, fat, vitamin E and minerals such as nitrogen, iron, and zinc. *Giovanelli et al., (2002)* said that rising costs of cereals and imported feedstuffs for poultry diets have resulted in a search for alternative ingredients that would be available as by-products from local agricultural industries. Also, *Salajegheh et al., (2012)* reported that Agro-Industrial By-Products AIBP represented one of the most talented and promising energy and protein sources supply for livestock. The use of AIBP as a part of the feed for livestock has a high value starting from reducing the cost of production and ultimately increasing the profit margin of livestock farmers.

Sogi et al., (2005) said that the remained solid waste after processing of tomato consists of skin, seeds, trimmings, cores, fibrous matter and cull tomato. The effect of diet containing of SDTP on laying economic parameters is enigmatic. Therefore, this study was carried out to investigate the effect of diets containing two levels (2.5 and 5%) of SDTP with or without AveMix® 02 CS enzyme on economic efficiency of laying quail.

2. MATERIALS AND METHODS:

2.1. Experimental Chicks:

Our study was carried out at the quail production unit of the faculty of veterinary medicine Moshtohor, Benha University. Department of Animal Wealth Development,at the period extended from 11th April 2015 to30th may. A total of 144 42-day old Japanese hens were used in this study. In which each group contains 24 females which subdivided into (3) replicates each one contains 8females.

2.2. Management and Housing:

The hens housed in 2 battery cages; each cageconsisted of 10 departments. They were housed in a clean well-ventilated room, previously disinfected with formalin. The hens were housed in a clean well-ventilated room. Feed and water were supplied ad-libitum.

2.3. Experimental Diets:

2.3.1. Tomato pomace obtained from commercial processors (Hienz company, 6th October City, Egypt). It dried by spreading on a plastic sheet with exposing to sunlight. The particle size of pomace reduced by beating using stick and hand crushing according to ***Yitbarek, (2013).***

2.3.2. Enzyme description:

AveMix® 02 CS enzyme, a commercial multi enzyme containing glucanase, endo-1,4-β-xylanase and pectinase added to enzyme supplemented diet at the rate of 0.2g/kg diet.

Quail hens were randomly sorted into six experimental groups and were fed ad libitum on the 6 different experimental diets until the end of the experiment.

2.4. Studied traits:

2.4.1. Egg production traits:

2.4.2. Egg mass:

The average egg weight (g) for each replicate multiplied by the egg number weekly calculated according to ***Jalalinasab et al., (2014).***

Economic efficiency measurements:

The most important economic efficiency parameters studied include the following:

Total costs (TC):

It calculated from the summation of total fixed costs and total variable costs.

b. Total returns (TR):

- Total returns = Litter sale + egg sale+ hen sales.
- Litter sale = Litter sale price / No. of quail at the end of theproject.
- Egg sale = number of eggs x price of an egg.
- Hen sale = Body weight/gmat the end of project x Gram price.

2.4.2. Production and cost function:

2.4.2.1. Production function

Logarithmic form was the best for determination the production model to estimate the effect of partial substitution of yellow corn and soya bean meal with sun dried tomato pomace on egg mass for laying hens for each group.

2.4.2. 2.2. Costs function:

Logarithmic form was carried out to estimate

2.4.2.2.a. Effect of egg mass on total cost

The egg mass used as (independent variable) and total cost used as (dependant variable).

2.4.2.2.b. Effect of total return on total costs

The total return used as (independent variable) and total cost used as (dependant variable) according to ***Fardos (2009).***

3. RESULTS:

3.1. Effect of dietary supplement cost on total egg mass.

3.1.1. Effect of dietary supplement on total egg mass.

3.2. Cost functions:

3.2.1. Relationship between Egg mass and Total Costs of laying quail.

3.2.2. The relationship between Egg mass and Total Costs of laying quail in 5% DTP groups.

Table (1): Experimental design for all treared groups.

Group	Number of birds	Diets
1	24	Control- Basal diet only
2	24	D1- Basal diet with enzymes.
3	24	D2 - Basal diet containing (2.5% SDTP)
4	24	D3 - Basal diet containing (2.5% SDTP plus enzymes).
5	24	D4 - Basal diet containing (5%) SDTP.
6	24	D5 - Basal diet containing (5%) SDTP plus Enzymes.

Table (2): Production Function of egg mass and dietary supplement for of (2.5%) SDTP group.

Function	Log egg mass = 1.924 + 1.108 log dietary supplement
t	(77.534) * (20.344) *
F	(348.924) *
R^{-2}	(0. 949)

** Significant at ($P\leq$ 0.05).

Table (3): Production Function of egg mass and dietary supplement for of (2.5%) SDTP with Enzyme group.

Function	Log egg mass = 1.124 + .835 log dietary supplement
T	
	(8.489) ** (9.728) * *
F	
R^{-2}	(94.640) * *
	(0.803)

** Significant at ($P \leq 0.05$).

Table (4): Production Function of egg mass and dietary supplement for (5%) SDTP with enzymes group.

Function	Log egg mass= 6.163 - 2.007 log dietary supplement
t	(13.228) ** (-7.988) **
F	
R^{-2}	(63.811) * *
	(0. 732)

Table (5): Cost Function of egg mass and total cost for control group

Function	Log total costs = 2.452 +0 .272 log egg mass
t	
F	(36.342) ** (9.744) * *
R^{-2}	(94.947) **
	(0. 803)

** Significant at ($P \leq 0.05$).

Table (6): Cost Function of egg mass and total cost for Control with enzymes group

Function	Log total costs = 3.288 - 0 .082 log egg mass
t	
F	(26.556) ** (-1.606) * *
R^{-2}	(2.578) **
	(0. 64)

Table (7): Cost Function of egg mass and total cost for (2.5%) SDTP group

Function	Log total costs = 2.532+0 .227log egg mass
t	
F	(18.702) ** (4.063) **
R^{-2}	(16.510) **
	(0. 413)

** Significant at ($P\leq$ 0.05).

Table (8): Cost Function of egg mass and total cost for 2.5% SDTP with enzymes group.

Function	Log total costs = 2.539 +0 .307 log egg mass
T	
F	(22.275) *** (6.988) ***
R^{-2}	(87.726) ***
	(0. 675)

** Significant at ($P\leq$ 0.05).

Table (9): Cost Function of egg mass and total cost for (5%) SDTP group

Function	Log total costs = 2.433+0 .269 log egg mass
t	
F	(23. 664) * (6.261) *
R^{-2}	(39.194) *
	(0.624)

** Significant at ($P \leq 0.05$).

Table (10): Cost Function of egg mass and total cost for (5%) SDTP with Enzymes.

Function	Log total costs = 3.218 - 0.047 log egg mass
t	
F	(29.267) * (-1.044) *
R^{-2}	(1.090) *
	(0.4)

Table (11): Cost Function of total return and total cost for Control group:

Function	Log total costs = 2.450+0 .207log total returns
t	
F	(39.294) ** * (10.580) ***
R^{-2}	(111.931) ***
	(0.828)

** Significant at ($P \leq 0.05$).

Table (12): Cost Function of total return and total cost for (2.5%) SDTP group:

Function	Log total costs = 2.626+0 .144 log total returns
t	
F	(24.353) *** (4.238) ***
R^{-2}	(17.959) ***
	(0.424)

** Significant at ($P\leq$ 0.05).

Table (13): Cost Function of total return and total cost for (2.5%) SDTP with enzymes group.

Function	Log total costs = 2.597+0 .158 log total returns
t	
F	(29.061) *** (5.614) ***
R^{-2}	(31.513) ***
	(0.570)

** Significant at ($P\leq$ 0.05).

4. DISCUSSION:

Regarding table (3), The average elasticity of dietary supplement cost was about (0.835), meaning that the increasing dietary supplement cost by 10 % resulted in an increase of egg mass by 8.35% and the dietary supplement explained about 80% from changes in total egg mass.

In regard to table (4), the average elasticity of dietary supplement cost was about (- 2.007), meaning that the increasing dietary supplement by 10 % resulted in a decrease of egg mass by 20.07%. This may be due to high fiber content in 5% SDTP.

The table (5) showed the significant ($P \leq 0.05$) of the production function and positive relationship total egg mass and total cost. The average elasticity of egg mass was about (+0 .272), meaning that the increasing weight of egg mass by 10 % resulted in an increase of TC by 2.72% and the value of dietary supplement explained about 80% from changes in TC.

In table (6), the average elasticity of egg mass was about (- 0 .082), meaning that the increasing weight of egg mass by 10 % resulted in a decrease of TC by 0.82% and the value of dietary supplement explained about 6.4 % from changes in TC.

The table (7) showed the significant ($P \leq 0.05$) of the production function and positive relationship total egg mass and total cost. The average elasticity of egg mass was about (+0 .227), meaning that the increasing weight of egg mass by 10 % resulted in an increase of TC by 2.27 % and the value of feed substitution explained about 41.3 % from changes in TC.

As showen in table (8) the significant ($P \leq 0.05$) of the production function and positive relationship total egg mass and total cost. The average elasticity of egg mass was about (+0 .307), meaning that the increasing weight of egg mass by 10 % resulted in an increase of TC by 3.07 % and dietary supplement addition explained about 67 % from changes in TC.

Table (9) indicated the significant ($P \leq 0.05$) of the production function and positive relationship total egg mass and total cost. The average elasticity of egg mass was about (+0 .269), meaning that the increasing weight of egg mass by 10 % resulted in an increase of TC by 2.69 %.

Concerning table (10), The average elasticity of egg mass was about (-0. 047), meaning that the increasing egg mass by 10 % resulted in decrease TC by 0.47% and the value of dietary supplement explained about 4 % from changes in TC.

The table (11) showed the significant ($P \leq 0.05$) of the production function and positive relationship total return and total cost. The average elasticity of TR was about (+0 .207), meaning that the increasing TR by 10 % resulted in an increase of TC by 2.07 %.

Table (12) indicated the significant ($P \leq 0.05$) of the production function and positive relationship total return and total cost. The average elasticity of TR was about (+0 .144), meaning that the increasing TR by 10 % resulted in an increase of TC by 1.44 %. As addition of SDTP decrease total cost. This result is in accordance by *Patwardhan et al., (2011)* who saidthe use of tomato processing byproducts could provide extra income.

Table (13) showed the significant ($P \leq 0.05$) of the production function and positive relationship total return and total cost. The average elasticity of TR was about (+0 .158), meaning that the increasing TR by 10 % resulted in an increase of TC by 1.58%. From our study, we conclude that the increasing 2.5% SDTP resulted in an increase of egg mass by 11.08%. In addition to, enzymes addition leads to increasing weight of egg mass and decrease of TC by 0.82%.

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