

## RESEARCH PAPER

# Effect of adding different levels of celery seeds powder with or without supplementation of exogenous enzymes upon the cost of feed for egg production and the external and internal quality of quail eggs.

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### ABSTRACT:

A total 250 quail females 120 days old were randomly divided into ten dietary treatments (1: basal diet, 2: basal diet plus 0.10% exogenous enzymes, 3: basal diet contained 0.25% celery seeds powder, 4: basal diet contained 0.50% celery seeds powder, 5: basal diet contained 0.75% celery seeds powder, 6: basal diet contained 1.00% celery seeds powder, 7: basal diet contained 0.10% exogenous enzymes plus 0.25% celery seeds powder, 8: basal diet contained 0.10% exogenous enzymes plus 0.50% celery seeds powder, 9: basal diet contained 0.10% exogenous enzymes plus 0.75% celery seeds powder, 10: basal diet contained 0.10% exogenous enzymes plus 1.00% celery seeds powder). The numbers of birds for each replicate (cage) were five birds and each treatment included five replicates. The results of statistical analysis showed significant differences ( $p < 0.05$ ) among treatments for egg mass (8.82, 9.32, 9.63, 9.11, 8.86, 8.79, 8.50, 9.37, 8.84 and 10.24 gms egg/bird/day) and for feed conversion ratio (3.33, 3.96, 3.05, 4.05, 3.30, 3.77, 3.02, 2.49, 3.28 and 3.35 gms feed per gram of egg respectively). The lowest feed cost for egg production was for the seventh dietary group (1.66, 1.98, 1.52, 2.02, 2.07, 1.87, 1.51, 1.25, 1.64 and 1.67 dollars feed cost per one kilogram of egg produced). There were significant ( $p < 0.05$ ) differences among treatments for shell thickness, weight of yolk, yolk color and the albumen diameter.

### KEY WORDS:

DOI: <http://dx.doi.org/10.21271/ZJPAS.33.s1.18>  
ZJPAS (2021) , 33(s1);175-181.

### INTRODUCTION

Phytochemical feed additives consist of a broad variety of substances, mainly extracts from plant materials, such as flowers, buds, seeds, leaves, twigs, bark, herbs, wood, fruit and roots (Frankic et al.; 2009 ; EL-Tazi et al., 2014; Qamar et al., 2015). These three properties are associated with the presence of many biologically active substances. The main component of celery seeds is limonene and p-cymene (Momin et al., 2002 ; Whitehouse et al., 2001 ; Falzari et al. Menar, 2005). The object of this study was to investigate the effect of different levels of celery seeds powder with or without exogenous enzymes upon the cost of feed for egg production and external ;internal quality of quail eggs.

### Material and Methods

**Birds and Experimental Diets :** 250 females of Japanese quail at 120 days of age were divided randomly into ten nutritional treatments as shown in table (1). Each treatment included five replicates five cages at battery system and the number of birds per each replicate (cage) were 5 birds. Both feed and water were provided ad libitum. A regimen of 16 hour light :8 hour dark/day was provided throughout the period (today) of this study. Eggs were collected daily, egg weight, egg mass, feed intake and feed conversion ratio calculated weekly. Feed cost per one kilo of egg produced was calculated as the following equation :

$$\text{Feed cost/kilo of egg} = \frac{\text{the price/kilo of feed} \times \text{feed conversion ratio}}{\text{Feed conversion ratio}}$$
 (Al-Neemi and Al-Hadeedy, 1971)

Statistical analysis : statistical analysis was applied by using complete randomized design using statistical analysis system (SAS ,2001).

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### Article History:

Published: 15/03 /2021

Multiple range test (Duncan ,1995) was used to establish the variance among treatment means.

### Results and Discussion

In the present study, egg mass for birds (Table2) fed tenth diet (0.10% exogenous enzymes plus 1.00% celery seeds powder) was significantly ( $p \leq 0.05$ ) heavier than the egg mass for the birds fed the control diet (without exogenous enzymes and celery seeds powder) about (16.10%), and the average of this trait were for the experimental treatments (8.80, 9.32, 9.63, 9.11, 8.86, 8.89, 8.50, 9.37, 8.84 and 10.42) gm egg mass respectively. The best ability for conversion feed to egg was for the birds of T8 (2.49 gm feed per gm of egg mass) which fed diet contain exogenous enzymes plus 0.50% celery seeds powder and the average of this trait were (3.33, 3.96, 3.05, 4.06, 3.30, 3.77, 3.02, 0.49, 3.28 and 3.35 gm feed/gm of egg produced) respectively. Celery seeds contain high ratio of fat and different components, like limonene which could get to 68% of the whole seed fat and B\_selenin and 3\_n\_bthylphthalide (Raghavan, 2007 and Bown, 1995) and these celery seeds contained different variety of vitamins and minerals might improve the digestive system through increase the liver activities and increase the activity of enzymes (Bahar et al., 2002) or through protecting the gut (whitehouse et al.,

2001) the improving the inner physiological environment to the poultry (proteins and fat) and regulating the bile secretions (Tsi and Tsi, 2000) and improving digestive pancreatic and gastrointestinal enzymes (Elgayyar et al., 2001). These results agree with the results of Roland (2009). On other hand the results in the tables (3, 4 and 5) showed no significant differences for egg specific, gravity, shape, index, percentage of shell weight, yolk index, percentage of yolk weight, high yolk and yolk diameter among the birds egg of the treatments percentage of albumen weight, albumin high and high unit, while the differences were significant ( $p \leq 0.05$ ) among the birds egg of the treatments for the egg shell thickness, egg surface area, yolk weight, yolk color and albumin diameter. The feed cost per one kilo of egg produced summarized in the Table (6). The lowest feed cost was for the birds fed diet for the treatments (8) which contained 0.10% exogenous enzymes plus 0.50% celery seeds powder. The values of this trait were (1.658, 1.983, 1.518, 2.017, 2.065, 1.869, 1.510, 1.245, 1.636 and 1.668) dollars cost feed for production one kilo of egg respectively.

Table (1) :The feeds stuffs percentage and calculated chemical composition of the diets.

Ingredients %	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Wheat	50.90	50.80	50.65	50.4	50.15	49.9	50.55	50.3	50.05	49.8
corn	10.60	10.60	10.60	10.60	10.60	10.60	10.60	10.60	10.60	10.60
Soybean meal (47%)	26.35	26.35	26.35	26.35	26.35	26.35	26.35	26.35	26.35	26.35
Celery seeds powder	—	—	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00
Enzymes mixture	—	0.10	—	—	—	—	0.10	0.10	0.10	0.10
Vegetable Oil	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Limestone	5.34	5.34	5.34	5.34	5.34	5.34	5.34	5.34	5.34	5.34
Di calcium phosphate	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94
Salt	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
vitamins and minerals (a)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Lysine	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14

<b>Methionine</b>	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
<b>Choline Chloride (60%)</b>	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
<b>Total</b>	100	100	100	100	100	100	100	100	100	100
<b>Calculated chemical composition (b)</b>										
<b>Metabolisable energy(Kcal/kg)</b>	2930	2927	2926	2922	2918	2914	2923	2919	2915	2911
<b>Crude Protein%</b>	20.20	20.19	20.26	20.31	20.37	20.43	20.25	20.30	20.36	20.41
<b>Calcium%</b>	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
<b>Phosphorus%</b>	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
<b>Methionine%</b>	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
<b>Lysine%</b>	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06

a) 1 kg of a mixture of vitamins and minerals processed: vitamin A (8 million IU), vitamin D3 (1,500,000 IU), vitamin E (1000 IU), K3 (2000 mg), B1 (500 mg), B2 (500 mg), B6 (200 mg), B12 (8 mg), Folic acid (50 mg), Niacin (8000 mg), Calcium (4000 mg), Magnesite (400 mg), Zinc (150 mg), Iron (53 mg), Copper (43 mg), choline (40 mg)

b) Calculated from NRC (1994).

Table (2) : The effect different levels of celery seeds powder supplemented with or without exogenous enzymes upon the performance (average  $\pm$  standard division).

Treatments	Egg mass (gm)	Feed Conversion Ratio (feed/egg)
<b>T1</b>	<b>8.82 <math>\pm</math> 0.32</b> <b>b</b>	<b>3.33<math>\pm</math>0.39</b> <b>ab</b>
<b>T2</b>	<b>9.32 <math>\pm</math>0.29</b> <b>ab</b>	<b>3.96<math>\pm</math>0.29</b> <b>a</b>
<b>T3</b>	<b>9.63 <math>\pm</math>0.25</b> <b>ab</b>	<b>3.05<math>\pm</math>0.34</b> <b>ab</b>
<b>T4</b>	<b>9.11 <math>\pm</math>0.16</b> <b>ab</b>	<b>4.06<math>\pm</math>0.34</b> <b>a</b>
<b>T5</b>	<b>8.86<math>\pm</math>0.33</b> <b>b</b>	<b>3.30<math>\pm</math>0.31</b> <b>ab</b>
<b>T6</b>	<b>8.79<math>\pm</math>0.49</b> <b>b</b>	<b>3.77 <math>\pm</math>0.27</b> <b>a</b>
<b>T7</b>	<b>8.50<math>\pm</math> 0.21</b> <b>b</b>	<b>3.02<math>\pm</math>0.50</b> <b>ab</b>
<b>T8</b>	<b>9.37 <math>\pm</math>0.80</b> <b>ab</b>	<b>2.49<math>\pm</math>0.22</b> <b>b</b>
<b>T9</b>	<b>8.84<math>\pm</math> 0.49</b> <b>b</b>	<b>3.28<math>\pm</math>0.52</b> <b>ab</b>
<b>T10</b>	<b>10.24<math>\pm</math>0.37</b> <b>a</b>	<b>3.35<math>\pm</math>0.13</b> <b>ab</b>

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\*: The mean values within each column with different superscripts differ significantly.

-T1: basal diet, T2: basal diet plus 0.10% exogenous enzymes, T3: basal diet contained 0.25% celery seeds powder, T4: basal diet contained 0.50% celery seeds powder, T5: basal diet contained 0.75% celery seeds powder, T6: basal diet contained 1.00% celery seeds powder, T7: basal diet contained 0.10% exogenous enzymes plus 0.25% celery seeds powder, T8: basal diet contained 0.10% exogenous enzymes plus 0.50% celery seeds powder, T9: basal diet contained 0.10% exogenous enzymes plus 0.75% celery seeds powder, T10: basal diet contained 0.10% exogenous enzymes plus 1.00% celery seeds powder

Table (3) :The effect different levels of celery seeds powder supplemented with or without exogenous enzymes of the egg on the external egg traits (average  $\pm$  standard division).

Ingredients	Egg specific gravity	Shape index (mm)	Egg Shell Thickness (mm)	Percentage of shell weight (%)	Egg surface area (cm <sup>2</sup> )
T1	<b>1.136 <math>\pm</math> 0.008</b> a	<b>76.00 <math>\pm</math> 2.60</b> a	<b>25.37 <math>\pm</math> 0.03</b> a	<b>18.32 <math>\pm</math> 1.23</b> a	<b>24.58 <math>\pm</math> 0.48</b> ab
T2	<b>1.157 <math>\pm</math> 0.016</b> a	<b>91.97 <math>\pm</math> 14.18</b> a	<b>25.37 <math>\pm</math> 0.07</b> a	<b>21.40 <math>\pm</math> 2.38</b> a	<b>25.66 <math>\pm</math> 0.72</b> ab
T3	<b>1.130 <math>\pm</math> 0.003</b> a	<b>98.01 <math>\pm</math> 20.47</b> a	<b>25.09 <math>\pm</math> 0.31</b> ab	<b>17.58 <math>\pm</math> 0.53</b> a	<b>25.04 <math>\pm</math> 0.45</b> ab
T4	<b>1.140 <math>\pm</math> 0.008</b> a	<b>87.29 <math>\pm</math> 8.11</b> a	<b>24.88 <math>\pm</math> 0.26</b> ab	<b>18.99 <math>\pm</math> 1.32</b> a	<b>25.72 <math>\pm</math> 0.61</b> ab
T5	<b>1.150 <math>\pm</math> 0.014</b> a	<b>78.13 <math>\pm</math> 1.33</b> a	<b>24.26 <math>\pm</math> 0.43</b> ab	<b>20.42 <math>\pm</math> 2.23</b> a	<b>24.06 <math>\pm</math> 0.87</b> b
T6	<b>1.130 <math>\pm</math> 0.011</b> a	<b>79.43 <math>\pm</math> 1.10</b> a	<b>25.35 <math>\pm</math> 0.10</b> a	<b>17.44 <math>\pm</math> 1.85</b> a	<b>24.90 <math>\pm</math> 0.67</b> ab
T7	<b>1.123 <math>\pm</math> 0.006</b> a	<b>77.77 <math>\pm</math> 2.09</b> a	<b>24.79 <math>\pm</math> 0.51</b> ab	<b>16.35 <math>\pm</math> 1.06</b> a	<b>25.15 <math>\pm</math> 0.58</b> ab
T8	<b>1.144 <math>\pm</math> 0.009</b> a	<b>96.61 <math>\pm</math> 12.25</b> a	<b>23.61 <math>\pm</math> 1.02</b> b	<b>19.74 <math>\pm</math> 1.54</b> a	<b>24.98 <math>\pm</math> 0.80</b> ab
T9	<b>1.142 <math>\pm</math> 0.021</b> a	<b>81.26 <math>\pm</math> 2.67</b> a	<b>25.04 <math>\pm</math> 0.31</b> ab	<b>19.12 <math>\pm</math> 3.49</b> a	<b>24.65 <math>\pm</math> 0.83</b> ab
T10	<b>1.142 <math>\pm</math> 0.014</b> a	<b>78.49 <math>\pm</math> 1.49</b> a	<b>23.89 <math>\pm</math> 0.72</b> ab	<b>19.32 <math>\pm</math> 2.20</b> a	<b>26.47 <math>\pm</math> 0.75</b> a
Moral	NS	NS	*	NS	*

\*: The mean values within each column with different superscripts differ significantly.

N.S: Not Significant ( $P \leq 0.05$ )

-T1: basal diet, T2: basal diet plus 0.10% exogenous enzymes, T3: basal diet contained 0.25% celery seeds powder, T4: basal diet contained 0.50% celery seeds powder, T5: basal diet contained 0.75% celery seeds powder, T6: basal diet contained 1.00% celery seeds powder, T7: basal diet contained 0.10% exogenous enzymes plus 0.25% celery seeds powder, T8: basal diet contained 0.10% exogenous enzymes plus 0.50% celery seeds powder, T9: basal diet contained 0.10% exogenous enzymes plus 0.75% celery seeds powder, T10: basal diet contained 0.10%

exogenous enzymes plus 1.00% celery seeds powder.

Table (4) : The effect different levels of celery seeds powder supplemented with or without exogenous enzymes upon the Yolk traits (average  $\pm$  standard division).

Ingredients	yolk index	Yolk Weight (g)	Percentage of Yolk Weight (%)	Yolk Color	High Yolk (mm)	Yolk diameter (mm)
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T1	51.69 ± 3.90 a	4.03 ± 0.12 b	36.14 ± 1.55 a	0.10 ± 3.10 ab	0.07 ± 11.12 a	1.19 ± 22.38 a
T2	49.52 ± 0.72 a	4.16 ± 0.14 ab	35.36 ± 1.32 a	3.20 ± 0.12 ab	11.24 ± 0.16 a	22.73 ± 0.52 a
T3	48.78 ± 1.69 a	4.02 ± 0.08 b	34.84 ± 1.23 a	3.00 ± 0.00 ab	11.10 ± 0.20 a	22.94 ± 0.66 a
T4	46.12 ± 1.66 a	4.17 ± 0.17 ab	34.86 ± 0.92 a	2.80 ± 0.20 b	11.12 ± 0.26 a	24.19 ± 0.77 a
T5	46.16 ± 1.03 a	4.25 ± 0.16 ab	41.48 ± 4.24 a	2.80 ± 0.20 b	11.04 ± 0.14 a	24.11 ± 0.53 a
T6	50.67 ± 2.80 a	3.96 ± 0.16 b	34.72 ± 1.38 a	3.20 ± 0.25 ab	11.52 ± 0.37 a	22.97 ± 0.81 a
T7	52.65 ± 2.61 a	4.11 ± 0.14 ab	35.56 ± 1.15 a	3.20 ± 0.20 ab	11.67 ± 0.13 a	22.60 ± 0.66 a
T8	49.15 ± 0.56 a	4.06 ± 0.30 b	35.35 ± 2.59 a	2.80 ± 0.12 b	11.23 ± 0.31 a	22.93 ± 0.81 a
T9	50.42 ± 2.31 a	4.37 ± 0.25 ab	39.12 ± 2.74 a	3.40 ± 0.18 a	11.00 ± 0.34 a	22.40 ± 1.03 a
T10	52.32 ± 4.78 a	4.68 ± 0.15 a	36.00 ± 1.43 a	3.40 ± 0.10 a	11.77 ± 0.21 a	23.28 ± 1.29 a
Moral	NS	*	NS	*	NS	NS

\*: The mean values within each column with different superscripts differ significantly.

-T1: basal diet, T2: basal diet plus 0.10% exogenous enzymes, T3: basal diet contained 0.25% celery seeds powder, T4: basal diet contained 0.50% celery seeds powder, T5: basal diet contained 0.75% celery seeds powder, T6: basal diet contained 1.00% celery seeds powder, T7: basal diet contained 0.10% exogenous enzymes plus 0.25% celery seeds powder, T8: basal diet contained 0.10% exogenous enzymes plus 0.50% celery seeds powder, T9: basal diet contained 0.10% exogenous enzymes plus 0.75% celery seeds powder, T10: basal diet contained 0.10% exogenous enzymes plus 1.00% celery seeds powder.

Table (5) : The effect different levels of celery seeds powder supplemented with or without exogenous enzymes upon the albumen traits (average ± standard division).

Ingredients	Percentage of Albumen Weight (%)	Albumin diameter (mm)	Albumin High (mm)	Hough Unit
T1	45.52 ± 1.55 a	11.85 ± 0.80 ab	3.26 ± 0.22 a	82.35 ± 1.33 a
T2	43.22 ± 3.21 a	11.62 ± 0.55 b	3.43 ± 0.17 a	82.86 ± 1.33 a
T3	47.57 ± 1.52 a	11.86 ± 0.62 ab	3.48 ± 0.18 a	83.51 ± 1.10 a
T4	46.13 ± 1.76 a	12.52 ± 0.42 ab	3.13 ± 0.25 a	80.81 ± 1.54 a
T5	38.08 ± 5.98 a	14.23 ± 1.27 a	3.19 ± 0.17 a	82.19 ± 1.08 a
T6	47.83 ± 3.08 a	12.73 ± 0.74 ab	3.23 ± 0.12 a	82.05 ± 0.71 a
T7	48.08 ± 1.67 a	12.69 ± 0.93 ab	3.20 ± 0.07 a	81.74 ± 0.33 a
T8	44.89 ± 2.24 a	13.41 ± 0.76 ab	3.40 ± 0.18 a	83.07 ± 1.19 a
T9	41.74 ± 5.85 a	10.96 ± 0.71 b	3.09 ± 0.09 a	81.20 ± 1.05 a
T10	42.67 ± 3.24 a	11.03 ± 0.71 b	3.51 ± 0.16 a	83.01 ± 1.13 a
Moral	NS	*	NS	NS

\*: The mean values within each column with different superscripts differ significantly.

N.S: Not Significant (P ≤ 0.05)

-T1: basal diet, T2: basal diet plus 0.10% exogenous enzymes, T3: basal diet contained 0.25% celery seeds powder, T4: basal diet contained 0.50% celery seeds powder, T5: basal diet contained 0.75% celery seeds powder, T6: basal diet contained 1.00% celery seeds powder, T7: basal diet contained 0.10% exogenous enzymes plus 0.25% celery seeds powder, T8: basal diet contained 0.10% exogenous enzymes plus 0.50% celery seeds powder, T9: basal diet contained 0.10% exogenous enzymes plus 0.75% celery seeds powder, T10: basal diet contained 0.10% exogenous enzymes plus 1.00% celery seeds powder.

Table (6) : The effect different levels of celery seeds powder supplemented with or without exogenous enzymes upon the feed cost (\$) per one kilo of egg produced

Ingredients	Price of one ton of feed (\$)	Price of one kilogram of feed (US \$)	Food conversion factor (gm Feed / gm Egg Mass)	Cost of feeding to produce one kilogram of eggs (US \$)
<b>T1</b>	<b>498.36</b>	<b>0.498</b>	<b>3.33</b>	<b>1.658</b>
<b>T2</b>	<b>501.08</b>	<b>0.501</b>	<b>3.96</b>	<b>1.983</b>
<b>T3</b>	<b>497.66</b>	<b>0.498</b>	<b>3.05</b>	<b>1.518</b>
<b>T4</b>	<b>496.96</b>	<b>0.497</b>	<b>4.06</b>	<b>2.017</b>
<b>T5</b>	<b>496.26</b>	<b>0.626</b>	<b>3.30</b>	<b>2.065</b>
<b>T6</b>	<b>495.56</b>	<b>0.496</b>	<b>3.77</b>	<b>1.869</b>
<b>T7</b>	<b>500.36</b>	<b>0.500</b>	<b>3.02</b>	<b>1.510</b>
<b>T8</b>	<b>499.68</b>	<b>0.500</b>	<b>2.49</b>	<b>1.245</b>
<b>T9</b>	<b>498.98</b>	<b>0.499</b>	<b>3.28</b>	<b>1.636</b>
<b>T10</b>	<b>498.28</b>	<b>0.498</b>	<b>3.35</b>	<b>1.668</b>

-T1: basal diet, T2: basal diet plus 0.10% exogenous enzymes, T3: basal diet contained 0.25% celery seeds powder, T4: basal diet contained 0.50% celery seeds powder, T5: basal diet contained 0.75% celery seeds powder, T6: basal diet contained 1.00% celery seeds powder, T7: basal diet contained 0.10% exogenous enzymes plus 0.25% celery seeds powder, T8: basal diet contained 0.10% exogenous enzymes plus 0.50% celery seeds powder, T9: basal diet contained 0.10% exogenous enzymes plus 0.75% celery seeds powder, T10: basal diet contained 0.10% exogenous enzymes plus 1.00% celery seeds powder.

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