

Effects of Empyreal® 75 on Egg Production and Wellness of Lohmann Brown Layers

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Background: Empyreal 75 is a corn-protein concentrate developed for applications requiring high dietary needs for protein. Because of the high protein concentration, good amino acid profile, digestibility and low anti-nutritional content, Empyreal 75 provides formulators an excellent foundation to build their diets. Empyreal 75 may also benefit species that do not require high dietary protein requirements. As poultry cannot produce carotenoids, Empyreal 75 provides a source of coloration to enhance yolk coloration. The addition of Empyreal 75 has also been hypothesized to provide additional benefits due to the high glutamine and branch chain amino acid content.

Objective: To test the effects of Empyreal 75 in Lohmann Brown laying hens — fed at six different levels, up to 2.5% of the diet — on egg production and hen wellness.

Materials and Methods:

- Trial was conducted at the Experimental Farm, Universidad de las Fuerzas Armadas ESPE, Universidad San Francisco de Quito, USFQ, Ecuador.
- 180 Lohmann Brown laying hens, at 64 weeks of age and weighing 1,855–2,235 g on average, were blocked by weight, then randomized within one of six treatment groups.
- Diets were manufactured to meet the recommended nutrient requirements. The Lohmann Brown layer and birds were fed 120 g/d. Diets were isocaloric and isonitrogenous, and can be seen in Table 1.
- Treatment groups consisted of a basal mash diet with 0% Empyreal 75. Subsequent treatment groups contain 0.5%, 1.0%, 1.5%, 2.0% and 2.5% on a dry matter basis.
- Trial duration lasted for 70 days and measurements consisted of: egg production, feed consumption, FCR, weight gain, egg quality parameters (weight, yolk pigmentation,

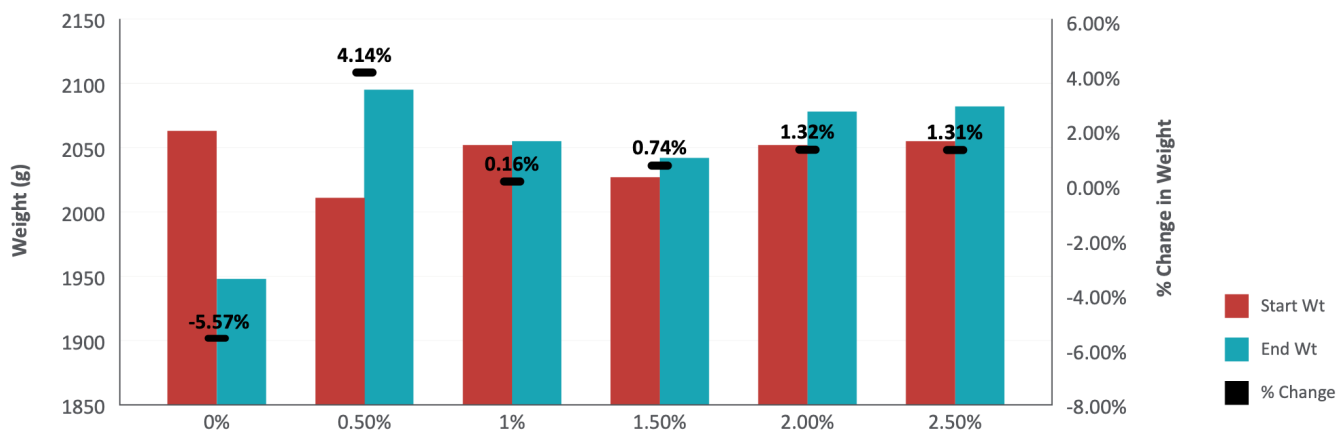
resistance and thickness of the shell).

Table 1: Diet formulations for each treatment group

Ingredient	Treatment Group					
	Control	0.5%	1%	1.50%	2.00%	2.50%
Corn	54.72	56.55	56.25	55.96	55.66	55.34
Calcium 37%	8.9	8.79	8.81	8.83	8.85	8.88
Soybean Meal 46%	17.6	18.3	17.29	16.26	15.24	14.21
Phosphate	0.97	1.22	1.18	1.14	1.10	1.07
Wheat Bran	12.96	9.83	10.76	11.69	12.62	13.55
Fish Meal 64%	0.44	0.42	0.31	0.20	0.08	0.00
Osmeq Layers	0.51	0.36	0.38	0.40	0.43	0.45
Palm Oil	2.70	2.70	2.70	2.70	2.70	2.70
Choline Chloride	0.04	0.04	0.04	0.04	0.04	0.04
Methionine	0.09	0.08	0.07	0.07	0.07	0.06
Salt	0.10	0.15	0.16	0.15	0.15	0.15
Threonine	0.02	0.02	0.02	0.02	0.02	0.02
VTM Premix	0.70	0.70	0.70	0.70	0.70	0.70
Mycotoxin Binder	0.34	0.34	0.34	0.34	0.34	0.34
Empyreal 75	0	0.5	1.00	1.50	2.00	2.50
Total	100	100	100	100	100	100

Results – Weight (Figure 1):

- There were no differences in average weight between treatment groups at the beginning of the trial.
- Birds in the control group (0% Empyreal 75) lost approximately 5.57% of their weight in the 70-day trial.
- Birds in the Empyreal 75 group gained or maintained weight throughout the trial.



Bird Efficiency (Table 2): Birds receiving 0.5% to 2.5% Empyreal 75 had increased egg production, egg weights and egg mass. Feed consumption was not different than the control leading to improved feed conversion.

Table 2: Treatment effect on egg production

Treatment	Egg Production (%)	Feed Consumption/ bird/day (g)	Egg Weight (g)	Egg Mass (g)	Feed Conversion
0%	85.83 ^b	114.17 ^b	54.87 ^c	47.24 ^b	2.09 ^a
0.50%	89.94 ^a	115.14 ^b	60.17 ^a	54.20 ^a	1.92 ^b
1.00%	86.81 ^b	116.67 ^a	57.61 ^b	50.17 ^b	2.03 ^a
1.50%	91.43 ^a	116.79 ^a	60.94 ^a	55.85 ^a	1.92 ^b
2.00%	90.52 ^a	116.06 ^a	59.79 ^a	54.23 ^a	1.95 ^b
2.50%	87.37 ^b	113.46 ^b	58.82 ^a	51.66 ^a	1.94 ^b

^{abc} Averages within columns with different superscripts were significantly different (P≤0.05)

Egg Quality (Table 3):

- Empyreal 75 positively impacted albumin height and shell resistance across all treatment groups above the control.
- The 0.5% treatment group increased the Haugh Units of the albumin.
- Yolk coloration at these levels of Empyreal 75 was not impacted.

Table 3: Treatment effect on egg parameters

Treatment	Albumin Height (mm)	Shell Resistance (kgf)	Shell Thickness (µm)	Haugh Units	Yolk Color (1–15)*
0%	7.10	3.72	383.48	81.83	8.57 ^{b,c}
0.50%	7.76	3.98	378.86	85.20	8.48 ^{c,d}
1.00%	7.21	3.79	377.32	81.62	8.43 ^d
1.50%	7.35	4.02	381.48	81.87	8.64 ^b
2.00%	7.44	4.04	372.37	82.94	8.85 ^a
2.50%	7.20	3.97	374.78	81.04	8.88 ^a

* Based on DSM YolkFan™

^{abc} Averages within columns with different superscripts were significantly different (P≤0.05)

Conclusions: In this trial, the inclusion of Empyreal 75 at up to 2.5% of the diet improved layer efficiency by improvement in egg production and egg quality, while maintaining or increasing bird weight. Empyreal 75 may improve overall bird wellness, allowing birds to increase productivity overall.

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