

EFFECTS OF ALL-LYTE C ON PRODUCTIVITY AND EGG QUALITY OF AC CHICKENS FROM 25 TO 35 WEEKS OF AGE

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ABSTRACT

This study evaluated the effects of All-Lyte C supplementation on the productivity and egg quality of Ac chickens at 25-35 weeks of age. For the supplementation trial, 250 laying hens were arranged in a CRD with five treatments and five replications. Treatments included a control (basal diet) and basal diets supplemented with All-Lyte C at 1, 2, 3, and 4 g/kg feed. Results from the supplementation trial showed that supplementing All-Lyte C significantly improved the laying rate and FCR. Specifically, hens receiving 3 and 4 g/kg All-Lyte C exhibited higher laying rates (38.9 and 39.1%) compared to the control and lower levels, ($P<0.05$). FCR was also markedly improved in hens supplemented with 2-4 g/kg (3.80-3.85), being lower than the control (4.19) and 1 g/kg (4.2), ($P<0.05$). These findings confirm that All-Lyte C, especially at levels of 2-3 g/kg, enhances egg productivity and quality.

Keywords: *All-Lyte C, egg quality, Ac chicken.*

1. INTRODUCTION

The livestock industry in particular, and agriculture in general, are currently experiencing steady development while simultaneously facing numerous challenges. One of the greatest difficulties for livestock producers is optimizing production efficiency. Achieving this goal requires effective nutritional management, close monitoring of animal health, and improvements in reproductive performance. To enhance reproductive health and disease resistance, supplementation with vitamins and electrolytes is among the most effective approaches. Among these, *All-Lyte C* is a widely used product containing high levels of vitamin A, D, E, C and electrolytes, known to strengthen the immune system and reduce stress in animals. Vitamin C has been reported to protect both humans and animals from environmental stress caused by heat or cold (Zaheer, 2015). The *Ac chicken* (*Gallus gallus domesticus*) is one of Vietnam's traditional indigenous breeds, long raised in the Mekong Delta and southeastern provinces (Phuoc, 2014). *Ac* eggs are highly appreciated by consumers for their pleasant aroma, rich flavor, absence of fishy smell,

and high proportions of yolk and albumen. However, the egg-laying rate of Silkie chickens remains relatively low, averaging only 40.2%, with annual egg production ranging from 80.4 to 105 eggs per hen (Phuoc, 2018). Therefore, supplementing *All-Lyte C* in the diet of Silkie chickens is expected to improve egg production and economic efficiency. Moreover, egg storage duration plays an equally important role in determining both productivity and quality. Investigating the effects of storage time on Silkie egg quality is essential for establishing suitable preservation protocols. Based on the above rationale, the present study was conducted to evaluate the impact of *All-Lyte C* on reproductive performance and egg quality, as well as the changes in egg quality during storage.

2. MATERIALS AND METHODS

2.1. Feeding and Management

The chickens were fed three times daily at 7:00, 13:00 and 17:00. Feed quantities were adjusted according to actual egg production. Automatic drinkers provided clean water daily. Chicken manure was treated with Balasa microbial inoculant and removed every 3-4 months. The facility was disinfected twice a week and after each manure removal. In the morning, chickens were first fed and then given supplements. The *Ac* hens were

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raised in well-ventilated housing divided into 25 pens by mesh partitions. The chicken house was roofed with double-layer corrugated sheets, and its sides were enclosed with a combination of mesh and corrugated panels to enhance ventilation, warmth, and protection from wind and rain. Each pen measured 0.5 m high, 1 m long, and 1 m wide, with rice husk litter spread on the floor. Plastic feeders and automatic nipple drinkers ensured a clean and sufficient supply of feed and water.

2.2. Experimental Design

The Ac hens were raised in open-sided housing divided into 25 pens separated by wire mesh, with 10 hens kept in each pen. A total of 250 Ac hens aged 25-35 weeks were used in the experiment. The study was arranged in a completely randomized design with five treatments corresponding to five levels of All-Lyte C supplementation, each replicated five times. In total, there were 25 experimental units, with 10 hens per pen. All treatments received All-Lyte C supplementation at levels of 0, 1, 2, 3, and 4 g/kg feed. The experiment lasted for 10 weeks, covering the 25-35 week age range of the Ac chickens. The treatments were as follows:

NT0: Basal diet + All-Lyte C (0 g/kg feed)

NT1: Basal diet + All-Lyte C (1 g/kg feed)

NT2: Basal diet + All-Lyte C (2 g/kg feed)

NT3: Basal diet + All-Lyte C (3 g/kg feed)

NT4: Basal diet + All-Lyte C (4 g/kg feed)

Table 1. Ingredient and chemical composition

Ingredient (%)	Rate	Ingredient (%)	Rate
Corn	39.3	Methionine	0.15
Rice bran	12.2	Bone meal	2.5
Fish meal	6.50	Oyster shell	1.5
Soybean meal	21	Premix	0.8
Lysine	0.05		

Table 1 presents the ingredients and mixing proportions in the diet formulated for laying *Ac chickens* during 25-35wks of age. The diet was designed to ensure an adequate supply of energy, protein, essential amino acids, minerals, and vitamins for the early

laying stage. The feed formulation provided a balanced combination of animal- and plant-based energy and protein sources, while also incorporating sufficient levels of essential AA, minerals, and vitamins. This mixing ratio was appropriate to meet the nutritional requirements of laying hens, aiming to optimize both productivity and egg quality.

Table 2. Composition of All-Lyte C

Component	Content	Component	Content
Vitamin A	85,000UI	Vitamin B ₂	200 mg
Vitamin D ₃	50,000UI	Vitamin B ₁₂	2 mg
Vitamin E	160mg	Sodium chloride	36-44%
Vitamin K ₃	700mg	Potassium chloride	7.2-8.8%
Vitamin C	200mg	Vitamin B ₆	170mg
Vitamin B ₁	200mg		

All-Lyte C is a fine powder product, ranging in color from off-white to bright white, homogeneous, and free from visible impurities. It has a mild, characteristic odor of vitamin-electrolyte mixture and is manufactured by Agriviet. The powder is slightly hygroscopic, easily soluble in water, forming a slightly turbid solution depending on concentration, with a pH of 4.5-5.5, which is suitable for the digestive physiology of poultry. When dissolved, the solution has a gentle scent and causes no irritation. Because it is sensitive to strong light and high temperatures, the product should be tightly sealed and stored in a dry, cool, well-ventilated place away from direct sunlight to preserve the activity of its ingredients.

All-Lyte C is a vitamin and electrolyte supplement complex designed to help reduce stress, enhance overall health, improve digestion and metabolism, and boost reproductive performance, particularly in industrial poultry production. The B-vitamin group (B₁, B₂, B₆, B₁₂) supports energy metabolism, stimulates appetite, and improves nerve function. Vitamins A, D₃, E, K₃, and C play vital roles in maintaining reproductive function, strengthening immunity, reducing oxidative stress, supporting mineral absorption, and

stabilizing blood coagulation. Electrolytes such as Na⁺, K⁺, and Cl⁻ help regulate water-electrolyte balance, maintain stable blood pressure, and prevent dehydration under heat stress or crowded rearing conditions.

Thanks to its well-balanced composition and comprehensive benefits, All-Lyte C is suitable for continuous use throughout the rearing period, especially effective during post-vaccination recovery, molting, feed changes, or when animals are under stress, fatigue, or loss of appetite.

2.3 Sampling Method

Each cage was numbered, and at the end of each day, all collected eggs were weighed and their weights recorded. Feed residues were gathered daily into plastic bags and weighed weekly to determine leftover amounts. The parameters recorded for each cage included laying rate, egg production, average age at first egg, body weight at first egg, egg weight, and egg shape index. At the end of the experiment, 20 eggs were selected from each treatment, for a total of 100 eggs selected for quality analysis.

2.4. Analytical Method

Reproductive performance indicators of Ac chickens supplemented with All-Lyte C in their diets-such as initial body weight (IBW) at 25wks of age, feed intake (FI), feed conversion ratio (FCR), average egg weight (AEW), and egg quality-were recorded and calculated according to the typically formulas.

External quality parameters included egg weight (EW), eggshell ratio (ER), shell thickness (ST), and shape index (SI).

Internal quality parameters: yolk ratio (YR), albumen ratio (AR), yolk index (YI), albumen index (AI), yolk color score, and HU, as described by Bui Huu Doan (2009).

Egg quality indicators egg weight (EW), yolk weight (YW), albumen weight (AW), and shell weight (SW).

The proportions of egg components were calculated according to the formulas

described by Doan (2009): Egg Weight (EW) = Total number of eggs per cage/
Total egg weight per cage

Shape Index (SI, cm) = Egg width (cm)/
Egg length (cm)

Yolk index (YI, cm) = Yolk height
(cm)/Diameter of yolk (cm)

Haugh Unit (HU): $HU = 100 \times \log (T - 1.7 \times W^{0.37 + 7.57})$

Yolk color: Determined using a Roche color fan.

2.5. Statistical analysis

The collected data were processed using Microsoft Excel 2021 and analyzed for variance using the General Linear Model (GLM) procedure in Minitab 16 software.

3. RESULTS AND DISCUSSION

Regarding EW, table 3 shows that different levels of All-Lyte C supplementation did not significantly affect EW. The treatment NT3 had the highest EW (36.2 g), followed by NT4 (36.0g), NT1 (35.6g), and NT2 (35.1g). The lowest EW was observed in the control group NT0 (35.1g).

The LR of Ac chickens supplemented with All-Lyte C in their diets showed a significant difference ($P < 0.05$) among treatments. Diets containing All-Lyte C at NT3 and NT4 resulted in higher daily LR (38.9 and 39.1%) compared with NT0 and NT1 (36.2 and 37.6%, respectively). This indicates that All-Lyte C had a positive effect on reproductive performance, suggesting that supplementing electrolytes and vitamin C improved reproductive efficiency under high-temperature conditions. Egg weight also increased from 35.1g (NT0) to 36.2g (NT3) and stabilized around 36.0g at NT4. This increase in egg weight could be related to improved nutrient metabolism and reduced oxidative stress due to the components in All-Lyte C, particularly vitamin C and minerals. The FCR decreased markedly from 4.19 in NT0 to 3.78 in NT3,

indicating better feed utilization efficiency with All-Lyte C supplementation. This was also reflected in the indicator “Feed (g)/10 eggs,” which reached the lowest values in NT2 and NT3 (1,364-1,368g).

Table 3. Effects on production and egg quality

Items	NT0	NT1	NT2	NT3	NT4	SEM	P
IBW, g/bird	900	897	895	905	903	2.56	0.77
EP/treatment	253.4 ^c	263.2 ^b	268.2 ^{ab}	272.4 ^a	273.8 ^a	1.54	0.01
Laying rate, %	36.2 ^d	37.6 ^c	38.3 ^b	38.9 ^{ab}	39.1 ^a	0.19	0.01
EW, g	35.1 ^c	35.6 ^{bc}	35.9 ^{abc}	36.2 ^a	36.0 ^{ab}	0.20	0.03
FCR	4.19 ^a	42 ^b	3.80 ^d	3.78 ^d	3.85 ^c	0.10	0.04
Feed, kg/10eggs	1471 ^a	1431 ^b	1364 ^d	1368 ^d	1386 ^c	2.19	0.04
FL, g	53.2	53.8	52.2	53.2	54.2	0.18	0.05
Egg shape index	75.4	74.8	75.0	75.7	76.1	0.24	0.95
Eggshell, mm	0.36 ^c	0.36 ^c	0.38 ^b	0.39 ^a	0.39 ^a	0.01	0.04
Yolk index	0.35 ^c	0.37 ^c	0.39 ^b	0.41 ^a	0.42 ^a	0.01	0.01
Yolk color	7.1 ^c	7.2 ^b	7.4 ^{ab}	7.9 ^{ab}	8.2 ^a	0.22	0.01
HU	87.3 ^b	87.9 ^b	88.7 ^{ab}	89.6 ^{ab}	90.8 ^a	0.24	0.01

Rows with different letters indicate statistically significant differences ($P < 0.05$)

These results are consistent with the findings of Hassan *et al.* (2013), reported that vitamin C supplementation improved FCR by enhancing nutrient digestion and absorption. The difference observed was statistically significant. However, there was no significant difference ($P > 0.05$) in egg production among treatments NT2, NT3, and NT4.

Table 3 showing that FCR values in treatments NT2, NT3 and NT4 (3.80, 3.78 and 3.85) were lower than those in NT0 and NT1 (4.19 and 42). This indicates more efficient feed utilization when All-Lyte C was supplemented at levels of 0.2g or higher. The marked improvement in the feed conversion ratio (FCR) reflects higher nutritional efficiency, meaning that the amount of feed required to produce one unit of egg mass decreased significantly. This is an important economic and technical indicator in poultry production, where feed costs typically account for 70-80% of total expenses. Specifically, compared with the control group (NT0, FCR=4.19), treatments NT2, NT3, and NT4 showed reductions of 0.39, 0.41 and 0.34 FCR units, respectively-equivalent to nearly 10% savings in feed consumption. This reduction

helps lower production costs while maintaining-or even improving-production efficiency. Notably, NT3 not only achieved the lowest FCR (3.78) but also recorded a high laying rate (38.9%), suggesting it may represent the optimal balance between productivity and feed efficiency. Specifically, supplementing All-Lyte C at levels of 2-3 g/kg in the feed improved egg quality, particularly eggshell thickness, yolk index, yolk color, and HU, all of which were higher compared to the NT0 ($P < 0.05$).

4. CONCLUSIONS

The addition of All-Lyte C to the diet of laying hens from 25 to 35 weeks of age at a level of 2-3 g/kg of feed has demonstrated significant effectiveness in enhancing reproductive performance and improving egg quality. Indicators such as laying rate, shell thickness, yolk color, yolk index, and HU index all showed improvement compared to the control group.

REFERENCES

- Doan B.H. (2009). Poultry eggs and incubation. Agricultural Publishing House.
- Dung N.N.X., Phuoc T.V. and Manh L.H. (2014). Effect of crude protein content on reproductive performance of black chicken breed. *J. Ani. Sci. Technol.*, 4: 51-58.
- Manh L.H., Phuoc T.V., Dung N.N.X. and Loc Đ.T. (2014). Effects of energy levels on reproductive performance of Black chicken breed. *J. Agr. Sci. Rur. Dev.*, 17: 75-80.
- Nikolova N. and Kocovski D. (2006). The influence of environmental stress on egg quality traits in laying hens. *Biotechnol. Ani. Husb.*, 22(1-2): 35-42.
- Okoli I.C. and Udedibie A.B.I. (2000). Effect of egg storage period on vitelline membrane integrity and sensory quality in poultry eggs: 55-60
- Phuoc T.V., Dung N.N.X. and Manh L.H. (2018). Effects of the ratio of sulfur-containing amino acids to Lysine in the diet on reproductive performance, egg quality, nutrient digestibility and nitrogen utilization efficiency of egg-laying Ac chicken. *J. Sci. Technol.-Agr. Rur. Dev.*, 1: 78-86.
- USDA (2000). United States Standards, Grades, and Weight Classes for Shell Eggs. Agricultural Marketing Service, USDA.
- Zaheer K. (2015). An updated review on chicken eggs: Production, consumption, management aspects and nutritional benefits to human health. *Food Nut. Sci.*, 6: 1280-90.
- Zhang K.Y., Zeng Q.F., Xuan Y., Su Z.W. and Qi S.R.N. (2020). Effect of different tea polyphenol products on egg production performance, egg quality and antioxidative status of laying hens under heat stress. *Ani. Feed Sci. Technol.*, 267: 114554.