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EVALUATION OF QUAIL EGGS UNDER THE EFFECT OF THE USE OF VITAMINS FOR ITS ADAPTATION TO THE HUMID TROPICS

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ABSTRACT

Quail is a macroscopic cell product of ovulation, has an ovoid shape and is covered by a shell and membranes that protects the albumine which surrounds the yolk, the **objective** of this research is to determine the effect caused by the use of vitamin B, ADE and observe the adaptability of quails to the wet tropics and egg characteristics. **Methodology**, for which 140 female quails and 20 males were used distributed in four treatments and five repetitions whose results were analyzed under an additive linear model where: Yij: is the estimated value of the variable, is the general mean, : the effect of vitamins and ; the $Yij = \mu + \tau_i + \epsilon_{ij}$experimental $\mu\tau_i\epsilon_{ij}$error; In addition, from Tukey's post Hot test (p<0.05) to determine the best treatment, the experimental units were randomly distributed and managed under controlled conditions in cages with feeders and drinkers, with a controlled sanitary system and feed supply. **Results;** The characteristics of the egg such as transverse diameter, longitudinal diameter, weight, volume, bulk density, weight of the shell, weight of the yolk plus albumin and thickness of the CáscarA when applying the control treatment exceeded the alternative treatments (ADE and B protein), whose behavior was when evaluating yolk and albumin. Therefore, it is **concluded** that quails at the level of humid tropics in the Morona canton do not require additional vitamin supplementation to that available in food.

KEYBOARDs: QUAIL EGGS , USE OF VITAMINS, HUMID TROPICS

INTRODUCTION

The birds are characterized by having an oviparous reproduction, thisparticularity allows to know that the birds ovulate and are put to s by the females that has been fertilized or not, the characteristic of the egg of the birds are important in the reproduction, because if these are large or small, these allow their chicks to be viable and the species is perpetuated.(Grimaldos, 2020)

The eggs of birds are generally ovoid, presenting variations from rounded, elongated and tubular, this is due to the inflammation of the oviduct, being essential to choose for the incubation process either only the well-formed eggs (ovoid)(Ortiz, 2019, p. 5 - 10) . Another characteristic of the quail egg is the varied coloration, being able to identify eggs with dark spots of irregular shape on its entire surface (normal egg) to ash, bluish, brown, beige, green among others. In this species you can identify eggs with abnormalities in the shell, such as: eggs in farfara caused by multiple factors such as very young females, calcium deficiency, deficiency of vitamin E, B12 and D, selenium and phosphorus deficiencies, or in turn caused by diseases such as New Castle, Infectious Bronchitis, Avian Influenza, ssyndrome of the fall of posture, parasites or mycotoxins and stress of the bird. In the same way you can find white eggs generated by an excess of proteins or inflammation of the oviduct which should not be subjected to the incubation process; although these are suitable for consumption.(Martìn, 2019)

The success of the adaptation of quails is to have a healthy environment with an ideal temperature for each species, in addition to a well-balanced diet and in its structure there are fat-soluble vitamins such as A, D and E, and those of the B complex(Quispe, 2014).

Considering that quails are early animals of high performance, diets rich in proteins are required according to line and age, the average daily consumption fluctuates between 20 to 23 g and to maintain an adequate feeding program a balanced, healthy, economical diet must be provided and that meets the nutritional requirements of birds according to age. With this, the objective of feeding a coturnícola farm can be crystallized in order to transform food into products such as meat and eggs.(Balleros & Vásquez, 2020)

MATERIALS AND MISALL

The present research was developed in the private farm León located in the ESPOCH headquarters Morona Santiago at an altitude of 1160 m.a.s.l. with a temperature ranging from 16 to 26 ° C and a monthly rainfall ranging from 63 to 122 mm of rain.

The experimental work was developed with a total of 140 female quails and 20 males, which were randomly distributed in 4 treatments (T1: Vitamin B + ADE, T2: Vitamins ADE and T3: B complex vitamin versus a T0: control treatment) in 5 repetitions and 7 female quails per cage with a male; the collection of bird eggs was analyzed under an additive linear model where: Yij: is the estimated value of the variable, is the general mean, : the effect of $Yij = \mu + \tau_i + \epsilon_{ij}$ vitamins and ; is the effect of randomization of birds in the experimental field, the same that served to test the hypothesis and a post Hot analysis according to Tukey's theory ($p<0.05$).$\mu \tau_i \epsilon_{ij}$

To analyze the quail egg the birds were subjected to a vitamin-based diet as set out in the previous paragraph and once the birds were in full posture the eggs were collected according to the treatments and repetitions and proceeded to measure the width, length, weight, volume, bulk density, weight of the shell, weight of the yolk plus the albumin and the weight of the shell.

Subsequently, samples of yolk, albumin and shell were taken to determine the moisture, organic matter and ashes by treatment.

RESULTS AND DISCUSSION

Table 1. Characteristics of the egg of codorniz under the effect of the use of vitamins for its adaptation to the humid tropics (Macas).

Variables	Treatments				Prob.	E. E.
	T0	T1	T2	T3		
Transverse diameter (cm)	2.59±0.42^{a}	2.53±0.08^{a}	2.53±0.12^{a}	2.68±0.09^{a}	0,34	0,07
Longitudinal diameter (cm)	3.27±0.28^{a}	3.30±0.07^{a}	3.21±0.13^{a}	3.16±0.13^{a}	0,19	0,05
Weight (g)	12.24±1.33^{a}	11.71±0.81^{a}	11.73±1.25^{a}	11.44±1.21^{a}	0,41	0,34
Volume (ml)	11.17±1.19^{a}	10.83±1.03^{a}	10.83±1.19^{a}	10.83±1.34^{a}	0,87	0,34
Bulk density (g/l)	1.10±0.04^{a}	1.08±0.06^{a}	1.08±0.03^{a}	1.07±0.06^{a}	0,51	0,01
Shell Weight (g)	1.64±0.17°	1,38±0,20^{b}	1.65±0.15°	1.64±0.14^{a}	0,00	0,05
Yolk weight + albumin (g)	10.87±0.64^{a}	10,00±0,69^{from}	9.95±1.11^{from}	9,78±0,92^{b}	0,02	0,25
Shell thickness (mm)	0.25±0.04°	0.27±0.03^{a}	0.28±0.03^{a}	0.28±0.02^{a}	0,12	0,01

Horizontally equal letters do not differ significantlyaccording to Tukey (p>0.05).
Pro. Probability
E.E. Error experimental.

The quail egg in the first phase of laying, after the application of the control treatment (T0), vitamin B complex plus ADE (T1), vitamins ADE (T2) and B complex (T3) registered a transverse diameter of 2.53±0.08 to 2.68±0.09 , values between which do not differ significantly (p>0.05), which means that birds only use these organic catalysts tailored to their requirements; in the breeding of c odorniz in Buenos Aires it is reported that the transverse diameter of the quail egg was approximately 2.5 0 cm value slightly lower than that reported in the present work, (Bissoni, 1993)which allows to manifest that the transverse diameter improves, although there is a risk that the birds prolapse when they lay eggs with a considerable transverse diameter. (Nuñez et al, 2021)

Regarding the longitudinal diameter of the quail egg, the birds that received in their diet in the first phase of laying the control treatment (T0), vitamin B complex plus ADE (T1), vitamins ADE (T2) and B complex (T3) registered values of 3.16±0.13 to 3.30±0.07 cm between which do not differ significantly (p>0.05), although it is not observed that their behavior is exactly equal to the longitudinal diameter, this means that the eggs do not have a symmetrical shape. In Buenos Aires, quail breeding reports a longitudinal egg diameter of 3.00 cm, (Bissoni, 1993) being slightly lower than that indicated in the present study, this may be due to the vitamin supplementation provided to birds at the beginning of the posture in order to adapt to the birds in Morona Santiago.

The mass of quail egg that was under the effect of control treatment (T0), vitamin B complex plus ADE (T1), vitamins ADE (T2) and B complex (T3) was between 11.44±1.21 and 12.24±1.33 g, values between which do not differ significantly ($p>0.05$), although it can be observed that the weight of quail eggs that were under the effect of the control treatment reached the highest weight, determining that the supply of additional vitamins to adapt quails beyond what is available to the balance is unnecessary for this purpose. According to the quail manual, the egg weighs 10 g, (Cumpa, 1999)a lower value than that recorded in the present study, this may be because the food provided to these birds was at will, preventing them from having adaptation problems due to lack of food. In the same way in the breeding of quails in Bogotá - Colombia they report that the egg mass must be between 9.60 and 10.00 g which allows to give a commercial value to more than hatchability(Balleros & Vásquez, 2020). On the other hand, quail eggs weigh 8.28 to 9.78 g this (Costa, Brandao, Sousa, da-Silva, & Rabello, 2011) low weight is due to multiple management factors (Hurtado-Nery & Torres, 2010) being less than those registered in this research work, this may be due to the application of vitamins to adapt to the humid tropics.

In accordance with the mass, the volume of quail egg subjected to control treatment (T0), vitamin B complex plus ADE (T1), vitamins ADE (T2) and B complex (T3) was between 10.83±1.34 and 11.17±1.19 ml values between which it does not demonstrate relevant differences ($p>0.05$), although it can be argued that the food without added vitamins (T0) registered the highest volume, ratifying the behavior of the quail egg mass in this research. In the Territorial Polytechnic University of the West of Sucre "Clodosbaldo Russián" when evaluating the effect of different levels of fishmeal on the production and quality of quail eggs allowed to record volumes of 6.03 and 8.20 cm^3(Pino, Pino, & Ruiz., 2018) and (Alasahan S, 2016) values lower than those recorded in this work, this may be due to the good size that was reached of the birds when starting the posture. (Anderson KE, 2004)

The bulk density of quail egg under the effect of control treatment (T0), vitamin B complex plus ADE (T1), vitamins ADE (T2) and B complex (T3) was 1.07 ±0.06 to 1.10±0.04 g/ml values between which do not allow significant differences ($p>0.05$) although it can be mentioned that the effect of the control treatment allowed a greater bulk density, mainly due to the fact that both the egg mass and the volume is greater in the treatment in question. When using different levels of fishmeal on the production and quality of quail eggs in Venezuela, densities of 1.1 0 and 1.37 g/cm^3 values higher than those recorded in this(Pino, Pino, & Ruiz., 2018)study.

The use of the control treatment (T0), vitamins ADE (T2) and B complex (T3) allowedto register weights of 1.64±0.17; 1.65±0.15 and 1.64±0.14 g, which differ significantly ($p<0.01$) from the weight of the eggshell that is under the effect of the vitamin treatment of the B complex plus

ADE (T1) with which a value of 1.38±0.20 was reached. g that when compared with the rest of treatments is lower, this may be because the vitamins of the B complex and ADE as a whole do not help to metabolize the calci or to be incorporated into the egg shell and the weight of the shell is affected that can possibly be shown to be weaker. In the breeding, production and marketing of quail in Peru, it is recorded that the weight of the shell represents 10.80% of the weight of the egg (Quispe, 2014) value that agrees with the present work.

The use of the control treatment (T0), vitamin B complex plus ADE (T1), vitamins ADE (T2) allowed to record weights of the yolk plus weight of the albumin of 10.87±0.64; 10.00±0.69 and 9.95±1.11 g, values that differ significantly ($p<0.05$) from the treatment based on B complex (T3) with which 9.78±0.92 g was reached, determining that the vitamin B complex is considered an excellent catalyst to reach the body weights of animals, but that does not help to improve egg mass (yolk plus albumin) . The breeding, production and marketing of quail in Peru records that the weight of the yolk and shell reflects 89.80% in relation to the weight of the egg (Astiasarán & Martinez, 1999) values similar to those recorded in the present study. The weight of albumin and quail egg yolk was 9.81 g distributed in 6.02 and 3.79 g respectively when feeding quails with serrated waste meal and butchery being (Rosario & Nieves, 2015) similar being slightly lower thanl found in the present study.

In thickness of quail eggshell under the effect of control treatment (T0), vitamin B complex plus ADE (T1), vitamins ADE (T2) and B complex (T3) was from 0.25±0.04 to 0.28±0.02 mm values between which they did not differ significantly ($p>0.05$) Although it can be mentioned that the quail eggshell under the effect of the control treatment has a thinner shell which is possibly more susceptible to breaking, although the farfaric membranes of the egg can result in good resistance. When using phytase on quail productivity, the thickness of the quail eggshell was 0.20 to 0.26 mm values similar to those recorded in the present study, which means that in the present work these standards of egg production of coturniculture were reached. On the other hand it should be noted that the thickness of the shell is related to availability of the enzyme phytase that helps synthesize phosphorus that is part of the structure of the quail eggshell.(Villacís & Vishco, 2016)(Sharafi, Shargh, & Jenabi, 2001)

Table 2. Characteristics of the yolk and albumin of the egg of c odorniz under the effect of the use of vitamins for its adaptation to the humid tropics (Macas).

Variables	T0	T1	T2	T3	$\bar{x} \pm \sigma$
Yolk					
PH	6,35	6,31	6,26	6,22	6,29±1,65
Turbidity (ms)	2,12	2,74	2,32	2,69	2,47±0,30
Humidity (%)	51,36	48,86	48,96	48,64	49,45±1,28
Dry matter (%)	48,64	51,14	51,04	51,36	50,55±1,28
Organic matter (%)	96,23	97,52	96,87	96,73	96,84±0,53

Ash (%)	2,41	2,48	3,13	3,27	2,82±0,44
Albumin					
PH	9,15	9,02	9,14	9,22	9,13±0,08
Turbidity (ms)	7,40	7,97	7,87	7,86	7,78±0,25
Sugars (°Brix)	15,50	16,20	15,50	17,20	16,10±0,80
Refractometer density	1,06	1,06	1,07	1,06	1,06±0,00
Humidity (%)	87,25	87,43	88,96	86,86	87,63±0,92
Dry matter (%)	12,75	12,57	11,04	13,14	12,38±0,92
Organic matter (%)	99,10	99,12	99,00	99,11	99,08±0,06
Ash (%)	0,90	0,88	1,00	0,89	0,92±0,06

Quail egg yolk has a pH of 6.29±1.65 with a minimum value of 6.22 and a maximum of 6.35; while the pH of albumin corresponds to 9.13±0.08; It can be determined that the pH of the albumin is alkaline and of the yolk has from neutral to an acid value. The pH of the yolk of the eggs of the hens is 5.95 and of the albumin 8.25 when evaluating the quality of the egg of four genetic lines of hens in warm climate (Hernández-Bautista, et al., 2013) determining the same trend in relation to quail eggs with a slight superiority to those registered in the present study.

The turbidity of the yolk was 2.47±0.30 (ms) and albumin 7.78±0.25 presenting higher turbidity albumin than yolk, this may be because albumin is only formed by protein while albumin of a series of compounds rich in carotenoids and triglycerides among other biochemical compounds. (Ayoola el al, 2014) While the presence of sugars using the brixómetro, the yolk lacks this organic compound while the albumin registers a value of 16.10±0.80 which corresponds to a low level.

The density of the yolk using the brixómetro does not mark this indicator, while albumin has a density of 1.06±0.00 demonstrating that it is a product with a density higher than that of water. As for humidity, quail egg yolk registers 49.45±1.28% and albumin 8 7.63±0.92, demonstrating that there is a lower amount of water in albumin than in the yolk, while the amount of dry matter of the yolk is 50.55±1.28% and albumin 12.3 8±0.92 % demonstrating the reverse. The quail egg yolk registers a humidity of 5 1.00±7.40 % and the albumin 86.00±1.40 % values similar to those recorded in the present work.(Gonzalez & Hernandez, 2011)

In relation to organic matter, quail egg in the yolk was determined a value of 96.84±0.53% and albumin 99.08±06%, being higher the amount of organic matter in the albumin than in the yolk, while the amount of ash in the yolk was 2.82±0.44 and in the albumin 0.92±0.06% demonstrating greater amount of ashes in the yolk que, in the albumin.

CONCLUSIONS

The quails adapt perfectly to the environmental conditions of the humid tropics located in Morona Santiago, since no mortality of the birds was recorded and in the production of eggs the best parameters were reached with the control treatment.

The application of the control treatment allowed to record the best parameters of the quail egg such as weight, volume, density, weight of the shell and weight of the yolk plus the albumin except the thickness of the shell.

The yolk has pH that tends to acidity, while albumin an alkaline pH, the highest indicator of turbidity corresponds to albumin when compared with the yolk and the presence of sugars using the broxymeter is only identified in the albumin, the largest amount of dry matter is found in the albumin in the same way the presence of organic matter.

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