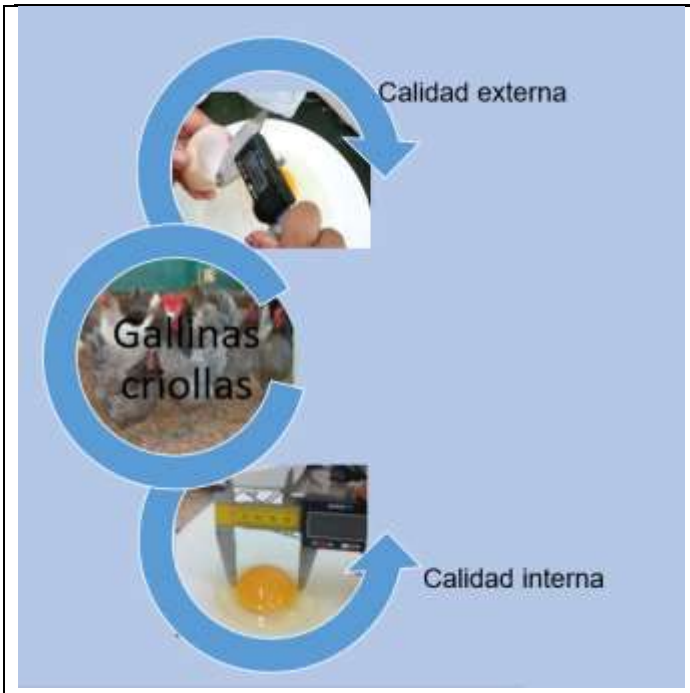
MOL2NET, International Conference Series on Multidisciplinary Sciences
http://sciforum.net/conference/mol2net-05

QUALITY AND CONSERVATION OF THE EGG OF CRIOLL FOR MARKETING IN THE AMAZON ENVIROMENT

Ramírez- Sánchez Alina (aramirez@uea.edu.ec), Viamonte- Garcés, M.I (mviamonte@uea.edu.ec), Jarrín Pico N. M. (agr20140096@uea.edu.ec), Andrade-Yucailla, V.C (vandrade@uea.edu.ec), Sánchez-Campuzano, J.M (jcampuzano.28.2014@gmail.com), Vargas –Burgos, J.C (jvargas@uea.edu.ec)

[a]*Departamento de Ciencias de la Tierra, Universidad Estatal Amazónica, Puyo, Pastaza, Ecuador*
[b] *Centro de Investigaciones, Posgrado y Conservación amazónica, Universidad Estatal Amazónica, Puyo, Pastaza, Ecuador*

Graphical Abstract	**Abstract.**
	The research was carried outs in the province of Pastaza in the Ecuadorian Amazon with the objective of determining external and internal quality at different days of storage in Creole eggs sent to local markets. 840 Creole eggs were evaluated, which were measured depending on the days of storage, and 120 eggs were sampled



for each day of storage. The treatments to be applied were seven storage times 0, 5, 10, 15, 20, 25 and 30 days. The variables that were measured for external quality were egg weight, shape index and shell index. For internal quality was evaluated: yolk index and haugh Units. A Fully Randomized Design (DCA) was used. The external quality of the egg is affected only by the weight, which decreases after 10 days of storage in local markets, while the shape index and the shell index did not show any alteration. Regarding internal quality, the indicators of the yolk index and Haugh Units began to decrease their quality as the days of storage increased, affecting the commercialization process. It is considered that for the commercialization and packaging the Creole egg can be used until day 5 taking into account the yolk index, whereas with respect to Haugh Units until day 25 of storage in local markets for the conditions of the Ecuadorian AmazonInsert abstract text here
***Keywords**: External and internal quality, commercialization, eggs, Amazon*

Introduction

In the Ecuadorian Amazon, the breeding of Creole chickens is developed in rural communities, so that egg production and commercialization are important in the family's livelihood as it constitutes one of the items that provides the most economic contributions to the family. However, by cost, the eggs are stored until significant accumulations are achieved and taken to local markets for commercialization; and although this ecosystem enjoys optimum temperatures for its conservation, an increase in temperature has been observed up to 30^0C a fundamental factor for the conservation of product quality. One of the most important parameters to take into account for the marketing process in local markets or in the national market is precisely the external and internal quality of the same, which can be affected by the days of storage by causing the development of microorganisms, caused due to variations in temperature and high humidity, characteristic of this area; which can influence the reliability of consumers and distributors due to loss of product quality.

Currently, research is carried out related to the quality of meat products and egg products in conditions of the Amazonian environment, so the objective of this work is to determine the external and internal quality of the Creole egg that is sent to local markets on different days of storage.

Materials and Methods

Location

This research work was carried outs in the province of Pastaza, which is located in the center of the Ecuadorian Amazon; it has a humid tropical climate with temperatures ranging between 18-24^{0}C.

Experimental procedure

We worked with 80 birds from Amazonian communities that consumed 150g per day of food (70% corn and 30% balanced Bioalimentar for layers). 840 Creole eggs were analyzed, measured depending on the days of conservation (0, 5, 10, 15, 20, 25 and 30 days) and 120 eggs were sampled per day, the duration of the experiment was 90 days. The evaluated variables responded to the determination of the external quality (egg weight, shell thickness, shape index, shell index); regarding internal quality, the variables measured were: Yolk Index and Haugh Units (U.H)), the latter applied the formula:

$$UH= 100*\log (h-1.7\ w^{0.37} +7.6)$$

Where:

h = Height of the white in (mm).

w = Egg Weight in (g)

Was it is considered a Completely Randomized Design (DCA). The data were tabulate and digitized in Excel, its processing was performed with the statistical package SPSS version 21, to which a variance analysis was applied and the Tukey comparison test was used.

Results and Discussion

The Table 1 shows the external quality of Creole eggs that are used for identification in local markets.The weight variable showed a decrease after 10 days of egg storage when beginning to lose weight, however, treatments 10, 15, 20, 25 and 30 did not show significant differences between them but with treatment 0 and 5 , the latter do not differ between them. In the evaluation a loss of weight of 4.3 g is observed, being able to be related to the changes of temperatures and humidity to which the eggs are exposed in the local markets. Galíndez et al. (2014) makes reference that the weight of the chicken egg is linked to the age, the race and the food that is provided to the hens, while Spadoni et al. (2013) determines that egg weight is related to the amount of yolk and albumin.

The shell index allows to determine the resistance to fractures and the permeability that the egg has, this index determines the content of calcium carbonate that the shell possesses, this variable was considered considering that it may be influenced by the age of the birds and the biotypes. The 30-day treatment differs from all treatments, while from day 0 to 20 there are no significant differences between them, however, according to García et al. (2014) the shell index must be between 10 and 12%

to consider an egg of good quality and that has not lost its internal quality, while an index below 5% is attacked by microorganisms and has a high fragility

The shape index is related to the width and length of the egg, usually the eggs of domestic hens have an elliptical shape, so their shape is of special interest to facilitate the packaging and transport of the eggs since when it comes to very long eggs are exposed to mechanical damage, while spherical and very thick eggs offer difficulty being introduced into preformed containers

However, in the case of Creole eggs obtained in the communities that are sent to local markets, the shape index was found to be between 74 and 76%, which is acceptable for the marketing and packaging process and The evaluation does not express any effects as to its form. Similar results obtained, Cayambe (2018) when studying the quality of the egg in Creole chickens at different days of conservation. However, Guerra (2010) establishes that percentages less than 60% are considered elongated, which are not suitable for commercialization, those that are between 70 and 80% are normal and more than 80% are round, in this way the days of conservation in these environmental conditions did not affect the shape index.

Table 1. Evaluation of the external quality of the egg that it's sent to local markets in Amazonian conditions.

Variables	**Storage days**						
	0	5	10	15	20	25	30
Egg weight, g	59,18^{c}	58,61 ^{bc}	56,32^{ab}	55,93^{a}	55,56^{a}	54,98^{a}	54,86^{a}
Shell index	10,03^{a}	10,02^{a}	10,57^{ab}	10,16^{a}	10,73^{b}	10,06^{a}	11,37^{c}
Shape index	75,94^{ab}	76,07^{b}	76,58^{b}	76,82^{b}	76,17^{b}	74,20^{a}	75,64^{ab}

Different letters between treatments indicate statistical difference $p \leq 0.05$, according to Tukey's test

The internal quality of the egg for its commercialization is important when indicating the quality of the product and the time that can be conserved without losing its nutritional properties (Table 2). The most important indices that are used to establish quality are the yolk index and the Haugh units that are used to determine the freshness and quality of the egg. In the study, the yolk index decreased with respect to storage days, only day 0 showed an optimal quality index; All treatments showed significant differences between them and as of day 5 the indices were below the optimum quality indicator (0.40-0.42), according to Periago, (2013). Raigón et al. (2015) expresses that this index allows to evaluate the quality and freshness of the yolk showing that when it is optimal, the yolk has a good compaction and lower elasticity of the yolk membrane, contributing to preserve its structure for the commercialization process.

With respect to the Haugh Units on conservation day 0 significant differences were reported with the rest; obtaining the highest value (86.51) being evaluated as very good, after the time elapsed every day of conservation presented significant differences reaching a value of 62.4 at 30 days of conservation, so it affects the quality for Consumption and commercialization. However, the quality up to 25 days is

acceptable when presenting a value of 71.65 which is suitable for human consumption so it is acceptable up to a value of 70 Haugh Units as described by (Cayambe, 2018).

Table 2. Evaluation of the internal quality of the egg that is sent to local markets in Amazonian conditions.

Variables	**Storage days**						
	0	5	10	15	20	25	30
Yolk index	0,40[a]	0,36[b]	0,33[c]	0,30[d]	0,28[d]	0,24[e]	0,19[f]
Haugh units	86,51[a]	81,74[b]	80,88[b]	73,19[c]	72,01[c]	71,65[c]	62,4[d]

Different letters between treatments indicate statistical difference according to Tukey test $p \leq 0.05$

Conclusions

The external quality of the egg is affected only by weight, which decreases after 10 days of storage in local markets.

For the commercialization and packaging, the Creole egg can be used until day 5 taking into account the yolk index, while with respect to Haugh Units until day 25 of storage in local markets for the conditions of the Ecuadorian Amazon.

References

1. Cayambe, J. **2018.** Evaluación de la calidad del huevo en gallinas criollas (Gallus domesticus) a diferentes tiempos de conservación (0, 5, 10 y 15) en la Amazonia Ecuatoriana. Proyecto de Investigación y Desarrollo en opción al título de Ingeniera Agropecuaria. Universidad Estatal Amazónica, Puyo – Pastaza – Ecuador.
2. Galíndez R..; Peña I.; Albarrán A.; Prospert J. **2014.** Peso e indicadores de calidad interna del huevo de cuatro razas de gallinas reproductoras venezolanas. Zootecnia Trop., 32 (2): 207-215**.**
3. García, R.; Berrocal, J.; Moreno, L. y Ferrón, G. **2014.** Producción Ecológica de Gallinas Ponedoras. Consejería de Agricultura, Pesca y Desarrollo Rural. Junta de Andalucía.
4. Raigón, M.; García, M. y Esteve, P. **2015.** Valoración de la calidad del huevo de granja ecológica e intensiva. Escuela Universitaria de Ingeniería Técnica Agrícola. Universidad Politécnica de Valencia.
5. Spadoni, E.; Rodríguez, G.; Van den Bosch, S. y Martínez, E. **2013.** Caracterización de parámetros de calidad de huevos frescos comercializados en el Gran Mendoza, Argentina,

.