Int. j. adv. multidisc. res. stud. 2026; 6(1):2212-2216

Received: 02-01-2026
Accepted: 01-02-2026

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Comparison of the Nutritional Value of Eggs from Imported and Native Chickens (Protein, Carbohydrate and Fat) Sold in the Markets of the City of Mbujimayi

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DOI: https://doi.org/10.62225/2583049X.2026.6.1.5790
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Abstract

Objective

To compare the nutritional value of the eggs of imported and indigenous hens in order to guide the consumer in the choice, helping him to consume what can be useful to him.

Material and Method

This was a cross-sectional descriptive study.

We have opted for the prospective survey method supported by experimental analysis. The study is carried out on the samples of eggs paid at the Bakuadianga market in the commune of Dibindi for a period from 27 April to 26 May, i.e., one month.

In this study, we opted for the non-probabilistic sampling technique. The parameters of interest below are the subject of our study: Physics: size, weight, color; Biochemicals: proteins, fat (cholesterol), carbohydrate.

Conclusion

Mean protein; Carbohydrates; Of eggs from native chickens is higher than that of eggs from imported chickens, on the other hand the weight and size of imported chicken eggs are higher than those of native chickens.

Laboratory testing clearly demonstrates that locally produced native chicken eggs are nutritionally rich than those imported in protein, carbohydrate and fat. On this, the population has the real pleasure to privilege what is produced locally in their consumption.

Keywords: Comparison, Nutritional Value, Eggs of Native and Imported Hens, Proteins, Carbohydrates, Fats

Introduction

Good nutrition is an undeniable factor in good health. It is based on three simple, common-sense principles. To stay healthy, the body needs a certain proportion of carbohydrates, fats, and proteins, as well as vitamins and minerals.¹³

Eggs have high nutritional value. The amount of nutrients varies depending on the size of the egg. Eggs are considered an excellent source of high-quality protein. The proteins in an egg are complete proteins, as they contain all eight essential amino acids. Amino acids are essential for the body because it cannot produce them on its own. They must be obtained through diet. Eggs contain all five essential amino acids in balanced proportions.

In fact, eggs are used as a reference for evaluating the quality and protein content of other foods. The fat in eggs is contained in the yolk. The lipids are composed of 32% saturated fatty acids, 14% polyunsaturated fatty acids, and 38% monounsaturated fatty acids. The yolk is particularly rich in unsaturated fatty acids, in the form of alpha-linolenic acid and linoleic acid. These have a very good reputation for their role in preventing cardiovascular disease. A whole egg contains, on average, 10% fatty acids. Eggs are a valuable food source because they contain all the nutrients necessary for a developing organism. In particular, they are rich in highly digestible protein. Their main drawback is the high cholesterol content of the yolk, on the one hand, and the high saturated fatty acid content, on the other.

The nutritional value of eggs lies in the subtle balance and diversity of their components: some of the best proteins for humans, very high-quality fats, and numerous vitamins and minerals. Once shunned by consumers, particularly due to its cholesterol content, the egg is now widely popular. Its rich and varied composition makes it a favorite food among nutritionists and researchers.¹³

"Some researchers show that the system in which hens are raised—in cages, aviaries, or with outdoor access—has no effect on the overall composition or nutritional value of the egg," explains Yves Nys, a specialist at the Poultry Research Station of the French National Institute for Agricultural Research (INRA) in Tours, France. Equally surprising, the hen's diet does not affect the composition of the major components of the egg. 11.

In many developing countries, most of the middle class population tends to consume more exported eggs from developed countries, imagining that they have a different composition than eggs from native hens. This is contradicted by some authors who claim that the composition is the same, apart from some findings in Switzerland that the particular diet of poultry, especially hens, influences to some extent its cholesterol and saturated fatty acid composition 7,9.

The middle class in the Democratic Republic of Congo, as well as in our province, has developed a greater tendency to consume imported eggs from improved breeds of chickens, believing them to be richer in composition, to the detriment of eggs from native chickens that we obtain at a low price.

Based on all of the above, and on our observation in our community that imported eggs are more readily available than locally produced ones, we were prompted to conduct this study entitled: "Comparison of the nutritional value of eggs from imported and local hens (protein, carbohydrate, and fat) sold in the markets of the city of Mbujimayi."

At this stage of research, we ask ourselves the following question: is there a difference from a nutritional point of view between the composition of eggs from imported hens and those from native hens?

The results we will achieve will help to establish opinions on the nutritional characteristics of eggs and encourage a middle ground in product choices.

The objective of this study was to compare the nutritional value of eggs from imported and native hens in order to guide the consumer in their choice.

Materials and Methods

Study framework:The data for this study were collected in the main market of the city of Mbuji-Mayi, which is the Bakuadianga market, while the analyses were carried out at the ISTM laboratory in Mbuji-Mayi. The market is located in the commune of Dibindi, whose health zone bears the same name.

Type, period and study population

This was a cross-sectional descriptive study.

We opted for the prospective survey method supported by experimental analysis.

The study is conducted on samples of eggs purchased at the Bakuadianga marketfor a period from April 27 to May 26, i.e., one month.

In this study, we opted for the non-probability convenience sampling technique.

The following parameters of interest are the subject of this study: Physical: size, weight, color; biochemical: proteins, fats (cholesterol), carbohydrate.

Results

1. Egg weights from imported and native hens

The weight is greater for eggs from imported hens than for eggs from native hens. This is justified by the average x import ±SX = 38.06 ± 5.43 >x ind ±SX = 18.76 ± 2.68. According to the statistical analysis, at the 5% significance level with df = 12, the observed weight difference between eggs from imported hens and those from native hens is highly significant because tc = 8.7 > tt = 2.179. This implies that imported eggs weigh significantly more than eggs from native hens.

2. Egg size of imported hens compared to eggs of native hens

The average size of eggs from imported hens is higher than that of eggs from native hens (15.35/13.5 mm).

3. Comparison of the protein value of egg yolks from imported and native hens

The average protein content of egg yolks from native hens is high compared to that of egg yolks from imported hens (15.8).This is justified by the averages xind ±SX = 110.8 ±15.80x>import ±SX = 94.4 ±13.05 According to the statistical analysis, at the 5% threshold with df = 12, the difference in the mean protein content of egg yolks from native hens compared to the protein content of egg yolks from imported hens remains highly significant because tc = 3.21 > tt = 2.179. This implies that the egg yolks of native hens are richer in protein than the egg yolks of imported hens.

Table 1: Average protein content of egg yolks from imported hens compared to protein content of egg yolks from native hens

Sample.	Imported	Indigenous people	(d)2
E1	12.6	15.6	9.00
E2	13.8	16.2	5.76
E3	12.2	15.4	10.24
E4	13.0	16.0	9.00
E5	13.4	15.8	5.76
E6	13.6	16.0	5.76
E7	12.8	15.8	9.00
N	7	7	
∑X	91.4	110.8	54.52
x	13.05	15.80	1699.28
Sex	1.86	2.25	3.21

✓ $SC\,Ed = -\sum_{i=1}^{n} d^e i \frac{(\sum d)^2}{h}$

$d = 54.52 - = 1699.28 \frac{(110,8)^2}{7}$

✓ $tc = \frac{[d]}{\sqrt{\frac{SCEd}{(n-1)}}} \longrightarrow tc = 3.21 \frac{15,80}{\sqrt{\frac{1699,28}{10x7}}}$

$ddl = n - 1 \longrightarrow ddl = 14 - 2 = 12$

4. Comparison of the protein value of chicken egg whites

According to the statistical analysis, at a significance level of 5% with df = 12, the difference in the mean protein content of egg whites from native hens compared to egg whites from imported hens remains highly significant because tc = 3.38 > tt = 2.179. This implies that egg whites from native hens are richer in protein than egg whites from imported hens.

Table 2: Average protein content of egg whites from imported hens compared to the protein content of egg whites from native hens

Sample	Imported	Indigenous people	(d)2
E1	8.0	10.0	4.0
E2	8.8	10.8	4.0
E3	9.0	9.8	0.64
E4	9.0	10.5	2.25
E5	9.2	10.2	1.0
E6	9.4	10.5	1.21
E7	8.6	10.3	2.89
N	7	7	
∑X	62.0	72.1	15.9
x	8.8	10.3	726.73
Sex	**1.2**	**1.47**	**3.38**

✓ SC Ed = - $\sum_{i=1}^{n} d^e i \frac{(\sum d)^2}{h}$

$d = 15.90 - 726.73\frac{(72,1)^2}{7}$

✓ $tc = \frac{[d]}{\sqrt{\frac{SCEd}{(n-1)}}} \longrightarrow tc = 3.38\frac{10,90}{\sqrt{\frac{726,73}{10x7}}}$

ddl = n – 1 ⟶ ddl = 14 – 2 = 12

5. Comparison of the protein value of egg yolks and egg whites from hens

The average protein content of egg yolks and egg whites from native hens is high compared to that of egg yolks and egg whites from imported hens (12.0/7.8).

6. Comparison of the carbohydrate value of chicken egg yolks

The average carbohydrate content of egg yolks from native hens is higher than that of protein content in egg yolks from imported hens (0.028).

Table 3: Average carbohydrate content of egg yolks from imported hens compared to protein content of egg yolks from native hens

Sample.	Imported	Indigenous people
E1	00	00
E2	00	0.5
E3	00	00
E4	00	00
E5	00	0.5
E6	00	0.5
E7	00	0.5
Average	**00**	**0.028**

7. Comparison of the carbohydrate value of egg whites.

The average carbohydrate content of egg whites from native hens is higher than that of egg whites from imported hens (0.0057).

8. Comparison of the carbohydrate value of egg yolks and egg whites

The average carbohydrate content of egg yolks plus white from native hens is high compared to that of protein in egg yolks plus white from hens (0.091).

9. Comparison of the fat content of egg yolks from hens

According to the statistical analysis at the 5% threshold with df = 12, the difference in the average fat content of egg yolks from native hens compared to the fat content of egg yolks from imported hens remains highly significant because tc = 3.16 > tt = 2.179.This is justified by the averages x ind ±SX = 237.8 ± 33.97 >x import ±SX = 223.8 ± 31.97. This implies that the egg yolks of native hens are richer in fat than the egg whites of imported hens.

Table 4: Average fat content of egg yolks from imported hens compared to the fat content of egg yolks from native hens

Sample.	Imported	Indigenous people	(d)2
E1	32.0	33.2	1.44
E2	33.0	36.0	9.0
E3	32.0	33.8	3.24
E4	31.6	34.0	5.76
E5	31.4	33.6	4.84
E6	31.6	34.0	5.76
E7	32.2	33.2	1.0
N	7	7	
∑X	223.8	237.8	31.04
x	31.97	33.97	8047.36
sx	**4.5**	**4.85**	**3.16**

10. Comparison of the fat content of egg yolk plus egg white.

According to the statistical analysis, at a significance level of 5% with df = 12, the difference in the mean fat content of egg whites and yolks from native hens compared to the fat content of egg whites and yolks from imported hens remains highly significant because tc = 3.48 > tt = 2.179. This implies that the egg whites and yolks from native hens are richer in fat than the yolks and whites from imported hens. This is supported by the means X_{ind} ± X_{import} = 76.6 ± 10.94 > X_{import} ± X_{import} = 53.7 ± 7.67

Discussion

Average weight of eggs from imported hens compared to those from native hens

The average weight of eggs from imported hens is higher than that of native hens (5.43 gr).According to the statistical analysis at a 5% risk level with 12 degrees of freedom, the tabulated t-value of 2.179 is less than the calculated t-value of 6.74. Therefore, the weight differences between eggs from imported hens and eggs from native hens are significant. In this regard,YVES N., for his part, claims that the weight of eggs varies from one breed to another, which means that eggs from improved breeds weigh more than eggs from hens of native breeds 11.

Average size of eggs from imported hens compared to eggs from native hens

LThe average size of eggs from imported hens is larger than that of native hens (15.35/13.5 mm). This is attributed to the fact that they come from improved breeds, thus justifying the significant size difference. The same figures cited above

suggest that egg size is also proportional to the breed of hens in question, but this is not a universally accepted view.^{1,2,3,6}

Average protein content of egg yolks from imported hens compared to protein content of egg yolks from native hens

LThe average protein content of egg yolks from native hens is high compared to that of egg yolks from imported hens (15.8). By statistically analyzing these results at the 5% risk level with 12 degrees of freedom, the tabular t-value is 2.179, which is lower than the calculated t-value of 3.21. Therefore, the differences in egg yolk protein from native hens are significant compared to the egg yolk protein from imported hens.

Average protein content of egg whites from imported hens compared to the protein content of egg whites from native hens

The average protein content of egg whites from native hens is high compared to that of egg whites from imported hens (10.3)Referring to the statistical test, these results at the 5% risk level with 12 degrees of freedom show a tabulated t-value of 2.179, lower than the calculated t-value of 3.38. Therefore, the protein differencesegg whites from native hensare significant compared to the protein in egg whites from imported hens.

Average protein content of egg yolk plus white from imported hens compared to egg yolk plus white protein from native hens

LThe average protein content of egg yolk plus white from native hens is high compared to that of egg yolk plus white from imported hens (12.0)Referring to the statistical analysis at a risk level of 5% with 12 degrees of freedom, the tabulated t-value is 2.179, which is lower than the calculated t-value of 3.21. Therefore, the differences inproteins from egg yolks and whites of imported native hensare significant compared to eggs from imported hens. These results are similar to those found by Romain J. and his colleagues in their publication, where they also found that the egg yolk had a protein proportion equivalent to 12.5% 12.

Average carbohydrate content of egg yolks from imported hens compared to protein content of egg yolks from native hens

The average carbohydrate content of egg yolks from native hens is high compared to that of eggs from imported hens (0.028); the average carbohydrate content of egg whites from native hens is high compared to that of egg whites from imported hens (12.0) (Table 7), while the average carbohydrate content of both yolks and egg whites from native hens is high compared to that of egg yolks from imported hens (0.091, Table 8). This difference is not statistically significant.The calculated t-value, which represents 0, is zero in the tabular value, which is 2.262, according to the statistical analysis at a risk level of 5% with 6 degrees of freedom. At this point,YVES N., in his publications, state that the composition of eggs, regardless of breed, the levels of certain elements are the same 11.

Average fat content of egg yolks from imported hens compared to the fat content of egg yolks from native hens

The average egg white fat content of native hens is high compared to that of egg white fat content of imported hens (34.0) Statistical analysis at a 5% risk level with 12 degrees of freedom yielded a tabulated t-value of 2.179, which was lower than the calculated t-value of 3.48. Therefore, the differences in fat content in egg yolkseggs from native hensare significant compared to eggs from imported hens.

Average fat content of egg yolks plus white from imported hens compared to that of egg yolks plus white from native hens

The average carbohydrate content of egg yolks plus egg whites from native hens is high compared to that of carbohydrates in egg yolks plus egg whites from imported hens (10.9)Referring again to the statistical test at a risk level of 5% with 12 degrees of freedom, the tabulated t-value is 2.179, which is lower than the calculated t-value of 3.16. Therefore, the differences in fat content between egg yolks and whites are significant.eggs from native hensare significant compared to eggs from imported hens. Similarly, Borne UJ states in his publications that the whole fat in an egg represents 33% of its capacity 4.

Conclusion

The present study revealed the following:

- The average weight of eggs from imported hens is higher than that of native hens (5.43 gr);
- The average size of eggs from imported hens is higher than that of native hens (15.35/13.5 mm);
- The average protein content of egg yolks from native hens is high compared to that of egg yolks from imported hens (15.8);
- The average protein content of egg whites from native hens is high compared to that of egg whites from imported hens (10.3);
- The average protein content of egg yolk plus white from native hens is high compared to that of egg yolk and white proteins from imported hens (12.0);
- The average carbohydrate content of egg yolks from native hens is high compared to the protein content of egg yolks from imported hens (0.028);
- The average carbohydrate content of egg whites from native hens is high compared to that of egg whites from imported hens (12.0);
- The average carbohydrate content of egg yolks plus whites from native hens is high compared to that of protein content in egg yolks plus whites from imported hens (0.091);
- The average egg white fat content of native hens is high compared to that of egg white fat content of imported hens (34.0);
- The average carbohydrate content of egg yolks plus egg whites from native hens is high compared to that of carbohydrates in egg yolks plus egg whites from imported hens (10.9).

In view of all the above, we recommend that the population of our community prioritize raising native chickens for egg production, as they are nutritionally rich, and consume locally produced chicken eggs.

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