

Nutrient Comparison between Enhanced and Non-Enhanced Dark Meat Chicken

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Introduction

According to a 2012 CDC report, most of the U.S. population consumes sodium in excess of daily guidelines. The mean daily sodium consumption was 3,266 mg (excluding salt added at the table), while the national guidelines are < 2,300mg sodium overall and 1,500 mg for specific populations. Forty-four percent of sodium consumed came from 10 food categories. For the majority of these categories, >70% of the sodium consumed came from foods including poultry available at the retail stores¹. In today's market, 40% of poultry products are enhanced including dark meat chicken (drumsticks and thighs). Solutions for enhancement typically include water, salts, and other flavorings to preserve taste and tenderness. A collaborative study was conducted by scientists at USDA and Texas Tech University to monitor nutrient content in enhanced and non-enhanced dark meat chicken in the retail market place. This study provides analytical sodium data in support of Federal Sodium Monitoring Initiative.

Objective

- To determine the content of sodium and other minerals for enhanced and non-enhanced raw dark meat chicken sold in U.S. retail stores.
- To update the values for sodium content and other nutrients in enhanced and non-enhanced raw, dark meat chicken in USDA National Nutrient Database for Standard Reference (SR).

Materials and Methods

- **Sampling:** Six samples of non-enhanced and four of enhanced raw drumsticks plus six samples of non-enhanced and five of enhanced chicken thighs were purchased from 12 retail outlets using a nationwide sampling plan developed for USDA's National Food and Nutrient Analysis Program².
- **Preparation:** Prior to analyses, refuse (skin, bone and connective tissues) was removed from each drumstick and thigh. Dark meat from each cut type (thigh and drumstick) was homogenized separately prior to nutrient analyses. Skin was also homogenized and analyzed separately for nutrient analyses.
- **Analyses:** Nutrient values for proximates composition and minerals were determined by commercial laboratories using validated AOAC methodologies³.
- **Quality Control:** Quality assurance was monitored using standard reference materials, in-house control materials, and random duplicate samples.
- **Statistics:** Data were evaluated using the nutrient values for non-enhanced and enhanced chicken drumsticks and thighs and were compared using the Wilcoxon Rank Sum Test and Factorial ANOVA ($p < 0.05$)⁴.

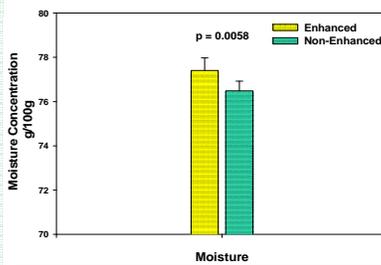


Fig 1. Comparison of moisture content in enhanced and non-enhanced dark meat chicken.

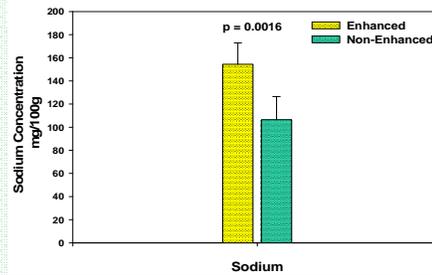


Fig 2. Comparison of sodium content in enhanced and non-enhanced dark meat chicken.

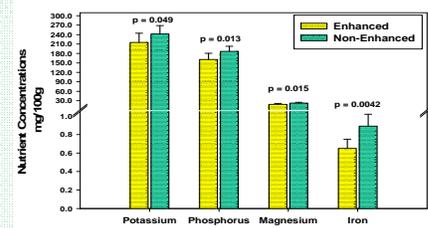


Fig 3. Comparison of potassium, phosphorus, magnesium and iron content in enhanced and non-enhanced dark meat chicken.

Table 1. Nutrient Content in Raw Enhanced and Non-Enhanced Dark Meat Chicken

| Nutrients | Enhanced | | Non-Enhanced | | p-value |
|------------|----------|---------------------|--------------|--------------|---------|
| | N | g/100g ¹ | N | g/100g | |
| Moisture | 9 | 77.40±0.57 | 12 | 76.48±0.44 | 0.0058 |
| Protein | 9 | 19.14±0.93 | 12 | 19.62±0.88 | 0.70 |
| Fat | 9 | 3.50±0.71 | 12 | 3.93±0.37 | 0.14 |
| | N | mg/100g | N | mg/100g | |
| Calcium | 9 | 8.10±1.67 | 12 | 7.37±3.56 | 0.86 |
| Iron | 9 | 0.65±0.10 | 12 | 0.89±0.13 | 0.0042 |
| Sodium | 9 | 154.45±18.37 | 12 | 106.43±20.05 | 0.0016 |
| Phosphorus | 9 | 160.63±19.89 | 12 | 186.94±15.90 | 0.013 |
| Potassium | 9 | 215.10±29.28 | 12 | 242.04±26.52 | 0.049 |
| Magnesium | 9 | 18.53±2.91 | 12 | 22.19±2.82 | 0.015 |
| Zinc | 9 | 1.75±0.26 | 12 | 1.92±0.42 | 0.46 |

¹ Values represent LS mean ± S.E.M

Results

- In enhanced raw chicken drumsticks and thighs, moisture and sodium were significantly greater than in the non-enhanced sample ($p < 0.05$) (Fig 1, 2).
- Iron, phosphorus, potassium and magnesium levels were significantly lower in enhanced versus non-enhanced dark meat chicken ($p < 0.05$) (Fig 3).
- Protein, fat, and zinc levels were slightly lower in enhanced versus non-enhanced dark meat chicken while calcium levels were slightly higher, but these differences were not statistically significant (Table 1).

Conclusion

- Nutrient levels of moisture and sodium are significantly increased in enhanced products due to the enhancement process. The enhancement solutions used vary dramatically in terms of content and volume added. Some solutions contribute minerals such as sodium, phosphorus and potassium as the major nutrients effected by enhancement.
- For this study, sodium concentration in enhanced dark meat chicken is 20 to 25% elevated when compared to non-enhanced dark meat chicken. Label information on the products used for this study indicates that enhancement levels are 12 to 15% chicken broth. According to the label, chicken broth consists of sodium solution, water and natural flavorings. In this study, phosphorus, potassium, iron and magnesium are significantly lower in enhanced versus non-enhanced products, which may reflect the dilution effect of the chicken broth.
- These preliminary results indicate that enhancement with chicken broth does not elevate potassium, phosphorus and other minerals. Previously reported data in turkey and pork showed increased levels of potassium, phosphorus and other minerals, which reflect an inclusion of these minerals in the enhancement solutions. Additional analytical studies are in progress to further evaluate effects of enhancement on nutrient values of chicken.
- These results suggest that consumption of enhanced chicken products can increase an individual's daily total sodium intake.

References

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