NUTRIENTS CONTENT OF POLISH HAMS AND SHOULDERS

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SUMMARY

The samples have been taken from the current industrial production of canned hams and shoulders. Test covered determination of moisture, protein, ash, total fat, saturated fat, cholesterol, sodium, potassium, calcium, iron, riboflavin and thiamin. On the basis of results estimation of nutrition values has been done.

Introduction

Recently in many countries there has been a tendency to standardize and widen information on nutrition value given on the labels of the majority of foodstuffs. This nutrition information showing energetic value and nutrients content in 100 g product or in a portion contained in an individual packing is a kind of a quality guarantee of the product being at the same time a specific advertisement stimulating the foodstuffs producers to raise the nutrition value of their products.

The education of consumers is another important aspect of the nutrition value information given on the labels. The customer, having got information about the important nutrients content in the portion he has bought and about their contribution to his daily intake, can easily choose his optimum diet (Gautrie 1989). The nutrition claims showed on the label are the additional indication, important for the customer (Permington et al. 1990).

Higher level of knowledge on nutrition and full information on the nutrition value of the purchased products should result in decrease of sick rate of the diet - dependant diseases like coronary heart disease, cancer, osteoporosis as well as in decrease of the number of people with arterial hypertension, obesity and allergies.

The present work was aimed at the testing of level of important nutritive components and estimation, on this basis, of the nutrition value of Polish canned hams and shoulders.

Materials and methods

The tested material (canned hams and shoulders) was taken from the current industrial production. The scope of testing included the determination of moisture, protein, fat and ash contents in 390 hams and 46 shoulders. The contents of saturated fat, cholesterol, riboflavin, thiamin, sodium, potassium, calcium and iron was determined in 75 ham samples and 17 shoulders samples. The contents of carbohydrates was calculated from the balance and calorific values was calculated with the application of Atwaters's coefficients.

The following analytical method were applied:
- Moisture content was determined according to ISO Standard 1442-1973
- Protein content was determined according to Kjeldahl's method using Kjeltec Analyzer 1026 (Tecator Sweden)
- Total fat content was analyzed by extraction using Soxtec Fat Analyzer HT 6 (Tecator Sweden)
- Saturated fat content was calculated on the basis of the total fat content and results of analysis of fatty acids composition. In order to determine the composition of fatty acids, the extracted fat was saponified and methyl esters of fatty acids prepared according to Polish Standard BN/8050-05. In the chromatographic analysis were used: the gas chromatograph Hewlett-Packard 5890 and capillary column covered with SP-2330 phase (0,20 \m), 30m long and of the diameter of 0,25 mm. The analysis conditions were as follows: carrier gas - helium 60 kPa, injector - split temp. 210\C, detector FID temp. 220\C, column temperature 130\C (5 min.) \ 195\C (3\C/min.).

- Ash content was determined according to ISO Standard 936-1978
- Thiamin and riboflavin content was determined using fluorimetric method (Witkowska 1972)
- Cholesterol content was determined as follows: cholesterol was extracted from the sample according to Folch method (1957) and than proceeded according to Jakubowski et al. (1990). - Sodium, potassium, calcium and iron contents were determined by atomic spectrometry according to AOAC methods (1984). Sodium and potassium were determined by the emission atomic spectrometry and iron and calcium - by the atomic absorption spectrometry.

Results and discussion

On the basis of results obtained frequency distributions of the tested components was determined and it was confirmed that in all cases except carbohydrates the values had shown normal distribution. Examplary distributions are shown in the figures 1 and 2.

The carbohydrate values do not follow a normal distribution due to their calculation from balance and not an analytical determination. This factor is not of a big importance while determining the nutrition values because, as it is commonly known, meat and its products are not an important source of carbohydrates in a daily intake. An average contents of carbohydrates was 0,9% and 1,0% of the tested samples of hams and shoulders, respectively.

The sample means and standard deviation shown in the tables No. 1 and 2 were the basis for determination of nutrition values. From many possible methods, the prediction intervals method was chosen as the most suitable for the calculation of the labelling values. The application of this method guarantees a high level of confidence that single unit of the product purchased in the market place will be in conformity with the labelled values. Prediction intervals aim at confidently bracketing the mean or any number of future samples. A prediction interval covering the range defined as the mean \ provides (1 - \) 100% confidence that the mean of k future samples will be bracketed by the limits; where mean is the sample mean, s is the sample standard deviation for individual units, n is the sample size and is a tabular t -value for (1 - V2) 100% confidence and df is (n - 1) degrees of freedom.

Estimation of labelled nutrient content according to American regulation (Federal Register 1993) depends on which of the following groups the nutrient belongs to:

1. Added nutrients in fortified or fabricated foods
2. Naturally occurring nutrients as vitamins, minerals, protein, total carbohydrate, complex carbohydrate, dietary fiber , unsaturated fat and potassium. Real contents of these components in the product should amount to at least 80% of declared value.
3. Calories, sugars, total fat, saturated fat, cholesterol and sodium. Real contents of these components should not exceed 120% of declared value.

So the computed values shown in tables No. 1 and 2 for the components of the second group consist a lower limit of one-sided 95% prediction interval multiplied by a factor of 5/4 and for the components of the third group - an upper limit of a one-sided 95% prediction interval multiplied by a factor of 5/6. The factors applied represent the 20% margin of allowance in labelled values.

Analysis of the data contained in the tables No. 1 and 2 shows that computed values for protein, thiamin and potassium were higher than sample means and those for calories and cholesterol were lower than sample means. It is due to the fact that standard deviation of individual values for these nutrients was relatively small as compared to the mean. For protein, riboflavin, thiamin, potassium, calcium and iron, as label values, the lower of the following two values was chosen: computed value or sample mean. For calories, calories from fat, total fat, saturated fat, cholesterol and sodium the higher of two values was chosen as label value. Computed value for carbohydrates was ignored for a large dispersion of individual value.

The nutrition values calculated for a reference amount customarily consumed per eating occasion (RACC) and converted to a percentage of daily value using appropriate increment and rounding procedure according to American regulations (Federal Register 1993) are shown in the table No. 3. Daily value (DV) comprises two sets of dietary standards: Daily Reference Value for total fat, saturated fat and cholesterol and Reference Daily Intake for minerals and vitamins.

Conclusion

The results of the study are as follows:

1. One RACC (55g) of ham contains: 50 kcal (15 kcal from fat), 1.5g total fat (2% DV), 0.5g saturated fat (2% DV), 25 mg cholesterol (8% DV), 10g of protein, 720 mg of sodium (30% DV), 180 mg of potassium (5% DV), 0.4 mg of iron (2% DV) and thiamin in the quantity of 35% DV and riboflavin - of 10% DV
2. One RACC (55g) of shoulders contains: 60 kcal (20 kcal from fat), 2.0g total fat (3% DV), 0.5g saturated fat (2% DV), 30 mg of cholesterol (10% DV), 10g of protein, 720 mg of sodium (30% DV), 180 mg of potassium (5% DV), 0.4 mg of iron (2% DV) and thiamin in the quantity of 35% and riboflavin - of 10% DV
3. The following nutrient claims can be used to describe the nutrition value of Polish hams and shoulders: "extra lean", "percent of fat free", "excellent source of thiamin", "good source of riboflavin"

Reference

Association of Official Analytical Chemists (1984). Official Method of Analysis Edition.
F. D. Mc Clure and J. K. Lee (1993), FDA Nutrition Labelling: A guide for developing and using databases.
Federal Register USA (1993), vol. 58, no 3 part II.
I. M. Folch, M. Less, G. H. S. Stanley (1957), A simple method for the isolation and purification of total lipides from animal tissues, J. Biol. Chem., 226 : 497.
H. Gutrie (1989), The many faces of nutrition education, J. Nutr. Educ., 21 : 226.
A. Jakubowski, M. ˉo³nierz-Piotrowska and St. Grzeœkiewicz (1990), Method of determination and content of cholesterol in lard. Edible Fats XXVIII : 1.
J. A. T. Permington , V. L. Wilkening and J. E. Vanderveen (1990), Descriptive terms for food labelling. J. Nutr. Educ. 22 : 51.
H. Witkowska (1972), Fluorimetric method of determination of thiamin and riboflavin content in meat. Annuals of Meat Industry Institute IX : 41.

Fig. 1. Frequency distribution of protein values in hams
Fig. 2. Frequency distribution of cholesterol values in hams
Table 1. Nutrients content of hams. Means and computed values per 100g
Table 2. Nutrients content of shoulders. Means and computed values per 100g
Table 3. Nutrients content of hams and shoulders.