

Comparison of basic nutritive components of venison in selected species of hoofed game

Porovnanie obsahu základných nutričných komponentov zveriny u vybraných druhov raticovej zveri

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Abstract

The aim of this experiment was to obtain the differences in protein, moisture and fat content in venison (*Musculus semimembranosus*) of roe deer (*Capreolus capreolus* L.) and wild boar (*Sus scrofa* L.). The monitoring of wild boar and roe deer was realized from 16 May 2016 to 16 June 2016 in red deer region JXXVIII Tribeč (Western Slovakia, Tribeč mountain). Analysis of basic nutritive components of venison were determined with FoodScan LAB Analyzer (FOSS, Denmark). The obtained average values of experimental traits were as follows: wild boar – 23.33%, roe deer – 21.55% in protein, respectively 2.46% and 1.8% in fat. The difference in fat content shows significant importance. Moisture was not statistically significant (average: wild boar – 73.2%, roe deer – 72.9%).

Keywords: fat, moisture, protein, roe deer, wild boar

Abstrakt

V našej práci sme sledovali rozdiel v obsahu bielkovín, vlhkosti a tuku v mäse (*Musculus semimembranosus*), medzi srnčou (*Capreolus capreolus* L.) a diviačou zverou (*Sus scrofa* L.). Monitoring diviačej a srnčej zveri bol realizovaný od 16. mája 2016 do 16. júna 2016 v jelenej oblasti JXXVIII Tribeč (západné Slovensko, Tribčeské pohorie). Analýzy základných nutričných komponentov zveriny boli stanovené na prístroji FoodScan LAB Analyzer (FOSS, Dánsko). Rozdiely pri bielkovinách (priemerné hodnoty: diviačia zver – 23.33%, srnčia zver – 21.55%) a

tuku (diviacia zver – 2.46%, srnčia zver – 1.80%), boli medzi jednotlivými druhmi štatisticky významné. Pri porovnaní obsahu vlhkosti sme štatisticky významný rozdiel nenašli, (diviacia zver – 73.2%, srnčia zver – 72.9%).

Kľúčové slová: tuk, vlhkosť, bielkoviny, srnec lesný, diviak lesný

Introduction

Venison currently presents a positive image as a healthy “natural” product (Wiklund et al., 2014). Venison from game represents a viable alternative to traditional red meats. It has a high nutritional value and it is rich in proteins and heme iron, while fat content and saturated fatty acid levels are low (Daskiewicz et al., 2009, Hoffman and Wiklund, 2006). Consumers are increasingly becoming concerned about healthy and safe products and the demand for these products is escalating. They expect the meat products on the market to have the required nutritional value, be wholesome, fresh, lean and have adequate juiciness, flavor and tenderness (Utrilla et al., 2014; Ngapo and Dransfield, 2006; Dransfield, 2003).

Today’s consumer sees health as a macro concept and prefers to lead a balanced lifestyle. Convenience foods have become a permanent part of most consumers (especially the younger generation) lives (Russel and Cox, 2004).

Marketing of venison, for example, is depended on the timing of the hunting season and on culling quotas. In addition, the quality of game products depends upon the raw meat quality, which is influenced by, among others factors, the period of the year in which the animals are growing, that affects the condition of the pasture and the animals activity and sexual activity. As an example, the fat reserves of venison are decreased after the mating period in autumn (García Ruiz et al., 2007).

Proteins are the most important components of meat from a nutritional and technological aspect. Their content in meat is very high. In terms of nutrition is called “full protein”, containing all the essential amino acids (Steinhauser, 2000). The meat is not only nourishing food, but also protective. Comparing to other meats, it is a very rich and diverse source of the highest quality proteins that are easily digestible and very useable (Habánová, 2006).

Between lipids dominants triglycerides (99%). Heterolipids are in less capacity, especially phospholipids and cholesterol. The lipids present to the consumer a highly concentrated source of energy, approximately 2 times larger than the proteins and carbohydrates. Food in Central European countries, including Slovakia is rich in lipids. Lipid from meat and meat products contributes to daily intake of about 25% energy (Staruch et al., 2005).

Moisture is the most represented component in meat. From a nutritional aspect irrelevant. However moisture has great significance for sensory and technological quality of meat. 70% of total water contain muscle myofibrils, 20% sarcoplasm and 10% extracellular space (Ingr, 2004).

Materials and methods

Monitoring area

The monitoring of wild boar and roe deer was realized from 16 May 2016 to 16 June 2016 in red deer region JXXVIII Tribeč (Western Slovakia, Tribeč mountain).

Sampling and laboratory analysis

Samples for analysis of basic nutritive components were collected after primary treatment of game. One sample presents 200 grams of muscle tissue from *Musculus semimembranosus*. These samples were stored in plastic bags in cooler (2-4°C). The samples were analyzed 48 hours post mortem with FoodScan LAB Analyzer (FOSS, Denmark) in National Agricultural and Food Centre, Research Institute for Animal Production in Nitra (laboratory of meat quality). Compact muscle mass was mechanically homogenized before analyze. Every one sample was individually identified during analyzing process. Measurement is based on the principle of NIR technology (Near Infrared Technology). Halogen lamp on the back of the device leads light through a fiber optic cable into the monochromator operates at wavelengths 850 – 1050 nm. Using fiber optic cable is light guided to the lens array located above the sample and the sample after passing the unabsorbed light fed to the detector. The detector measures the amount of light passes through sample. Using calculation (PC) and using calibration after completion of the measurement result appears on the display. The sample is rotated during measurement for the correctly result.

Statistics analysis

The content of each nutritive component was determined separately for each species of the game. Summary statistics were calculated for each species separately too. Statistical significance of differences of mean values was tested by t-test. Statistical analyzes were processed in the program Statgraphic Centurion.

Results and discussion

The summary analyses of moisture percentage for both species are listed in tab. 1. The average value was 72.9% in roe deer and 73.19% wild boar. The difference value obtained in our study reach 0.29%, it is very low value. The P value count in statistical analyses was 0.56, that means non statistically significant difference between means of analysed samples at the 95% confidence level.

Table 1. Summary statistics of moisture content in roe deers and wild boars
 Tabuľka 1. Sumárna štatistika obsahu vody v svalovine srnčej a diviačej zveri

	Roe deer	Wild boar
Count	9	8
Average	72.90%	73.19%
Standard deviation	0.74%	1.28%
Coeff. Of Variation	1.01%	1.75%
Minimum	71.4	71.6
Maximum	74.1	75.16

P=0,56, there is not a statistically significant difference between the means of the two samples at the 95% confidence level

Farouk et al. (2007) indicates the content of moisture 74.1% in red deer muscle (*Musculus semimembranosus*). Compared with results which were recorded in the case of roe deer (72.9%) and the wild boar (73.19%) that presents visible lower values. The difference between the moisture content in muscle of analysed species was low in the our experiment. Dahlan and Norfarizan Hanoon (2008) states that venison of fallow deer has 74.26% content of moisture in *Musculus longissimus dorsi*. It can conclude, that the values of moisture are not very different in each animal species. Frančáková et al., (2007) indicate that the moisture of meat in pigs (Landrace) was 76.79% (*Triceps brachii*). Comparing of our results with this work, it can conclude, that the moisture content in wild boar is 3.6% lower by Landrace.

The table 2 presents summary analyses of fat content in venison of both analysed species. The mean of fat content value reach 1.80% in roe deer and 2.46% wild boar venison. The statistical difference was tested by t – test, since the computed P – value was 0.0049, there is statistically significant difference of fat content in venison of roe deer and wild boar.

Table 2. Summary statistics of fat content in roe deers and wild boars

Tabuľka 2. Sumárna štatistika obsahu tuku pri srnčej a diviačej zveri

	Roe deer	Wild boar
Count	9	8
Average	1.80%	2.46%
Standard deviation	0.17%	0.57%
Coeff. Of Variation	9.81%	23.20%
Minimum	1.55	1.18
Maximum	2.1	2.9

$P=0.0049$, there is a statistically significant difference between the means of the two samples at the 95% confidence level.

Dahlam and Norfarizan Hanoon (2008) found the value of fat in venison of fallow deer was 6,13% in *Musculus semimembranosus*. It was found out the value of fat content in roe deer was 1.8% in our analysis. The values of fat content in roe deer in our experiment correspond with the work Farouk et al. (2007). They found out the average value in red deer venison 1.2%. Wild boars have the higher content of fat, because they have different way of life. Hofman and Cawthorn (2012) found average value of roe deer on the level 1.7%. The difference is just 0.1%.

The values of protein content are listed in Table 3. The average value of protein content in roe deer muscle was 21.55%, resp. 23.33% in wild boar. Difference between values of proteins was 1.78%. Since the P - value is 0.00064 there is statistically significant difference in the level 95% between experimental sampled species.

Table 3. Summary statistics of protein content in roe deers and wild boars

Tabuľka 3. Sumárna štatistika obsahu bielkovín pri srncoch a diviakoch

	Roe deer	Wild boar
Count	9	8
Average	21.55%	23.33%
Standard deviation	0.95%	0.72%
Coeff. Of Variation	4.42%	3.09%
Minimum	20.64	21.89
Maximum	23.9	23.95

$P=0.00064$, there is a statistically significant difference between the means of the two samples at the 95% confidence level.

Hoffman and Cawthorn (2012) found the average content of proteins at 23% in roe deer, 22% in fallow deer and 21,7% in red deer. They found higher value in roe deer (difference 1.45%) and fallow deer (difference 0.45%) comparing to results of roe deer. Compared to results of wild boar, they found lower values in all three species. Frančáková et al. (2007) found the average value of proteins in pigs (Landrace) 20.96%, which is visible lower value comparing to our result.

Conclusions

The content of each of nutrients in venison of game is specific in each species. Statistical significance of the differences observed in the protein and fat between roe deer and wild boar is probably caused by diversity of biological characteristics of each animal species. Higher protein content in wild boar is probably caused by consuming the food of animal origin (higher content of proteins) comparing to plant pasture of roe deer. Deposition of muscular fat is typical biological trait of *Suidae*, this fact can causes higher fat composition in venison of wild boar comparing to roe deer venison. The water content of all animals is almost the same.

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