VITAMINS IN OSTRICH MEAT

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Abstract

Meat is muscle tissue from animals. It is a good source of protein. The meat of various species also is good source for micronutrients and vitamins.

Ostrich meat differs from the meat of other animals. It is not fat, it is lean and easily separated from bones and connective tissue. It is more digestible compared to other types of meat, soft and does not require long culinary treatment. Although it can be compared with beef due to its red colour and taste, ostrich meat is as tender as chicken meat, and is characterized by short muscle fibre.

The objective of study was to determine the A, E, B_1, B_2 and B_5 vitamins content in ostrich meat and compare it with beef and chicken produced in Latvia and available at retail. All vitamins are determined by standard methods according to AOAC Official Standard Methods: vitamin A – 974.29, vitamin E – 971.30, vitamin B_1– 986.27, vitamin B_2 – 970.25, and vitamin B_5 – 961.14.

The obtained results showed that ostrich meat contains significant quantities of vitamins B_1, B_2 and B_5. The highest content in ostrich meat was calculated for B_5 (11.45 mg $100g^{-1}$) and the lowest – for B_2 (0.098 mg $100g^{-1}$). Ostrich meat contains more than 18 % of vitamins B_1 and B_2 and more than 7.5 % of B_5compared with beef, and more than 30 % of vitamins B_1 and B_2 and more than 27 % of B_5 compared with chicken. The content of vitamin E is highest in ostrich meat then follow chicken and beef. Regarding vitamin A, ostrich meat has only traces of it.

Keywords: meat, vitamins A, E, B_1, B_2, and B_5.

Introduction

Meat plays a very important role in diet by contributing quality protein, essential minerals and trace elements, and a range of vitamins (Sandler, Strain, 1999).

Ostrich meat differs from the meat of other animals. As mention some researchers, it is not so fat (Jensen, 2004). It is lean and easily separated from bones and connective tissue. It is more digestible compared to other types of meat, soft and does not require long culinary treatment. Although it can be compared with beef due to its red colour and taste, ostrich meat is as tender as chicken meat, and is characterized by short muscle fibres.

The ostrich is a relatively new agricultural animal in Latvia (Horbacuks, 2005; Bundze –Zdanovska, 2005). There have not been carried out studies regarding vitamin content in ostrich meat.

The objective of the study was to determine the A, E, B_1, B_2 and B_5 vitamin content in ostrich meat and compare it with beef and chicken produced in Latvia and available at retail.

Materials and Methods

The research was performed at the Laboratory of Biochemistry and Physiology of Animals of the Institute of Biology of the University of Latvia.

Meat samples were obtained from Latvian meat producers. Ostrich, beef and poultry meat was frozen and stored in a freezer before analysis. All meat samples were ground in food blender to ensure homogeneous consistence of meat samples for analysis.

The amounts of A, E, B_1, B_2, and B_5 vitamins were determined by standard methods – AOAC Official Standard Methods: vitamin A – 974.29, vitamin E – 971.30, vitamin B_1– 986.27, vitamin B_2 – 970.25, and vitamin B_5 – 961.14 respectively.

The chemical analyses were repeated five times; mean value and standard error were calculated.

Results and Discussion

Vitamin A is present in many animal tissues, especially in liver. One of the most important consequences of vitamin A deficiency is dryness of the eyes eventually leading to blindness. It remains one of the main causes of blindness in the world. Night blindness is also an eye complication of early vitamin A deficiency. The leaner meats have only small quantities of vitamin (Batless, 1998). In our case the highest concentration of vitamin A was found in chicken – 0.23 mg $100g^{-1}$, in beef and ostrich meat samples – only traces; compared to the data in the literature, vitamin

A is more concentrated in animal liver (Batless, 1998).

Vitamin E is a mixture of several related compounds known as tocopherols. The alpha-tocopherol molecule is the most potent of the tocopherols. Vitamin E originates from plants. Animals acquire vitamin E from plants directly, or by eating other animals that have derived their vitamin E from plants and stored it in their liver, muscles and fat. Vitamin E is a major lipid soluble antioxidant. One of its primary functions is to maintain and protect biological membranes against lipid peroxidation. It is considered to function as a free radical quencher in biological membranes. The major function of vitamin E is to act as a natural antioxidant by scavenging free radicals and molecular oxygen. In particular vitamin E is important for preventing peroxidation of polyunsaturated membrane fatty acids. The rate and extent of lipid oxidation in meats are dependent on the vitamin E concentration in the tissue (Batless, 1998).

The alpha-tocopherol content of different meat was examined. Ostrich meat had the highest vitamin E content, which was followed by chicken and beef (Figure 1.). The content of this vitamin differs significantly ($p < 0.05$) in different meat kinds. The obtained data regarding vitamin A confirm to the results described in the literature (Batless, 1998).

Meat is an important dietary source of the water soluble B - complex vitamins that in general take part in the utilization of energy, help regulate many chemical reactions, and support normal vision and healthy skin. The amount of B vitamins in meat can depend on such factors as the species, age, and degree of fatness (Batless, 1998). Thiamine is known as vitamin B_1. Thiamine is derived from a substituted pyrimidine and a thiazole which are coupled by a methylene bridge. Thiamine is rapidly converted to its active form, thiamine pyrophosphate, TPP, in the brain and liver by a specific enzymes, thiamine diphosphotransferase. TPP is necessary as a cofactor for the pyruvate and a-ketoglutarate dehydrogenase catalyzed reactions as well as the transketolase catalyzed reactions of the pentose phosphate pathway. A deficiency in thiamine intake leads to a severely reduced capacity of cells to generate energy as a result of its role in these reactions. Average value of vitamin B_1 for all meats was from 0.14 mg 100 g^{-1} to 0.22 mg 100 g^{-1} (Table 1).

Riboflavin is known as vitamin B_2. Riboflavin is the precursor for the coenzymes flavin mononucleotide (FMN) and flavin adenine dinucleotide (FAD). FAD is synthesized from riboflavin and ATP. Vitamin B_2 concentration in ostrich meat was essentially higher compared with other meat ($p < 0.05$) (Table 1).

Pantothenic acid is known as vitamin B_5. Pantothenic acid is formed from ß-alanine and pantoic acid. Pantothenate is required for synthesis of CoA and is a component of the acyl carrier protein (ACP) domain of fatty acid synthase. Pantothenate is, therefore, required for the metabolism of carbohydrate via the TCA cycle and all fats and proteins. At least 70

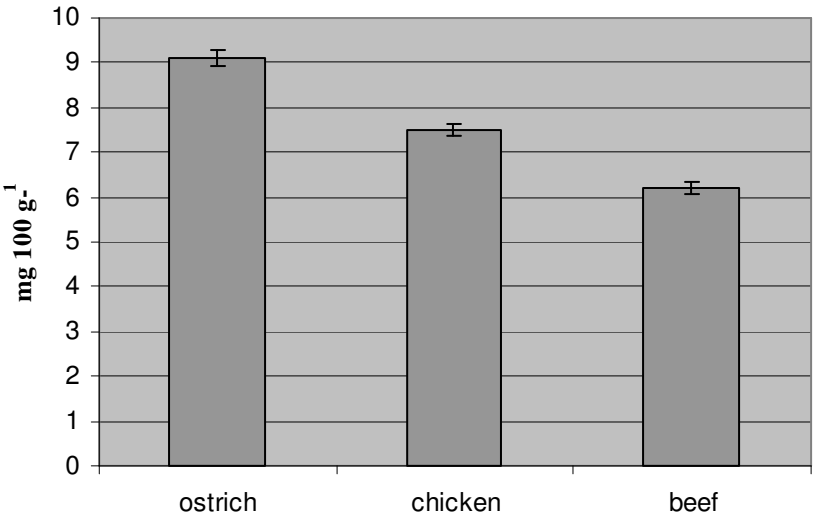

Figure 1. Vitamin E content in meat.

Table 1

The concentration of thiamine, riboflavin, and pantothenic acid in meat

Meat	Vitamin concentration, mg 100 g^{-1}		
	Thiamine (B_1)	Riboflavin (B_2)	Pantothenic acid (B_5)
Ostrich	0.22 ± 0.02	0.098 ± 0.003	11.45 ± 0.02
Beef	0.178 ± 0.003	0.087 ± 0.001	10.60 ± 0.03
Chicken	0.14 ± 0.01	0.066 ± 0.001	8.32 ± 0.02

enzymes have been identified as requiring CoA or ACP derivatives for their function.

The highest content for B_5 was calculated in ostrich meat (11.45 mg 100 g^{-1}) and the lowest – in chicken (8.32 mg 100 g^{-1}) (Table 1).

The obtained results showed ostrich meat contains more than 18% of B_1 and B_2 vitamins and more than 7.5% of vitamin B_5compared with beef, and more than 30% of B_1 and B_2vitamins and more than 27% of vitamin B_5 compared with chicken. The vitamins content of all meat samples produced in Latvia was found to be similar with the data found in the literature (Sandler, Strain, 1999).

Conclusions

Ostrich meat contains significant quantities of vitamin B_1, B_2, and B_5. The highest content in ostrich meat was calculated for vitamin B_5 (11.45 mg 100 g^{-1}) and the lowest – for B_2 (0.098 mg 100 g^{-1}). It contains more than 18% vitamins B_1 and B_2 and more than 7.5% of vitamin B_5compared with beef, and more than 30% of vitamins B_1 and B_2 and more than 27% of vitamin B_5compared with chicken.

Ostrich meat had the highest vitamin E content, and then followed chicken and beef.

Regarding vitamin A, ostrich meat has only traces of it.

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