THE CORRELATION BETWEEN NUTRITIONAL VALUE INDICATORS OF MEAT AND LIVER

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INTRODUCTION

According to FAO and WHO an important indicator of food is nutritional quality, including nutritional value of proteins. The nutritional value of food is even higher as it provides the body with a greater quantity of nutritional substances or as its chemical composition [1, 6, 9, 11].

Nutritional quality of food is determined by: the content and quality of carbohydrates, proteins and lipids, content of soluble and fat soluble vitamins, mineral content and, as well, the content of biologically active substances. [2-5, 14, 15].

In this context, our aim was to examine the nutritional value of meat and liver of swine and bovine. The conducted study was based on the bibliographic data of the chemical composition of foods named above. The study was completed by assessing the correlation between the main nutritional indicators: nutritional value of 10 components (VN10), chemical index (CS) and energy value (VE).

I. MATERIALS AND METHODS

Tested products: swine meat, swine liver, bovine meat, bovine liver. The study of nutritional value was conducted on the bibliographical study of the chemical composition of products mentioned above [1-15].

1.1. Determination of VN_{10}

Czech nutritionist F. Strimska designed a nutrition index, taking into account 10 components of food, determined through chemical analyze and that are valuable for the proper functioning of the body. These components are: proteins, lipids, carbohydrates, Ca, P, Fe, vitamins A, B1, B2, C. The index proposed for assessing the nutritional value is called "The nutritional value of 10 components – VN10". The assessing of VN10 in tested samples was carried out in the formula suggested by the nutritionist F. Strimska [11, 13], using the program "Evaluation of the nutritional value of food products" produced in Excel [10].

1.2. Determination of energy value

For the determination of energy value [1, 9, 11] of tested samples were taken into account the following: the percentage content of main nutrients in food (proteins, carbohydrates, lipids), the amount of energy provided by each gram of organic substance: 1 g protein – 3,1 kcal, 1g lipid – 9,3 kcal, 1g carbohydrate – 4,1 kcal.
The energy value of food (100g) is achieved by the relation:

$$V_E = 4{,}1 \times (\%\ Pr) + 9{,}3 \times (\%\ L) + 4{,}1 \times (\%\ G)\ ; \quad Kcal/100g \quad (1)$$

where: Pr, L and C is the percentage content of proteins, lipids and carbohydrates in food.

1.3. Evaluation of protein quality

The evaluation of protein quality was performed using methods standardized and approved by the International Committee of FAO and WHO. In tested products were assessed the chemical index (CS – chemical score), according to the formula [11, 15], using the Excel program [10].
The interdependence between the indexes VN10, CS, VE was determined through Excel program, using the Pearson function (r^2).

2. APPOACHES AND SUGGESTIONS

The evaluation of nutritional value of meat and liver of bovine and pork was performed based on bibliographic study [1 - 6]. In Figures 1 and 2 shows the composition of meat and liver of cattle.

In table 1 we present the mean value of the major nutrients considered by nutritionists to assess the nutritional value of food.

In table 2 we present the calculated results of nutritional value (VN_{10}, CS, VE) of meat and liver of swine and bovine. There are presented the mean values, obtained from data presented in Table 1.

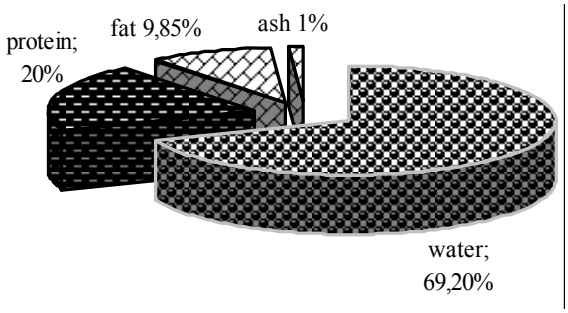


Figure 1. The chemical composition of bovine meat

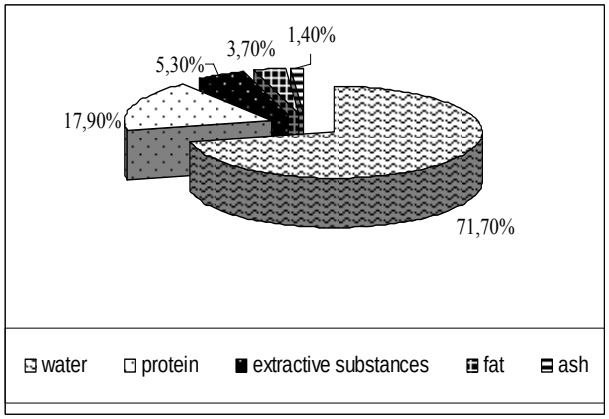


Figure 2. The chemical composition of bovine liver.

Table 1. The content of nutrients in the chemical composition of products.

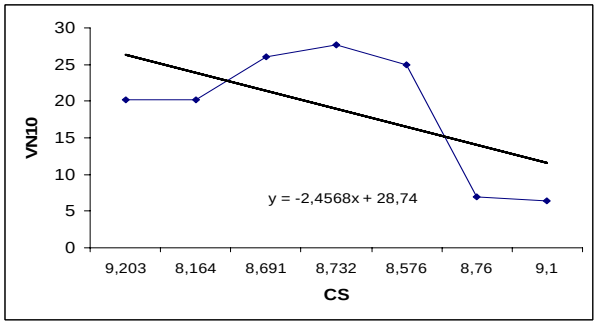
Macro and micro nutrients	Cattle		Swine		Standard Protein FAO/ WHO g/100g protein
	meat	liver	meat	liver	
Protein, g/100g	20,0	17,9	14,3	18,8	-
Lipids, g/100g	9,8	3,7	33,3	3,8	-
Carbohydrate, g/100g	1,0	5,3	0,9	4,7	-
Ca, mg/100g	10	9	7	9	-
P, mg/100g	200	314	164	347	-
Fe, mg/100g	2,9	6,9	1,7	20,2	-
Vitamin A, mg/100g	traces	9,2	traces	3,45	-
Vitamin B_1, mg/100g	0,07	0,3	0,52	0,3	-
Vitamin B_2, mg/100g	0,18	2,19	0,14	2,18	-
Vitamin C, mg/100g	traces	33	traces	21	-
Valine	1,15	1,25	1,14	1,25	5
Isoleucine	0,94	0,93	0,97	1,00	4
Leucine	1,62	1,59	1,54	1,76	7
Lysine	1,74	1,43	1,63	1,49	5,5
Methionine + Cysteine	0,90	0,756	0,76	0,77	3,5
Threonie	0,88	0,81	0,96	0,92	4
Triptophan	0,27	0,24	0,27	0,31	1
Fenilamină + Tyrosine	1,70	1,66	1,51	1,68	6
Total essential amino acids	9,20	8,67	8,77	9,28	36

Table 2. The VN10, CS, VE indicators of meat and liver of swine and bovine.

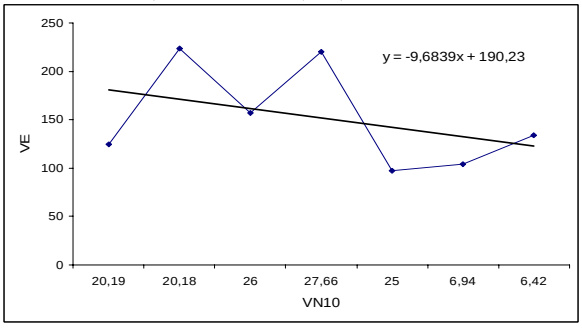
Product analyzed	VN_{10}	VE, kcal/ 100g	CS, %
Meat of bovine	20,19	124,55	9,2
Liver of bovine	59,46	328,91	8,7
Meat of swine	19,27	339,27	7,7
liver of swine	56,69	117,34	9,4

The data presented in table 1 and table 2 shows that meat and liver represent important sources of macro and micronutrients. The nutritional value of liver is almost identical to the meat's, except the content of essential amino acids, B vitamin complex and the content of I_2 and Fe, where the liver is a leader.

In figure 3 - 6 we present the interdependence between the nutritional value indicators of meat and liver, as assessed; using Excel program and calculating the Pearson indicator (r^2).

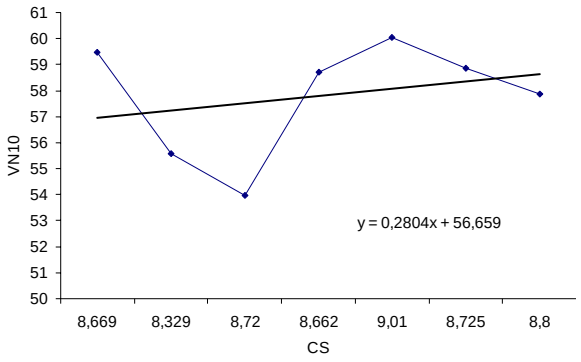


a) VN_{10} = f (CS); r = -0,34686

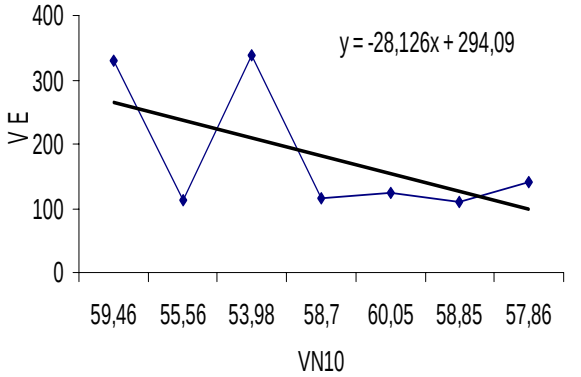


b) VN_{10} = f (VE); r = 0,418285

Figure 3. The interdependence of nutritional indicators of bovine meat.

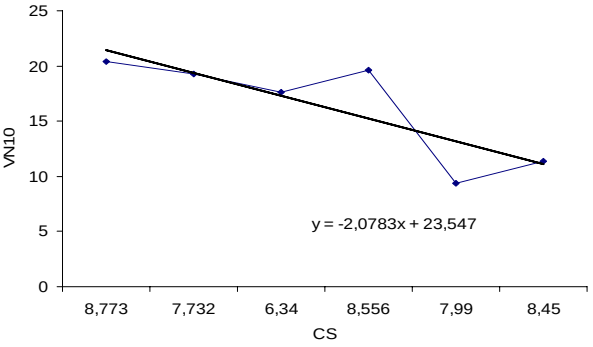


a) $VN_{10} = f(CS)$; r =0,519537

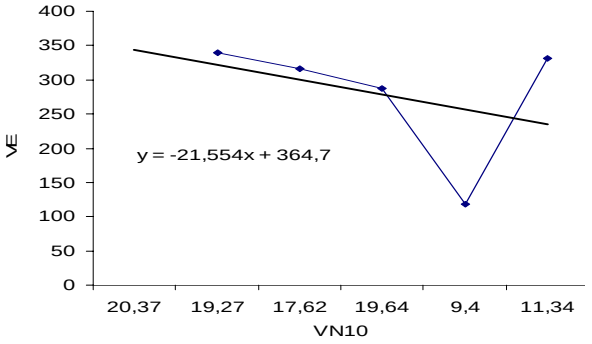


b) $VN_{10} = f(VE)$; r = - 0,33856

Figure 4. The interdependence of nutritional indicators of bovine liver

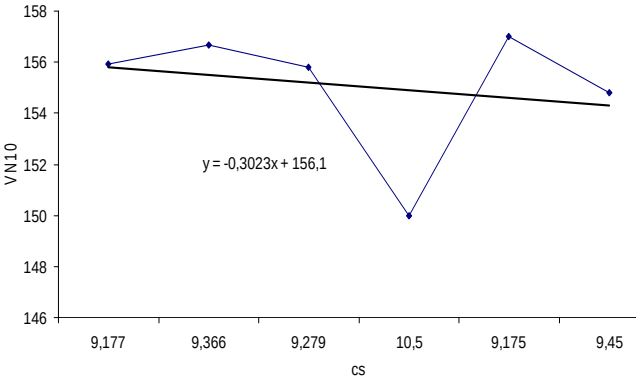


a) $VN_{10} = f(CS)$; r = -0,00726

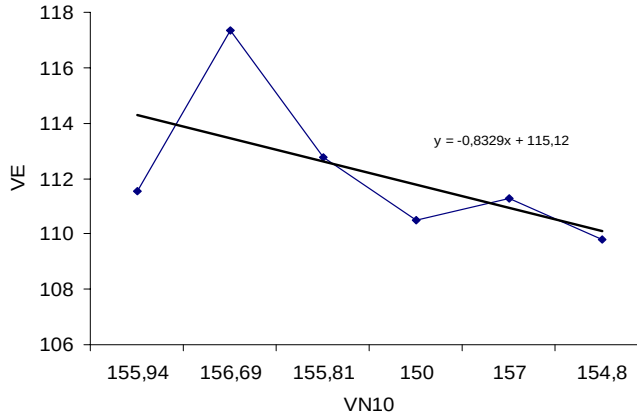


b) $VN_{10} = f(VE)$; r = 0,635524

Figure 5. The interdependence of nutritional indicators of swine meat



a)$VN_{10} = f(CS)$; r = -0,97079



b) $VN_{10} = f(VE)$; r = 0,448122

Figure 6. The interdependence of nutritional indicators of swine liver

CONCLUSIONS

1. In this paper we have realized a bibliographic study of chemical composition of meat and liver of swine and bovine, from which it was found that the meat and liver presents important sources of macro and micro nutrients, in some cases the content of such elements as Fe, I2, essential amino acids is higher in liver than in meat.

2. It was found that the nutritional indicators as VN_{10}, CS, EV in liver are almost identical to those in meat, in some cases even higher, being influenced by many factors: variety, age, anatomical part, animal's nutrition.

3. It was found that liver is an important raw material in terms of nutritional quality and can be used to diversify the products with the optimized values.

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