Lucrări ştiinţifice **Zootehnie şi Biotehnologii**, vol. **41 (2)** (**2008**), Timişoara

STUDY CONCERNING CHEMICAL COMPOSITION OF FISH MEAT DEPENDING ON THE CONSIDERED FISH SPECIES

STUDIU PRIVIND APRECIEREA COMPOZIȚIEI CHIMICE A CĂRNII DE PEŞTE ÎN FUNCȚIE DE SPECIILE DE PEŞTI CONSIDERATE

BUD I.*, LADOSI DANIELA*, REKA ST.*, NEGREA O.*

** Faculty of Animal Sciences and BiotechnologiesCluj-Napoca, România*

In this paper the authors approach a very actual thematic concerning the fish meat quality, depending on different species with different alimentary behavior and life style. For this goal, it was made chemical analysis of 10 species of fresh water and marine fish, starting with the establishment of the different body components percentage related at the total body weight and continuing with the determination of the chemical composition of the analyzed species. Also, we approach aspects related to the qualitative differences of fish meat, depending on the species, and we compared these result with the meat obtained from domesticated animals. The obtained results showed that the fish meat is clearly superior, from qualitative point of view, comparative to the domesticated animal's meat.
Key words: quality, fish meat, biological value, domesticated animals.

Introduction

Humans of XXI century started to better understand and became more conscious that fish meat, fish products and subproducts were very important for the human health maintain and the development of the organism, because fish products offer high nutritional values proteins.

Fish meat contain so much important nutritional components, including proteins, that majority of the nutritionists consider that we should eat every day fish meat.

In present, it is known that a high consumption of fish meat has a benefic role on human health, helping to the fortifying of the organism, one hand, and on the other hand, to minimizing the appearance of the cardio-vascular diseases, decreasing the cholesterol and the triglycerides level. For moderating the inflammatory response and improving the carbohydrates metabolism it is very important to consume fish meat, witch proteins determining these processes.

In this context, we try to distinguish the fish meat chemical composition depending on main fish species breaded and consumed in our country, and in comparison with other domesticated animals meat.

The results were statistically debated and transformed in percentage, as it is showed in the following tables.

Materials and Methods

The biological material was represented by 10 species of fish, some species breaded in continental fresh waters, and others breaded in marine waters. We choused for this experience the species with higher density in the farms, and the most consummated by society. The fish dimension, which we choused it was close to the slaughter weight.

It was tested the main index of meat production, after disembowel and of the fish, related at total weight.

It was analyzed meat samples from each species, five examples, from the dorsal muscles region, it was determinate the main chemical components, and also, the gross energy. The fish examples were choused at random.

We were analyzed the main chemical components of each meat species, using usually lab analyses. The results were statistically debated and transformed in percentage, as it is showed in the following tables (Table 1,2,3). Also, we analyzed the percentage of the main body components of fish related to the total weight of the fish and the slaughter efficiency.

Results and Discussions

After the obtained results, like a first conclusion, we can mention that there were significant differences between the analyzed species, at some index like slaughter efficiency. The values of the slaughter efficiency vary between 63 and 77.20 %, depending on fish species. From the results presented in the first table emerge that marine species and the carp, have the most reduced values, fewer than 65 %, instead all ravishing species, and also, two cyprinids, have the slaughter efficiency under 65 %. If we made a hierarchy, related at the slaughter efficiency at first place is situated the trout, with 77.2 %, followed by pike perch with 72 %, and catfish with 69.35 %.

Following the meat percentage related at the total body weight, we find out that the higher meat percentage related to the total body weight has the trout, with 67.10 %, followed by the pike perch, with 57.4 %, the sheatfish, with 53.5 % and the catfish, with 53 %. The lower meat percentage related at the total body weight has the carp, only with 46.60 %, respectively the bream, with 48.90 %, due to the higher gastro-intestinal contain and to the digestive tract length.

If we analyzing the skin percentage related at the total body weight, we find out that the higher values were in the case of species without scales, respectively the catfish, with 6 % and the sheatfish, with 5.1 %, and the lower values were find in the case of squirrel hake, with 1,9 % and respectively at trout, with 2.15 (Table 1).

One of the body components which significant influence the slaughter efficiency is the fish head, which represents between 13.8 % at trout, and 24.8 % at mackerel, respectively 21.7 % at sheatfish.

The percentages of fins and scales, related at the total body weight, vary significant, depending on species. In the case of trout, the fins percentage represents only 0.95 % related at total body weight, it is the lower value. The higher value is meat at the carp and bream, with 3.5 %, respectively 3.4 %.

The percentage of scales related at the total body weight, at some species these missing (like cathfish), low values were occurred in the case of trout, 1.15 % and in the case of squirrel hake, 1.60. Higher values occurred in the case of bream, 4.3 % and carp, 5.2 % (Table 1).

Also, the bones were other components which lay marks on the slaughter efficiency, which differ depending on fish dimensions, and on skeleton development. A high percentage occurred on the case of mackerel (10 %), bream (11 %) and tench (9.25). instead the lower value occurred in the case of trout, only 5.8 %, as it is showed in the fallowing table.

Table 1

The percentage of the main body components of fish related to the total weight

Species	**Slaughter efficiency (%)**	**Meat (%)**	**Skin (%)**	**Head (%)**	**Fins (%)**	**Scales (%)**	**Bones (%)**	**Intern organs (%)**
Carp	63.00	46.60	4.20	18.30	3.50	5.20	8.70	13.50
Pike perch	72.00	57.40	3.70	15.60	3.10	2.60	7.80	9.80
Sheatfish	68.60	53.50	5.10	21.70	2.10	-	7.90	9.70
Pike	65.80	51.30	3.60	19.75	2.95	2.65	7.95	11.80
Bream	66.70	48.90	3.40	15.00	3.40	4.30	11.00	14.00
Catfish	69.35	53.00	6.00	20.80	2.25	-	8.10	9.85
Tench	66.50	50.45	3.95	17.80	2.85	3.10	9.25	12.60
Trout	77.20	67.10	2.15	13.80	2.15	1.15	5.80	7.85
Mackerel	64.35	50.25	3.15	24.85	0.95	-	10.00	10.80
Squirrel hake	64.30	52.50	1.90	17.80	2.40	1.6	7.50	16.30

Depending on the alimentary behavior we observed significant differences between the species, regarding the percentage of internal organs. Thus, we remarked that as a rule, in the case of ravishing species have a lower values percentage of internal organs related at the total body weight, situated between 7.85 %, respectively 9.85 %, and in the case of other species this is situated between 12.6 %, respectively 16.30 %.

Following the chemical composition of the fish meat and domesticated animals meat, we observed significant differences, depending on species (Table 2).

We have to mention like a first aspect the value of the dry substances, a very important index for fish meat quality. The variation limits of this index were very large ones, and these are situated between 19.60 %, in the case of tench, and 28.30 % in the case of sheatfish. One hand these differences were due to the fat contains, and on the other hand to the water percentage of the meat, the other components have a lower influence on the dry matter percentage. The lower water percentage occurred in the case of sheatfish, and with the higher dry matter percentage, it is due to the high fat contains (10.25 %).

From the point of view of protein contains, we remarked as a rule, that the ravishing species have a higher protein percentage comparative to the cyprinids.

Thus, in the ravishing species these values got over 17-18 %, excepting the sheatfish, which value is 16.80 %, and in the case of the other species the values were situated under 17 %, like in the case of tench, with only 15.95 %, bream, with 16.48 %, respectively carp, with 16.6 %.

In the case of catfish, sheatfish and carp, the fat contains getting over 8.5 %, and at the other species these values were situated between 1.8 and 4.07 % (Table 2).

Table 2

Chemical composition of fish meat

Species	Water (%)	Dry matter (%)	Protein (%)	Fat (%)	Gross energy (MJ/kg)	Minerals (%)
Carp	73.22±4.32	26.78±3.45	16.6±3.11	8.97±3.73	6.99±1.00	1.20±0.3
Pike perch	77.56±3.93	22.44±2.68	18.78±1.96	2.56±1.25	5.40±0.34	1.10±0.2
Pike	78.62±4.15	21.38±1.52	17.96±1.34	2.34±0.89	4.93±0.28	1.08±0.1
Sheatfish	71.70±3.74	28.30±1.36	16.80±1.15	10.25±1.82	8.12±0.76	1.25±0.2
Bream	78.41±2.85	21.50±1.68	16.48±1.25	2.96±0.77	5.25±1.15	2.15±0.2
Catfish	72.17±3.46	27.83±1.68	17.20±1.07	8.56±1.14	7.98±2.33	2.07±0.1
Tench	80.40±2.85	19.60±4.36	15.95±1.23	1.80±0.36	3.76±1.12	1.85±0.2
Trout	77.03±3.22	22.97±2.15	18.88±1.63	2.94±0.34	3.67±0.19	1.15±0.1
Mackerel	77.46±2.52	22.54±2.1	17.84±1.09	3.25±0.94	4.93±1.07	1.45±0.1
Squirrel hake	76.38±2.67	23.62±2.18	18.25±1.34	4.07±1.15	5.25±1.25	1.30±0.2

Compared the chemical composition of the fish meat with domesticated animals meat, we observed significant differences between these values, especially in the protein case, in the favor of fish meat, respectively in the fat contains, in favor of farm animals (Table 3).

Table 3

Chemical composition of fish meat in comparison with other species

Species	Water (%)	Dry matter (%)	Protein (%)	Fat (%)	Minerals (%)	Gross energy (MJ/kg)
Carp	73.22±4.32	26.78±3.45	16.6±3.11	8.97±3.73	6.99±1.00	1.20±0.3
Pike perch	77.56±3.93	22.44±2.68	18.78±1.96	2.56±1.25	5.40±0.34	1.10±0.2
Sheatfish	71.70±3.74	28.30±1.36	16.80±1.15	10.25±1.82	8.12±0.76	1.25±0.2
Trout	77.03±3.22	22.97±2.15	18.88±1.63	2.94±0.34	3.67±0.19	1.15±0.1
Cattle	70.55±4.32	29.45±2.31	16.75±1.14	10.35±1.34	2.35±0.25	8.56±0.77
Pigs	53.49±4.54	46.51±2.38	15.85±1.83	27.80±2.46	2.86±0.31	19.32±1.26
Sheep	61.03±3.86	38.97±2.46	17.95±1.36	18.65±2.15	2.37±0.42	14.54±1.38

These result point out, if it was necessary one more time, the superior quality and the higher biologic value of this, comparative to the farm animals.

Following these quality index, we consider that it is important to slaughter the fish at the favor moment and to establish a good price, depending on biologic material quality.

For increasing these results certain, that we obtained concerning fish meat quality, we consider that it is necessary to continue these studies and to make some vast researches, following these indexes depending on different ages and on other species too, considering the higher request for fish products, in the last period.

Conclusions

In present, it is known that a high consumption of fish meat has a benefic role on human health, helping to the fortifying of the organism, one hand, and on the other hand, to minimizing the appearance of the cardio-vascular diseases, decreasing the cholesterol and the triglycerides level.

The higher meat percentage related to the total body weight has the trout, with 67.10 %, followed by the pike perch, with 57.4 %, the sheatfish, with 53.5 % and the catfish, with 53 %. The lower meat percentage related at the total body weight has the carp, only with 46.60 %, respectively the bream, with 48.90 %, due to the higher gastro-intestinal contain and to the digestive tract length.

From the results presented in the first table emerge that marine species and the carp, have the most reduced values, fewer than 65 %, instead all ravishing species, and also, two cyprinids, have the slaughter efficiency under 65 %. If we made a hierarchy, related at the slaughter efficiency at first place is situated the trout, with 77.2 %, followed by pike perch with 72 %, and catfish with 69.35 %.

We try to distinguish the fish meat chemical composition depending on main fish species breaded and consumed in our country, and in comparison with other domesticated animals meat.

Compared the chemical composition of the fish meat with domesticated animals meat, we observed significant differences between these values, especially in the protein case, in the favor of fish meat, respectively in the fat contains, in favor of farm animals.

Bibliography

1. **Banu C. (**1996) - *Metode de conservare aplicată în industria cărnii*, Partea a III-a, Univ. Aurel Vlaicu, Arad.
2. **Bent J. Maas** *et al.*(2003) – *Guide de poissons d'eau douce et de peche*, Delachaux et Niestle Paris.
3. **Bud I.** *et al* .(2004) – *Creşterea crapului şi a altor specii de peşti*, Editura Ceres, Bucureşti.
4. **Bud I.** *et al* .(2007) – *Peştii din apele reci – Păstrăvii*, Editura Risoprint, Cluj-Napoca.
5. **Bud I.** *et al* .(2007) – *Pestii rapitori- crestere, inmultire, valorificare*, Editura Ceres, Bucureşti.
6. **Ionescu A.** (1995) – *Tehnici si procedee de conservare a pestelui*, Editura Mypatya, Galati.
7. **Jurca M.I**. (2006) – *Procesarea si controlul calitatii produselor acvacole*, Editura AcademicPres, Cluj-Napoca.