ABSTRACT

In human nutrition, fish has a significant weight, providing a ratio of 12 to 15% of the protein consumed. Fish meat has special sensory qualities and a high nutritional value, high in protein content conferred full of lipids with high unsaturated fatty acid of vitamins, amino acids and fatty acids content and mineral salts.

In Romania have been made numerous investigations on salmonids, but most relate to increasing knowledge and improving technologies, aiming in particular to establish the optimal technology of our country.

To date, research in fish, meat production on the cold water fish, mountain, focused mainly on quantitative aspects of this production, and marketing through acclimatization of valuable species, enabling superior capitalization food in terms of obtaining high economic profit in less possible time.

In all species of trout, especially in regard to brown trout, data from local and foreign literature consulted are less conclusive and sometimes controversial regarding biometrics, chemical composition of meat, cut into portions participation carcass composition and in terms of meat quality determinations fine, no data in Romanian literature, so our research is a first for literature in Romania and aim to bring new information to enrich.

The information provided in the literature on the profile of fatty acids and amino acids in rainbow trout and brook meat are scarce and data presented are controversial.

In Moldova did not complete analyzes were performed on aquatic influence on quantitative traits especially quality of meat obtained.

The research that we intend to operate have studied for the first time in Romania, sensory characteristics, physico-chemical and microbiological characteristics of meat obtained from species of trout raised in fish ponds in Moldova (trout, brook trout and rainbow trout).

Also have studied some properties of conservabilitate and possibilities for superior meat of trout species under study.

In this study were included in the study 600 trout of various ages and weights of the species Salmo trutta fario, Salvelinus fontinalis and Oncorychus mykiss, reared in two salmonid facilities in Neamt and Suceava County. That actually fish were weighed approximately 10% for

each age separately. Measurements and laboratory determinations were chosen by 10 fish for each age group average weights close.

Our research has been conducted on experimental plan that included three series of experiments, and were aimed at creating an image on meat quality objectives of farmed trout fish ponds in Moldova.

The three series of experiments during which surveys were conducted are:

First series of experience - Knowledge of natural environmental features and morpho-productive trout species;

Second series of experience - Knowledge and evaluating quantitative peculiarities of meat production in species of trout;

Third Series of experience - Evaluation of qualitative peculiarities of meat production in species of trout.

In the series of experiments I presented data on the natural environment and specific technological trout production in two salmonid units studied.

Vicovu de Jos trout farm is located in the village of Vicovu de Jos in the northern part of the county of Suceava County, near the town Rădăuţi, at a distance of about 60 kilometers from the county capital, Suceava County.

Vicovu de Jos village is situated in Radauti depression at an altitude of 504 m, near Suceava river. The average annual temperature is 6.9 ° C, the average rainfall is 643.6 mm, the area has a moderate continental climate.

Cheita trout farm is situated 3 km from the exit toward Red Lake Bicaz on Bicaz River in the western part of the county of Neamt County.

Bicaz town is situated at the foot Ceahlău mountain at the confluence with Bicazul Bistrita, characterized by higher air temperatures in summer, they can reach 25 ° C and lower in winter to -25 ° C, high rainfall especially in winter when snow cover, the valley remains between 80-120 days (November to March) and 160 days a slope (September to April).

Production capacity depends largely fishponds physico-chemical quality of water, determined by parameters such as temperature, pH, transparency, organic matter, chlorine, calcium, magnesium, phosphates, nitrates and nitrites. These indicators provide very important information on the physical and chemical water quality and for determining measures to improve water quality and trout growth conditions.

Synthesizing, analyzing environment parameters trout Vicovu de Jos characteristics, Suceava County, and Cheita trout farm, Neamt County, shows that their values fall within the corresponding optimal growth and exploitation of rainbow trout, brook and brown.

Growth and optimal development of salmonids depend largely on physico-chemical water quality technology, we determined that some specific physico-chemical parameters of the water. Results provide some very important information on water quality in salmonid river and also for determining measures to improve water quality and salmonid rearing conditions.

Both the Vicovu de Jos trout farm and Cheita trout farm, technology is the specific growth trout intensive system. Basins are sized according to the biological requirements of each age separately, stocking density, dissolved oxygen levels, size specimens, the degree of feeding, water supply flow size in the following categories:

- ponds for raising juveniles;
- Ponds for raising of consumption trout.

In the Vicovu de Jos trout farm, Suceava County, ponds for raising trout have a trapezoidal section, with walls of reinforced concrete slabs having a thickness of 10 cm, dimensions of 1.25 mx 2.00 m.

Ponds for raising juveniles BP1, BP2 and BP3 and trout ponds to increase consumption (Bp4 - Bp11) have hearth made from a concrete screed solution that greatly facilitates maintenance and operation.

Ponds for raising juveniles were built area of 35.00 m^2 each, while those for increasing consumer trout 28.00 m^2 each. Build the river is 329.00 m^2 and the surface slick is 310.00 m^2.

Popular density varied according to age and water temperature ranging between 50 specimens/m^2 summer and over 100 specimens/m^2 winter.

In Cheita trout farm, Neamt County, maintenance and trout growth is achieved in 9 pools, totaling 576 m^2 and 1 pool for retail sale of consumer trout, with an area of 54 m^2. Tanks are constructed of reinforced concrete, concrete hearth and a depth between 1.2 m and 1.5 m intake disposal.

Popular density varies according to age and water temperature ranging between 20 specimens/m^2 in summer and over 100 specimens/m^2 in winter.

Study of morphological characters through biometrics is a technique commonly used in fish systematic study groups. Performing body measurements and age of fish weighing is done in order to infer the state of maintenance especially fishing material and adaptability to environmental conditions provided.

In order to calculate growth indices and coefficients were determined several dimensions, namely: total length, standard length, head length, caudal peduncle length, body height and thickness of the body.

Profile Index (PI), had a mean value of 3.49 ± 0.06 to copies of L1 and 3.94 ± 0.08 in group L5 specimens indicating a harmonious body shape in the five groups experimental.

Thickness index (Ig), showed a mean value of 41.36 ± 1.35 for copies of L1, and 47.94 ± 0.84 for those in the L4 group. Character studied was homogeneous medium in both groups brook trout, and homogeneous with the other groups studied, the coefficient of variation ranging between 2.82% and 7.19%.

Quality or Kiselev index (CI). Specimens lowest values in this index are highly recommended because they have greater circumference against standard length, indicating extensive muscle mass.

Trout in L2 showed the lowest values for quality index of only 1.47 ± 0.03, compared with individuals in the L5 group, which had a higher value of this index, 1.60 ± 0, 03.

Fulton coefficient (I). The Fulton index values are higher, the fish is more developed. Fulton coefficient calculated values ranged between 1.50 ± 0.03 value obtained in group L5, respectively, 1.75 ± 0.05, as occurred in L1. Variability of this character was homogeneous medium, the coefficient of variation values ranging between 9.50 and 12.19.

To specimens analyzed, the fleshy index I presented a minimum of 19.94 ± 0.52 for group L3 and a maximum of 22.08 ± 0.56 at L1. After processing the experimental data, the fleshy index II values were 19.05 ± 0.57 for between group L4 and L5 21.20 ± 1.33 in group.

Fact that the value indicated by fleshy index oscillates around 20%, certifies that the trout studied had adequate body development, are healthy and have a high percentage of meat.

Values obtained by calculating indices and growth coefficients fall in values in the literature, resulting in the material analyzed fish had a good maintenance. Trout were analyzed a corresponding increase have effectively harnessed food in basins with good growth and health maintenance.

During the second series of experiments aimed to assess the knowledge and quantitative features of meat production in species of trout.

Regarding slaughter yield, yield values for brook trout were hot and 79.63 ± 0.34, respectively, 79.75 ± 0.19%, for rainbow trout values to be between 82,16 ± 0.21% and 82.35 ± 0.18, and for brown trout, the value recorded was 83.86% ± 0.30.

If performance cold brook trout was found that it ranged around 77.69 ± 0.31% for specimens in group F1, respectively, 77.78 ± 0.19% for specimens of group F2. Rainbow trout values recorded by specimens in group C1 stood around 80.47 ± 0.16%, respectively, 80.40 ± 0.27 for specimens of group C2, and if the value of brown trout was 81.82 ± 0.27%.

Slaughter yield calculated values for all five lots within the limits cited in the literature consulted.

Quantitative analysis of meat production features the rainbow and brook trout species included brown and establishing internal organ weight and visceral mass. The three categories of organs from trout studied were: liver, kidneys and heart. It has also been weighed and visceral mass, composed of: internal organs, gonads and viscera.

Visceral mass weight in trout study ranged from 27.87 ± 0.91 g and 42.08 ± 1.63 F2 group g in group I1. Analyzing the weight of the three organs studied was found that the largest share has liver. Thus, its percentage share ranged from 1.52 ± 0.04% in sample F2 and 1.72 ± 0.01% for Q1 lot of total body weight trout studied. Kidneys had a ratio between 0.98 ± 0.01 for C1 and 1.24 ± 0.03 batch if batch F1, the total body weight. Regarding the proportion of heart, of total body weight, it ranged from 0.111 ± 0.001% for specimens of group C1, and 0.159 ± 0.004% for specimens of group I1.

Regarding participation in producing consumable parts case, the proportion of participation of the head, after removing the gills of trout species studied ranged from 8.72 ± 0.34% for specimens of group I1 and 076 ± 11.09 % in specimens of group F2. Share fins ranged from 1.36 ± 0.56% for specimens of batch F1, and 0.96 ± 23% for specimens of group I1, the total mass of the shell.

During the third series of experiments aimed to assess the knowledge and quality of meat production features species of trout.

With regard to sensory properties of meat, we appreciate the fact that in terms of fresh meat from species of trout, that is white with light shades of pink, farm, taste and texture characteristic of trout meat.

Fillet water content of the site (side muscles) from trout species studied, for all five experimental groups had similar values, ranging from 72.89 ± 0.48% for brook trout specimens from group F2 and 76.05 ± 0.27% for trout specimens from group I1, these values fall within the limits cited in the literature consulted.

Fillet protein content of the site (side muscles) from species of trout, for the five experimental groups ranged between 17.27 ± 0.24% for trout specimens from group I1 and 19.21 ± 0 , 34% for brook trout specimens in group F2 values fall these fish in fish protein group, being similar to those found in the literature.

Fillet fat content of the site (side muscles) to analyze trout, ranged from 4.14 ± 0.21% in trout specimens from group I1 and 5.62% ± 0.14% for brook trout specimens the F1 group, these values fall in the category fish trout average lipid content. Again, the data obtained were within the limits of literature.

Fillet ash content of the site (side muscle) on trout study, ranged from 1.09 ± 0.007% for trout specimens from group I1 and 1.19% ± 0.01%, for specimens of brook trout group F2.

In the series of experiments conducted was conducted comparing the content in essential amino acids (lysine, methionine and cystine) in the three types of fillet of trout, to determine possible differences between them. After processing the data, we can see that there are significant differences ($p \leq 0.05$) between meat and brook trout, both in terms of content of methionine and cystine for content. Regarding the content of lysine, there were no significant differences between the three types of trout fillet. Also, for the three species was observed that there is a strong correlation between meat content in amino acids and protein content.

Also in the series of experiments conducted was done comparing trout meat derived from three species, in terms of the fatty acid content. After processing the data obtained showed that significant differences ($p \leq 0.05$), in the content of alpha-linolenic acid, eicosatrienoic and eicosapentaenoic between the three types of trout' fillet. Docosatrienoic amount of acid in rainbow trout meat is significantly higher ($p \leq 0.05$) than meat and brook trout, while the amount of docosahexaenoic acid in rainbow trout meat is significantly lower ($p \leq 0.05$) compared with the registered meat and brook trout. For docosapentaenoic acid was observed significantly higher content ($p \leq 0.05$) in meat brook trout, rainbow trout against flesh and indigenous.

Analyzing the ratio of fatty acids in meat ω-6/ω-3 three species studied it is observed that ranged from 1.278 to 1.568 for meat and brook trout, brown trout for meat.

To determine the weight of muscle and connective tissue of trout flesh were made prior histological studies. Thus, if lateral muscle from rainbow trout, average fiber diameter ranged between 47.91 and 49.48 μ μ epaxiali to muşcii the muscles hipaxiali, calculating an intermediate value of 48.69 μ. Average muscle fiber diameter in brown trout of the species Salmo trutta fario (73.42 μ) characterizes a thick meat texture compared to the brook trout (Salvelinus fontinalis) where he found an average thickness of 71.85 μ muscle fiber.

Profile cross-section of muscle fibers was ellipsoidal shape, this was evidenced by the ratio of large diameter and small diameter (DM / Dm) which ranged from 1.35 / 1 to specimens of rainbow trout and 1.61 / 1 the specimens of trout.

By flouring and roasting meat trout were recorded average loss of 37.04 ± 0.82% for brook trout specimens and 38.26 ± 0.53% for brown trout specimens. Consumption of flour for these operations ranged from 4.02% for brook trout specimens and 4.28% for brown trout specimens of processed meat meal.

Losses were caused by frying in water and fat content, so brown trout with a higher water content have higher losses compared to other species of trout. The heat treatment applied, much of the fat has melted and passed the processing environment (water, oil).

Studying changes in sensory characteristics of meat trout were analyzed immediately after capture fish and refrigeration during storage for 15 days at a temperature of +2 ... +4 ° C in the refrigerator.

The first sensory indicators have changed during refrigeration storage appeared after 4 days of keeping the cold (refrigerated) and were skin appearance, meat, abdomen and smell. Therefore, after 15 days, the total amount of points parameters analyzed was 24, which indicates that trout are unfit for consumption by maintaining the freezing after only six days, when the amount reaches parameters analyzed points 10 points maximum score up the fish are considered optimal for consumption.

For all three groups analyzed, it is noted that the fish studied, analyzed sensorial indicators indicates an optimal period of preservation by refrigeration (+2 ... +4 ° C) for only 5-6 days.

Appreciation of the freshness of trout by determining pH, easily hydrolysable nitrogen, the reaction Eber / Nessler and reaction with hydrogen sulfide was also a period of 15 days under refrigeration at temperatures of +2 ... +4 ^{o}C.

During storage, the values of this indicator changed trout indicating impairment characteristics analyzed, so that they become unfit for consumption after 4 days of maintaining temperatures of +2 ... +4 ^{o}C, the easily hydrolysable nitrogen content values ranged from 34.54 mg/100g to 35.16 mg/100g rainbow trout to brown trout.

At the end of refrigerated storage, easily hydrolysable nitrogen content values we showed altered meat, improper use, this parameter is assigned values between 37.15 and 38.44 mg/100g in rainbow trout mg/100g in brown trout.

Analysis Eber reactions, and hydrogen sulfide Nessler revealed that the meat can be kept refrigerated for 3-4 days, after which it becomes unfit for consumption.

Analyzing the three types of superior trout (trunk, fill, smoked trout), we found that the most effective way to cut recovery was recorded su-shaped trunk, where he recorded an average yield of 88.00% in While the recovery in the form of fill was found to be the least effective because there was only an average yield of 48.73%.

Following research conducted found that rainbow trout, brook and brown species of interest for aquaculture is in Romania. By applying optimal growth technologies, we can obtain a quantitative and qualitative increase trout production and efficient recovery of animal nutritional components.

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