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## UPOREDNA ANALIZA HEMIJSKOG I MASNOKISELINSKOG SASTAVA MLAĐI I KONZUMNE KALIFORNIJSKE PASTRMKE (*ONCORHYNCHUS MYKISS*)\*

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Kalifornijska pastrmka (*Onchorhynchus mykiss*) je jedna od najpoznatijih vrsta ribe u prirodi. U mnogim zemljama je uzgajana vrsta, zbog brzog rasta i odličnog nutritivnog kvaliteta (povoljan sadržaj proteina, masti, mineralnih materija i vitamina, kao i značajan sadržaj nezasićenih masnih kiselina, posebno n-3 polinezasićenih masnih kiselina, PNMK). Promene u hemijskom sastavu mesa ribe su povezane sa starošću i veličinom ribe. Sadržaj holesterola u tkivima životinja povezan je sa načinom i kvalitetom ishrane, uprkos regulatornom mehanizmu sinteze i apsorpcije holesterola.

Cilj ovog ispitivanja je bio određivanje i poređenje hemijskog sastava i masnokiselinskog profila mlađi i konzumne kalifornijske pastrmke iz akvakulture. Uzorci mlađi (prosečne mase 99 g i dužine 18,6 cm) i konzumne kalifornijske pastrmke (prosečne mase 229 g i dužine 23,3 cm) su sakupljeni u avgustu 2010. godine u ribnjaku „Ribnik“, Mrkonjić grad, Republika Srpska. Mlađ i konzumna pastrmka su hranjene kompletnom hranom za pastrmku, sličnog sastava (riblji proizvodi, ulja i masnoće, proizvodi od žita i semena uljarica).

Sadržaj proteina je određen metodom po Kjelahlu. Sadržaj vode, ukupnih lipida i pepela je određen standardnim SRPS ISO metodama. Sastav masnih kiselina je određen gasnom hromatografijom (GC/FID), a sadržaj holesterola tečnom hromatografijom (HPLC/PDA).

Rezultati ispitivanja su pokazali da nema statistički značajne razlike ( $p > 0,05$ ) u sadržaju ukupnih lipida (3,81%, mlađ i 4,17%, konzumna pastrmka) i pepela (1,27%, mlađ i 1,29%, konzumna pastrmka). U filetima konzumne pastrmke je utvrđen veći sadržaj proteina (18,69%) i manji sadržaj vode (75,40%) u poređenju sa njihovim sadržajem u filetima mlađi (17,72% proteina i 77,11% vode). Sadržaj holesterola je bio 82,59 mg/100g (mlađ) i 70,12 mg/100g (konzumna pastrmka).

U filetima mlađi i konzumne pastrmke utvrđena je statistički značajna razlika ( $p < 0,05$ ) u sadržaju ukupnih zasićenih masnih kiselina, (31,81% i 29,14%, respektivno), PNMK (33,93% i 36,78%, respektivno) i n-3 masnih kiselina (17,17% i 19,20%, respektivno). Sadržaj mononezasićenih masnih kiselina je bio sličan i iznosio je u mlađi 33,30% i u konzumnoj pastrmci 33,05%. Nije postojala statistički značajna razlika ( $p > 0,05$ ) u sadržaju ukupnih n-6 masnih kiselina u mlađi (16,76%) i konzumnoj ribi (17,58%). Sadržaj eikozapentaenske (EPA, C20:5 n-3) i dokozaheksaenske kiseline (DHA, C22:6 n-3) bio je 2,78% i 8,21% u mlađi i 3,36% i 9,29% u konzumnoj ribi, respektivno. Sadržaj EPA+DHA u ukupnim masnim kiselinama je bio 10,99% u mlađi i 12,65% u konzumnoj kalifornijskoj pastrmci. Konzumiranjem

200 g ove ribe unos poželjnih masnih kiselina, EPA i DHA, iznosi 0,84 g za mlađ, odnosno 1,08 g za konzumnju kalifornijsku pastrmku, što je u skladu sa preporukom Američkog udruženja za srce za osobe sa kardiovaskularnim oboljenjima (dnevni unos: ukupno 1g EPA i DHA).

Veće količine n-3 PNMK u filetima mlađi (17,17%) i konzumne pastrmke (19,20%) i manje količine n-6 PNMK (16,76% u mlađi i 17,58% u konzumnoj pastrmci) daju povoljan odnos n-3 i n-6 (1,02 u mlađi i 1,09 u konzumnoj pastrmci).

Rast pastrmke je bio praćen povećanjem sadržaja proteina, smanjenjem sadržaja vode i povećanjem PNMK, naročito n-3 esencijalnih masnih kiselina. Zbog značajnog sadržaja proteina i nezasićenih masnih kiselina i male količine masti, kalifornijska pastrmka se može svrstati u jednu od nutritivno najvrednijih namirnica u ishrani ljudi.

**Ključne reči:** Kalifornijska pastrmka, hemijski sastav, masne kiseline, n-3 PNMK.

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## COMPARATIVE ANALYSIS OF CHEMICAL AND FATTY ACID COMPOSITION OF FINGERLING AND MARKETABLE SIZE RAINBOW TROUT (*ONCORHYNCHUS MYKISS*)\*

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Rainbow trout (*Onchorhynchus mykiss*) is one of the most popular fish species in the nature. In many countries it is also farmed species, because of rapid growth and excellent nutritional quality (favourable content of proteins, fats, mineral substances and vitamins, as well as significant content of unsaturated fatty acids, especially polyunsaturated fatty acids (PUFA). Changes in chemical composition of fish meat are associated with age and size of fish. Cholesterol content in animal tissues is associated with feeding method and quality of food, in spite of regulatory mechanism of cholesterol synthesis and absorption.

Objective of this study was determination and comparison of chemical composition and fatty acid profile of fingerling and marketable size rainbow trout from aquaculture. Samples of fingerling (average mass of 99 g and length of 18.6 cm) and marketable size rainbow trout (average mass of 229 g and length of 23.3 cm) were

collected in August 2010, in the fishpond „Ribnik“, Mrkonjić city, Republic Srpska. Fingerling and marketable size rainbow trout were fed with complete mixture of similar composition for bought fish categories (fish products, oils and fats, cereal products and oil seeds).

Protein content was determined according to method of Kjeldahl. Contents of water, total lipids and ash were determined by standard methods SRPS ISO. Fatty acids profile was determined by gas chromatography (GC/FID), and cholesterol content by liquid chromatography (HPLC/PDA).

Research results showed that there was no statistically significant difference ( $p > 0.05$ ) in content of total lipids (3.81%, fingerling and 4.17%, marketable size trout) and ash (1.27%, fingerling and 1.29%, marketable size trout). Higher protein content was determined in commercial trout fillets (18.69%), as well as lower water content (75.40%) compared to their content in fingerling (17.72% proteins and 77.11% water). Cholesterol content was 82.59 mg/100g (fingerling) and 70.12 mg/100g (commercial trout).

Statistically significant differences ( $p < 0.05$ ) in content of total saturated fatty acids was established between fingerling and marketable size trout (31.81% and 29.14%, respectively), also in PUFA (33.93% and 36.78%, respectively) and n-3 fatty acids (17.17% and 19.20%, respectively). Content of monounsaturated fatty acids was similar and ranged from 33.30%, in fingerling, to 33.05% in commercial trout. There was no statistically significant difference ( $p > 0.05$ ) in content of total n-6 fatty acids in fingerling (16.76%) and commercial fish (17.58%). Content of eicosapentaenoic acid (EPA, C20:5 n-3) and docosahexaenoic acid (DHA, C22:6 n-3) was 2.78% and 8.21% in fingerling and 3.36% and 9.29% in commercial fish, respectively. Content of EPA+DHA in total fatty acids was 10.99% in fingerling and 12.65% in marketable size rainbow trout. By consumption of 200 g of this fish intake of desirable fatty acids, EPA and DHA, is 0.84 g in fingerling, and 1.08 g in commercial rainbow trout, which is in accordance with recommendation of the American Heart Association for persons with cardiovascular disease (daily intake: total 1g EPA and DHA).

Higher quantities of n-3 PUFA in fingerling (17.17%) and commercial trout (19.20%) and lower quantities of n-6 PUFA (16.76% in fingerling and 17.58% in commercial trout) result in favourable n-3/n-6 ratio (1.02 in fingerling and 1.09 in commercial trout).

Trout growth was accompanied by increase content of proteins, decrease content of water and increase content of PUFA; especially n-3 essential fatty acids. Due to significant content of proteins and unsaturated fatty acids and smaller amounts of fat, rainbow trout can be considered as one of the most valuable food stuffs in human nutrition.

**Key words:** Rainbow trout, chemical composition, fatty acids, n-3 PUFA.

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