RESEARCH REGARDING THE INFLUENCE OF SLAUGHTER AGE ON QUANTITY MEAT PRODUCTION OF THE *ONCORHYNCHUS MYKISS* SPECIES

I.B. Pagu[1*], C.E. Nistor[1], Iuliana Mădălina Iordache[1], B. Păsărin[1]

[1] *University of Agricultural Sciences and Veterinary Medicine Iasi, Romania*

Abstract

For human consumption is used only some parts from fish body, considerate to be eatable parts; establishment of these parts face to the whole fish differs from one breed to another. From a strict commercial point of view, from trout body interested the muscular tissue which has the greatest proportion. The current research was carried out on three batches of trout of different ages, in specific environmental conditions from NE area of Romania. During our investigations, the trout from the three batches were raised in the same environmental conditions, being slaughtered in August 2011, analysing the meat percent from carcass at all three ages. Mean corporal mass at slaughter for the first batch was 160.06 g, at second batch of 255.60 g and of 474.83 g at the last batch. The best efficiency at slaughter in carcass, respectively 81.81 % was recorded at the third batch of rainbow trout, while at the first batch we obtain the greatest value of the viscera-somatic index (17.56). The values of hepatic-somatic index did not have significant differences between the three batches.

Key words: slaughter yield, rainbow trout, age

INTRODUCTION

Fish represent an important feed resource in human nutrition due to its high nutritive qualities [5]. Rainbow trout (*Oncorhynchus mykiss*), is taxonomic classified in Salmonidae family [3, 9, 12] being the most spread breed from this family in the NE area of Romania.

In Europe rainbow trout is capitalised usually at the age of two years and at a corporal mass between 250 and 400 g. At this age, usually trout are sexually immature and this thing is very important for aquaculture because the debut of sexual maturity at rainbow trout have a negative influence on feed conversion index and growing rate and also has an unfavourable effect on meat quality and fishes' resistance to illness [8, 10].

In the last period of time were made research which enlightened the fact that indexes of meat production have an evolution in direct correspondence with corporal mass and age and on the other side those ones are differentiating also function of breed, rainbow trout having in all the cases superior values [1].

For human consumption is used only some parts of fish body, considerate to be eatable; establishment of those parts in connection with the whole fish is different from a breed to another. From strict commercial point of view from trout body we are interested in muscular tissue which has the greatest participation.

Interesting and at the same time important are the data regarding the proportion of different parts of the body related to total weight, which enlightened the fact that these ones could have an ascendant evolution but also a descendant one while fish gains in corporal mass.

MATERIAL AND METHODS

The current research were realised on three batches of rainbow trout (20 individuals/batch), of different ages, growth in the specific environmental conditions from NE area of Romania. During research trout from the three batches were grown in identical environment conditions, being

*Corresponding author: pagu_ionut@yahoo.com
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slaughtered in August 2011, analysing: corporal mass, meat rate from carcass, rate meat/bones, participation of the slaughtered parts in carcass and the weight of internal organs for all three age categories (2nd summer, 3rd summer and 4th summer).

Individual corporal mass and carcasses mass were determinate on live individuals, slaughtered ones and on refrigerated individuals. Corporal mass and weight of carcasses both at warm and cold were measured by weighting with the help of Kern precision balance.

Meat percentage in carcass has an increasing tendency at rainbow trout till reaching the age of 2 years and after that start to decrease [7].

Determination of rainbow trout carcasses' weight at warm was realised at the fishery unit after maximum one hour from gathering, and for determination of carcasses' weight after refrigeration weighting was repeated after 24 hours. The obtained data were used for concretion of slaughter yield both at warm and at cold, reported as a rate between the carcass mass at warm or after refrigeration and live mass of studied fishes.

To determinate slaughter yield both at warm and cold were used the following formulas:

$$\text{R at warm (\%)} = \frac{\text{carcass weight at warm}}{\text{live mass}} \times 100$$

$$\text{R at cold(\%)} = \frac{\text{carcass weight at cold}}{\text{live mass}} \times 100$$

In the case of rainbow trout breed (*Oncorhynchus mykiss*) carcass is represented by fish body which was eviscerated and removed the gills.

Evisceration is the process from which are removed the uneatable parts from inside the trout and have the role to prolonged the preservation period of fish and to offer presentation possibilities of the final product in very good conditions. This operation must be effectuated quickly because in fish body starts the proteolyses processes.

Evisceration process implies opening of fish along median ventral line, from gills level up to anal orifice.

Were effectuated gravimetric measurements regarding participation of sliced portions in carcass' structure (head, body, viscera, fins, skin and scales).

Gravimetric composition of fish represents the rate between each component and the total weight of fish. Fish is considered to be more valuable as much as the gravimetric composition is in the favour of eatable parts [11].

Research involved also the establishment of weight of internal organs, visceral mass and also the establishment of meat/bones rate. The gathered organs were: liver, kidneys and heart. Kidneys which at *Oncorhynchus mykiss* breed are placed at the level of backbone were removed with the help of a spatula.

The rate of the organs for fish corporal mass have a significant influence on slaughter yield, this one being different function of corporal dimensions, and also by the development of trout skeleton.

The obtained data after gravimetric measurements were statistically processed by calculating the values of some statistical estimators, appreciation of variance, its limits, differences and their signification.

RESULTS AND DISCUSSIONS

Mean corporal mass at slaughter recorded at first batch of rainbow trout (L_1) was of 160.06 g, at second batch (L_2) of 255.55 g, and at last batch (L_3) of 474.83 g (table 1).

Variation coefficient was placed at values specific for a medium variability (V%=11.66 and 10.06) for batches L_1 and L_3 and lower (V%=8.34) for batch L_2.

In the case of trout of 2nd summer the value of warm slaughter yield was of 79.72%, at 3rd summer trout were recorded a value with 2.52% higher, and at the ones of 4th summer was recorded the highest value, reaching up 84.14%.

Table 1 Slaughter yield calculated for *Oncorhynchus mykiss* breed

Specification	*Oncorhynchus mykiss* Pc_{1+} (L_1)		*Oncorhynchus mykiss* Pc_{2+} (L_2)		*Oncorhynchus mykiss* Pc_{3+} (L_3)	
	$\bar{X} \pm s_{\bar{X}}$	V%	$\bar{X} \pm s_{\bar{X}}$	V%	$\bar{X} \pm s_{\bar{X}}$	V%
Live weight (g)	160.06±4.17	11.66	255.55±4.77	8.34	474.83±10.69	10.06
Weight of warm carcass (g)	127.68±3.49	12.22	210.16±3.81	8.11	399.90±9.90	11.07
Warm slaughter yield (%)	79.72±0.19	1.04	82.24±0.13	0.71	84.14±0.24	1.27
Weight of cold carcass (g)	124.81±3.47	12.45	205.58±3.83	8.34	391.50±9.97	11.39
Cold slaughter yield (%)	77.73±0.18	1.03	80.43±0.11	0.60	82.35±0.29	1.59

By weighting the carcasses from the rainbow trout individuals from the three batches could be observed that after refrigeration those ones suffered losses between 1.79 and 1.99 % from the initial weight. The lowest differences were recorded at rainbow trout of 4th summer.

The calculated values for slaughter yield at all three batches are in the limits cited in the literature, 66.56 – 86.48 % [1, 2, 4, 6].

Table 2 The main indexes of meat production at *Oncorhynchus mykiss* breed

Specification	UM	*Oncorhynchus mykiss* Pc_{1+} (L_1)		*Oncorhynchus mykiss* Pc_{2+} (L_2)		*Oncorhynchus mykiss* Pc_{3+} (L_3)	
		$\bar{X} \pm s_{\bar{X}}$	V%	$\bar{X} \pm s_{\bar{X}}$	V%	$\bar{X} \pm s_{\bar{X}}$	V%
Live weight	g	160.06±4.17	11.66	255.55±4.77	8.34	474.83±10.69	10.06
Head	g	20.39±0.25	5.47	30.02±0.51	7.53	51.36±0.64	5.61
	%	12.84±0.24	8.36	11.77±0.15	5.69	10.87±0.12	5.06
Body	g	106.92±3.35	14.02	180.15±3.51	8.72	350.39±9.55	12.19
	%	66.62±0.38	2.54	70.48±0.16	1.00	73.65±0.39	2.34
Fins	g	2.75±0.05	8.08	4.13±0.05	5.25	5.57±0.08	6.56
	%	1.73±0.03	6.51	1.62±0.02	5.38	1.18±0.02	6.25
Skin and scales	g	10.39±0.13	5.78	16.03±0.34	9.61	28.85±0.48	7.37
	%	6.54±0.11	7.84	6.29±0.12	8.37	6.10±0.08	5.73
Bones	g	7.34±0.14	8.27	11.28±0.19	7.45	20.46±0.41	9.02
	%	4.61±0.06	5.66	4.42±0.03	2.62	4.31±0.02	2.36

The main corporal component which has a significant influence on meat quantitative production is head which at the studied individuals from *Oncorhynchus mykiss* breed presents a rate of 12.84% for the trout of 2nd summer, 11.77% for trout of 3rd summer and respectively 10.87% for the individuals of 4th summer.

Body have the greatest rate with an ascendant evolution at the same time with the age, so the lowest rate of 66.62 % was recorded at rainbow trout individuals of 2nd summer from batch L_1, and the highest rate of 73.65 %was recorded at batch L_3, aged of 4th summer.

The fins' mass related with the total weight of body represents in the case of rainbow trout, values between 1.18 and 1.73%, and tegument and scales represent between 6.10 and 6.54% from the total mass of the body.

Analysing the data presented in table 2 could be observed the fact that rainbow trout from batch L_1 had a mean value of the rate meat/bones of 4.61 ± 0.06 %, value higher face to the one of batch L_2, which was of 4.42±0.03%.

In the case of rainbow trout individuals of 4th summer, the rate meat/bones recorded a lower mean value of only 4.31±0.02%, comparative with the first two batches. The resulted values for variation coefficient (V%=2.36-5.66) show the homogeneity of the studied character.

Table 3 The weight of internal organs and visceral mass at *Oncorhynchus mykiss* breed

Specification	UM	*Oncorhynchus mykiss* Pc_{1+} (L_1)		*Oncorhynchus mykiss* Pc_{2+} (L_2)		*Oncorhynchus mykiss* Pc_{3+} (L_3)	
		$\bar{X} \pm s_{\bar{X}}$	V%	$\bar{X} \pm s_{\bar{X}}$	V%	$\bar{X} \pm s_{\bar{X}}$	V%
Visceral mass	g	28.03±0.60	9.58	38.71±0.85	9.79	62.46±0.98	7.05
	%	17.56±0.15	3.87	15.14±0.12	3.48	13.24±0.27	9.28
Liver	g	2.42±0.03	4.97	4.04±0.07	7.99	8.53±0.27	13.92
	%	1.53±0.04	10.60	1.58±0.02	6.57	1.79±0.03	6.46
Kidneys	g	1.98±0.03	6.06	2.54±0.06	10.38	5.06±0.14	12.18
	%	1.24±0.02	7.13	1.00±0.01	5.69	1.06±0.01	4.39
Heart	g	0.19±0.01	11.90	0.29±0.01	11.00	0.73±0.02	12.01
	%	0.12±0.002	7.60	0.11±0.002	7.57	0.15±0.003	7.70

Analysing the data presented in table 3 could be observed that at *Oncorhynchus mykiss* breed the most significant decreasing are recorded at the viscera level, their mass decrease from 17.56% in the case of trout of 2nd summer till 13.24 % at the trout individuals of 4th summer.

Analysing the mass of those threes studied internal organs we notice that the highest rate belongs to liver. So the percentage of it was between 1.53 and 1.79% from the total corporal mass of rainbow trout.

The calculated values for variation coefficient in the case of liver were lower than 10 % in the case of individuals of 3rd and 4th summers and higher in the case of rainbow trout of 2nd summer.

In a decreasing order of percentage in body structure were place kidneys, those ones having a rate between 1.00 and 1.24 %, while heart had a much lower rate of 0.11-0.15 %.

The values of the calculated indexes for quantitative meat production at all three experimental batches are in the limits mentioned in the literature for *Oncorhynchus mykiss* breed [1, 2, 4, 6].

CONCLUSIONS

From the presented data we can coclude that at the time with age, at *Oncorhynchus mykiss* breed, meat percentage in carcass has an ascendant evolution fact enlightened also by the calculation of slaughter yield.

The best values for meat production indicators were obtained at rainbow trout individuals of 4th summer from batch L_3, fact which show that from quantitative point of view the rainbow trout individuals are recommended to be capitalized at the age of 4th summer.

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