Slaughter Yield and Weight of Body Segments in Rainbow Trout (*Oncorhynchus Mykiss*) Reared in two Different Growth Systems

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Abstract
Slaughter yield is one of the most important indices of meat production, which in the current legislation, dealing with employment în quality classes and to establish the commercial value of fish or other animals. To make our research, were slaughtered by mechanical stunning, 25 rainbow trout (*Oncorhynchus mykiss*), from Fiad trout farm, Bistriţa-Năsăud County (M group), respectively 25 rainbow trout from an recirculating system arranged in Cluj-Napoca (E group). The average weight of the studied specimens was similar (228.96±1.21 g-M group, respectively 229.40±1.24 g-E group; d= -0.44 g, p>0.05). Slaughter yield obtained in the goup M was 89.23±0.05%, and in the group E 90.55±0.03%. Results showed that in gravimetric terms, the differences are insignificant between the two groups (d=3.43 g, p>0,05), but in percentage terms, the differences are negative and very significant (d=1.32%, p<0.001). In our opinion, this yields in good for both groups, and demonstrates that the biological material is valuable, and applied technology is optimal in both growth systems. In terms of weight of body segments, the results expressed significant differences for all elements studied, both in terms of gravity and percentage. Thus, if viscera (taken as a whole), the mean value of weight was 24.71±0.19 g (M group), respectively 21.67±0.12 g (E group), resulting a negative and very significant difference (d=3.04 g; p<0.001). In percentage terms, in M group the internal organs and the viscera represents 10.78±0.05% from the initial weight of fish, and in the case of E group, they were 9.44±0.03%, resulting a negative and very significant diferrence between the two groups (d=1.34%; p<0.001).

Keywords: body segments, growth technology, rainbow trout, slaughter yield

1. Introduction

Meat is the commodity and the most valuable to the consumer directly and fish processing industries. So it is needed a higher percentage as compared to its initial weight. The amount of meat resulting from the slaughter of rainbow trout (Oncorhynchus mykiss), relative to the initial weight of fish is called the yield at slaughter. Slaughter yield is one of the most important indicators of meat production, which in the current legislation is based on graded classification and to determine the commercial value of fish or other animals [1]. Rainbow trout slaughter yield is influenced by visceral mass and the fact that some authors gills removed when calculating the index. Moreover, the presentation and marketing of fresh trout gutted, gills are removed [2], which is an indicator of fish freshness. The literature is also calculated and yield is deleted and ends. In our experiments, taking into account consumer demand, was calculated yield only removing the internal organs. It was also determined share they hold different anatomical segments: meat, viscera, heads, bones, fins, scales and skin of the total weight of trout studied. It is desirable

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economically meat prevail among all anatomic segments listed.

2. Materials and methods

For research in this area were killed by mechanical stunning, 25 rainbow trout (Oncorhynchus mykiss), coming from the trout Fiad, Nasaud County. In order to provide comparative results were also killed by the same process 25 rainbow trout (Oncorhynchus mykiss) in an experimental recirculation system, arranged in Cluj-Napoca. Origin of fish was the same, the biological material from the breeding Salmonid Complex Fiad-Telcişor, Nasaud County. Also, given feed and feeding frequency was identical. Differences between the two farming systems were represented by environmental conditions, which showed a good range of variations within Fiad trout, while in the recirculation system they were almost constant regardless of season. To make a fair comparison and relevant to the slaughter yield and body weight segments in rainbow trout (Oncorhynchus mykiss) operated in different farming systems, the initial average weight of the specimens studied was similar (228.96±1.21 g M-group, respectively 229.40±1.24 g-group E) (d=0.44 g, p>0.05). However, environmental conditions different from the two farms have led to differences in body size of the trout, as can be seen in Figures 1 and 2.

Figure 1. Rainbow trout (*Oncorhynchus mykiss*) from Fiad trout farm, Bistriţa-Năsăud County (M – control group) (original)

Figure 2. Rainbow trout (*Oncorhynchus mykiss*) from recirculating system Cluj-Napoca (**E**-experimental group) (original)

Slaughter weight yields and body segments were determined by methods in the literature [1, 5, 6], by killing fish, separation of body segments and their weighting and interpretation of results.

Slaughter yield was determined by weighting the initial and subsequent elimination of the internal organs and viscera, applying the formula:
Slaughter yield=(Mfx100)/I,

where: I - initial mass,

Mf – final mass

To determine the weight of body segments, and proceeded to behead trout weighting machine heads with gills. Internal organs and viscera were weighed individually, while the fins were weighed together (pectoral fins, ventral fins, caudal, dorsal and adipose fins) for each copy sacrificed. Determination of skin and scales weight to each copy made by skinning slaughtered and weighing the two components together. The amount of meat in carcass was determined by tapping the dorsal muscles and muscle separation with scalpel caudal peduncle, the intercostals and abdominal muscles. Resulting skeleton (spine and ribs) was weighed.

3. Results and discussion

After determining the yield at slaughter, the results showed that in terms of gravimetric that differences are insignificant between the two groups (d=3.43 g, p>0.05), but expressed as a percentage of this difference is negative and highly significant (d =1.32%, p<0.001). Slaughter yield obtained in the group M was 89.23±0.05% and in sample E of 90.55±0.03%. Results are confirmed by other studies conducted under conditions similar to their (89.22±1.04% - group M, 90.29±1.27% - group E) [3]. This performance is considered good and demonstrates that the biological material is valuable and applied technology is optimal in both systems.

Regarding the weight on body segments, tabular data expressed significant differences for all elements studied, both in terms of gravity and percentage. Thus, if viscera (taken as a whole), their average weight in sample M was 24.71± 0.19 g for group E while they had an average weight of 21.67±0.12 g, resulting in a negative and highly significant difference of 3.04 g (p<0.001). In terms of percentage, in sample M internal organs and viscera were 10.7±0.05% of initial weight of rainbow trout, and in sample E, they were 9.44±0.03% by weight original, resulting in a very significant shortfall between the two groups (d=1.34%, p<0.001). Percentage values of the internal organs and viscera, from the two experimental groups are much lower than those cited in the literature, demonstrating the fact and the high value of yield at slaughter, which goes as mentioned above 90%, so which confirms the biological material and the feed used and also increase monitoring system. The values obtained in our experiments are favorable for both groups since the literature contains data below those obtained in our study: viscera% =11.42±0.02% [4]; viscera%=13, 38±1.55% -18.55±4.61% [5].

As segments of rainbow trout body, heads were in sample M 10.99±0.04% of initial weight, 9.69±0.02% respectively for group E. The difference recorded between the two groups was negative and very significant and negative (d= 1.30%, p<0.001) in favor of group E. This one explain the fact that in practice particularly livestock and fisheries practices and fish processing industry, heads of trout are capitalized only to obtain flour protein compared to other fish species (Cyprinid family) whose ends are valued in cooking. And on the corporate segment, the results are favorable compared with literature data. This Bud et al. [6] obtained from research conducted a rate of 13.80% as a share of heads of rainbow trout (*Oncorhynchus mykiss*) of initial weight.

Fins rainbow trout (*Oncorhynchus mykiss*) is not removed when the trout is prepared whole, but the fish processing industry is immaterial. It is therefore desirable that they represent as little of the total weight of the specimens. Our research showed that if the lot is 2.89± fins were 0.009% of initial weight, while in sample M they represented 3.33±0.01%, resulting in a negative and highly significant difference between the two groups (d=0.44%, p<0.001), favorable for lot E .Bud et al. [6], (2008) stating the amount of 2.15% of initial weight as a percentage of fins in rainbow trout (*Oncorhynchus mykiss*).

Bones were 3.82±0.01% of initial weight of rainbow trout (group M) and 3.30±0.01% (group E). The difference between the two groups was negative and highly significant (d=0.52%, p<0.001) in favor of Lot E and values are positive, citing literature value of 5.80% of initial weight of the trout [6].

Skin and scales for rainbow trout is not removed when it is made, except when you want to get fillets. However it is desired that their proportion is as low relative to the initial weight of trout. Our results regarding the proportion of skin and scales relative to initial weight: 5.25±0.01% (group M) and 4.82±0.03% (group E). The difference between the two groups in the proportion of these

body segments in relation to initial weight was negative and highly significant (d=0.43%, p<0.001) in favor of Lot E.

Table 1. Statistical significance regarding the mean values of slaughter yield of the two groups and the share of body segments of rainbow trout (*Oncorhynchus mykiss*)

Issue	UM	Group	n	Variables				
				$\bar{X} \pm s_x$	s	V%	d	semnif
Initial Weight	g	M	25	228.96 ± 1.21	12.098	5.28	0.44	p > 0.05
		E	25	229.40 ± 1.24	12.457	5.43	ns	
Carcass Weight	g	M	25	204.30 ± 1.06	10.593	5.18	3.43	p > 0.05
		E	25	207.73 ± 1.14	11.453	5.51	ns	
Slaughter Yield	%	M	25	89.23 ± 0.05	0.535	0.60	1,32	p < 0.001
		E	25	90.55 ± 0.03	0.305	0.34	***	
Viscera	g	M	25	24.71 ± 0.19	1.959	7.93	3.04	p < 0.001
		E	25	21.67 ± 0.12	1.209	5.57	ooo	
	%	M	25	10.78 ± 0.05	0.532	4.93	1.34	p < 0.001
		E	25	9.44 ± 0.03	0.304	3.22	ooo	
Head	g	M	25	25.23 ± 0.22	2.189	8.68	2.91	p < 0.001
		E	25	22.32 ± 0.14	1.470	6.58	ooo	
	%	M	25	10.99 ± 0.04	0.434	3.95	1.30	p < 0.001
		E	25	9.69 ± 0.02	0.236	2.43	ooo	
Fins	g	M	25	7.64 ± 0.06	0.578	7.56	0.99	p < 0.001
		E	25	6.65 ± 0.04	0.472	7.09	ooo	
	%	M	25	3.33 ± 0.01	0.144	4.32	0.44	p < 0.001
		E	25	2.89 ± 0.009	0.094	3.26	ooo	
Bones	g	M	25	8.75 ± 0.06	0.596	6.81	1.17	p < 0.001
		E	25	7.58 ± 0.04	0.444	5.85	ooo	
	%	M	25	3.82 ± 0.01	0.136	3.56	0.52	p < 0.001
		E	25	3.30 ± 0.01	0.108	3.27	ooo	
Skin and Scales	g	M	25	12.06 ± 0.08	0.857	7.11	0.83	p < 0.001
		E	25	11.23 ± 0.05	0.521	4.63	ooo	
	%	M	25	5.25 ± 0.01	0.157	2.99	0.43	p < 0.001
		E	25	4.82 ± 0.03	0.370	7.66	ooo	
Meat	g	M	25	150.57 ± 0.71	7.108	4.72	9.37	p < 0.001
		E	25	159.94 ± 0.89	8.933	5.58	***	
	%	M	25	65.78 ± 0.11	1.138	1.73	3,93	p < 0.001
		E	25	69.71 ± 0.06	0.627	0,90	***	

M-control group (Fiad farm) **E**- experimental group (recirculating system)

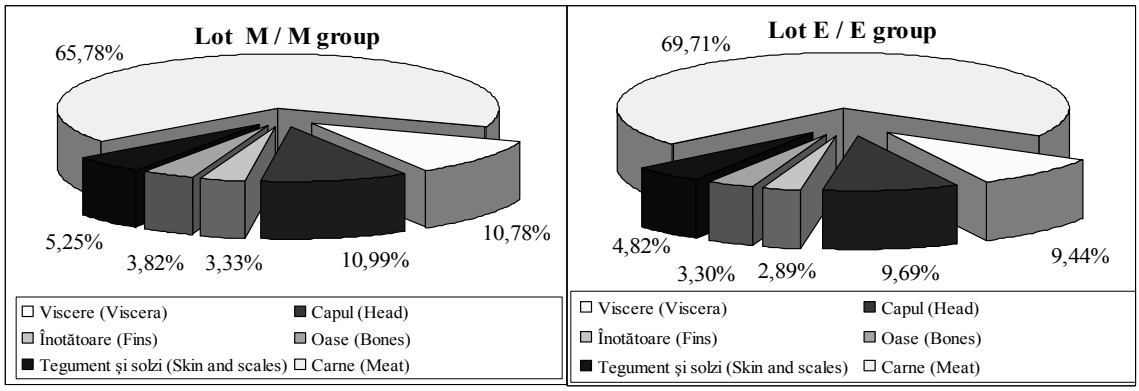

Figure 3. The share of body segments in rainbow trout (*Oncorhynchus mykiss*)

Meat is the commodity and the most valuable to the consumer directly and fish processing industries. So you want as high a percentage of its initial weight. Our experimental results reflect the

higher values in this respect, the lot is recorded, compared with group M. The proportion of meat in the group E was 69.71±0.06% and in sample M 65.78±0.11%, resulting in a very significant shortfall for lot E (d=3.93%, $p<0.001$). Values we obtained fall within the literature cited: 66.06±3.03% -70.96±2.55%, [5].

4. Conclusions

According to the results obtained, systems influence growth performance and slaughter weight anatomical segments. The high density growth (50 kg/m^3), optimal environmental conditions and lack of space for movement of the recirculation system, led to a higher slaughter yield of trout recorded in the classical system. Also, the proportion of anatomical segments which are important to consumers (bones, viscera, heads, etc.) was lower in group E.

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