

ACCESSION OF CARCASS QUALITY OF COMMON CARP (*Cyprinus carpio* L.)

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ABSTRACT: Common carp is worldwide domesticated freshwater fish species. Cage system of carp production represents a type of intensive production. Dressing percentage of carp is important from economical point of view. It is also an important parameter in all technological operations related to fish processing. The aim of this study was to determined yield of male and female common carp as the ratio of the fish weight and the carcass without the head, scales, fins and internal organs. The obtained results showed slightly higher body height and head length values in the females compared to the males. Weight parameters obtained had no statistically significant difference. Total length, standard length and carcass length of females compared to males had a statistically significant difference. In female carp, significantly higher carcass weight and viscera weight were found. Significant differences were found in head weight and gonad weight as well in gonadosomatic index value in the favour of male carps.

Key words: fish, carp, quality, freshwater, carcass

INTRODUCTION

Common carp represents the dominant species in many counties with prerequisites for extensive, semi-intensive and intensive freshwater fish production owing to the benefits that reflected by the extensive reproductive abilities, breeding and prime selection potentials, and high resistance to various diseases (Ljubojević et al., 2013). Cage production system for carp is a special type of intensive production (Ljubojević et al., 2015). It is characterized by lower initial investments in cage construction and minimal labor engagement, ensuring high production yield per volume capacity of water contained in the constructed units. Modern cages are constructed from metal and synthetic polymers (Mihailović et al., 2007). Cage has to be robust enough to endure associated hazards (such as winds and waves, uncomplicated servicing and maintenance. Location choice is critical as it affects the production and mortality of the produce (carp) directly impacting the profitability of the production unit. Dressing percentage of fish is an economic parameter with significant value attached to it, in all technological operations related to fish processing. It is expressed as the ratio of the primary processed carcass (dressed) relative to carcass weight of live fish. The ratio of edible and non-edible part of the fish carcass can vary significantly depending on the species, weight, size of the fish and season catch (Baltić and Teodorović, 1997). Since the dressing percentage directly influences the economy (profitability) of production, it is unjustly neglected as the parameter in scientific studies (Ljubojević et al, 2012). The difference in yield of different lines and their hybrids occur due to different body shape,

head length, width and fat of the body. Parts that are rejected may include all or some parts of the head, scales, skin, intestine, gonads and fins. According to Dunhamu et al. (1983) fish carcass primary handling involves removal of the head, scales and internal organs, while Lovell (1981) reference states that primary treatment involves the removal of skin, dorsal and pectoral fins, head and abdominal organs cavity, with the tail present. Naumovski (1991) and Tumbas (1976) define fish carcass primary handling as a process which include removal of the tail fin. In this study, yield was determined as the ratio of the fish weight and the carcass without the head, scales, fins and internal organs.

MATERIAL AND METHODS

The specimens of 3-year old carp from cage production system were sampled whereas 12 male and 12 female samples are taken. Morphometric characteristics determination, (described by Baltić and Teodorović, 1997) of 3-year old carp specimens from cage production system is conducted in order to evaluate the dressing percentage in relation to sex. After being harvested, the carp were kept on ice. The scales are removed with a serrated knife. The head is cut off with a circular incision in front of the pectoral fins (Gela and Linhart, 2000). The internal organs along with the gonads were removed manually and a processed carcass (without scales, fins, internal organs and head) is obtained. After dissection, the internal organs, gonads, head, fins and carcass were measured. The obtained results were used to determine the relative percentage ratio in relation to the initially measured fish body weight. After dissection acquired data were used to calculate the percentage of fillets, head, fins, viscera and waste per fish weight, as well as important indices such as dressing percentage (DP), gonadosomatic index (GSI) and relative fillet weight. The obtained results were used to determine the relative percentage ratio of each parameter in relation to the initially measured fish body weight.

Statistical analysis

For the statistical analysis of the results, software package Microsoft Office Excel 2010 and Data Analysis ToolPack, were used. Statistical t-test was used for mean values determination.

RESULTS AND DISCUSSION

The biometric parameters of 3-year old male and female carp specimen are presented in the Table 1: (TL-total length, SL-standard length, CL-body length, HL-head length and BH-body height), and weight parameters (FW-fish weight, CW-carcass weight, FW- fillet weight, HW- head weight, FW-fin weight, GW-gonad weight, VW- viscera weight).

The results obtained in our study showed slightly higher body height (BH) and head length (HL) values in the females compared to the males. Weight parameters obtained (fish weight, fin weight and fillet weight) had no statistically significant difference ($p > 0.05$) Total length (TL), standard length (SL), and carcass length (CL) of females compared to males had a statistically significant difference ($p < 0.05$). In female carp, significantly higher carcass weight (CW) and viscera weight (VW) were found ($p < 0.05$).

Significant differences ($p < 0.05$) were found in head weight (HW) and gonad weight (GW) as well in gonadosomatic index value (GSI) in the favour of male carps.

Table 1. The values of biometric parameters in carp (*Cyprinus carpio*) in relation to sex (females, males)

Parameter	Unit	Female (mean \pm SD)	Male (mean \pm SD)
TL	mm	457.5 \pm 13.72 ^a	438 \pm 8.18 ^b
SL	mm	393.88 \pm 16.76 ^a	369.87 \pm 21.83 ^b
CL	mm	322.5 \pm 13.72 ^a	308 \pm 8.18 ^b
HL	mm	87.92 \pm 2.61	87.7 \pm 2.8
BH	mm	126 \pm 4.8	125.54 \pm 6.51
FW	g	1550.23 \pm 55.59	1459.47 \pm 109.09
CW	g	1010.12 \pm 19.57 ^a	947.5 \pm 72.68 ^b
FW	g	750.42 \pm 33.81	727.5 \pm 51.29
HW	g	235.96 \pm 30.98 ^b	263.89 \pm 27.35 ^a
FW	g	40.05 \pm 4.59	38.88 \pm 5.4
VW	g	267.18 \pm 57.13 ^a	222.14 \pm 24.64 ^b
GW	g	56.57 \pm 3.21 ^b	59.61 \pm 2.89 ^a
GSI		3.66 \pm 0.26 ^b	4.01 \pm 0.4 ^a
Dressing percentage	%	65.57 \pm 2.25	63.57 \pm 5.49
Relative fillet weight	%	48.41 \pm 1.29	48.6 \pm 2.02

Values in the table are the mean values \pm SD, values in the same row with different letters differs significantly at $p < 0.05$.

The results of this study demonstrate greater weighing females compared to males (FW), but of no statistical significance. The results gonad weight (GW) of males and values of the gonad somatic index (GSI) of males had a statistically significant difference compared to the values of the same parameters in females ($p < 0.05$). Total length (TL), standard length (SL) and body length (CL) of females compared to males had a statistically significant difference ($p < 0.05$), while the difference in weight of females and males were statistically of little significance. Results obtained by measurements of carcass weight (CW) and the weight of the internal organs (VW) females compared to males with the same parameters demonstrated statistically significant difference ($p < 0.05$). The difference in values obtained by measuring the weight of the head (HW), gonad weight (GW) of males, and gonad somatic index GSI values compared to the values of the same parameters in females demonstrated variance of statistical significance ($p < 0.05$). Analytical Differences in the head length (HL), body height (BH), body weight of individuals (FW) and fin weight (FW) of males and females demonstrated variance of no statistical significance. Carp (*Cyprinus carpio* L.) belongs to the species that have expressed a high degree of sexual dimorphism. The results of research conducted by Bay et al. (2006) showed almost the same growth rate of male and female 3-year carp from four different subgroups examined. The faster growth of female carp was confirmed by research of Cherfasa et al. (1996). Analysis of the relation between sexual maturity and growth rate of the Chinese and European carp conducted by Hulata et al. (1995) showed that the beginning of sexual maturity has a negative impact on the physical growth of many species of fish. The production of sex hormones during sexual maturation, especially their accumulation, inhibits growth as a result of the reaction between sex hormones and growth hormones. Due to the different time of

reaching sexual maturity amongst different sexes, the results of this study are consistent with the conclusion that males attribute of reaching sexual maturity earlier than females, utilize more nutrients for development of the gonads, while sexually immature female specimen(s) during the maturation period go through intensive physical growth.

CONCLUSIONS

Values obtained by calculating the relative weights and fillet yield of three-year sampled carp male and female demonstrated no variance of statistical difference. Production of 3-year old carp in cage production system utilizes plenty nutrients and energy received in feed during sexual maturation for development of the gonads.

ACKNOWLEDGEMENTS

The presented results stemmed from the work on the project no. TR31011 funded by the Ministry of Education and Science, Republic of Serbia.

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