EVALUATION OF QUANTITATIVE PARTICULARITIES OF MEAT PRODUCTION AT *POLYODON SPATHULA* SPECIES

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Abstract

The research was conducted on a total number of 30 Spathula paddlefish sturgeons of various ages (10 P.s.$_{1+}$ fishes, 10 P.s.$_{2+}$ fishes and 10 P.s.$_{3+}$ fishes) from a farm in the county of Botoşani. To determine the slaughter yield, the specimens were beheaded, eviscerated and their fins were removed. Warm slaughter yield stood between 56.12 – 57.78% and after chilling was lower by 0.94% - 1.30%. After cutting we found that fish head weight ranged from 26.34 – 27.04%; 2.99 – 3.27% at fins, visceral mass weight ranged from 10.60 – 12.78%. Carcass weight was 56.12% in the second summer, 57.36% for the third summer and 57.78% for the fourth one, which shows that the ratio is in favour of the edible portion being greater than 50%. Fish's fillet at the studied Spathula paddlefish ranged between 29.30 – 31.19%. Analyzing the weight of the three studied organs were found that higher ratio is at liver, between 1.0 and 1.2% followed by spleen with a ratio of 0.3 to 0.4%, heart having a ratio of 0.10 – 0.15%. The slaughter yield and the ratio of cut portions indicate that Spathula paddlefish specie is a valuable fish, in terms of meat quantity production.

Key words: slaughter yield, Spathula paddlefish, cut portions

INTRODUCTION

Polyodon spathula (Spathula paddlefish) is the unique representative of *Polyodontidae* family from North America, the natural habitat of the specie being represented by the hydrologic basin of Mississippi River, and also could be found in the piscicultural basins from Romania. It is a fish with large waist, reaching 1.5-2 m length and 50-70 kg weight, in the natural habitat [3]. Due to its trophic regime, mainly zooplanktonofag and increase growing ratio, *Polyodon spathula* (Spathula paddlefish) specie present a high demand for Romanian pisciculture, being possible to obtain a qualitative and quantitative increase through an efficient capitalization of the trophic compartment of the piscicultural basins from our country [1] [6].

Slaughter yield, considered to be the most important index which characterise the meat quantitative production could offer direct information regarding the proportion of carcass respectively edible part of fish body. The ratio of cut portions shows details regarding the development of different body regions and muscular mass and also on the development on internal organs and other parts of the fishes.

MATERIAL AND METODH

This study was carried out on a number of 30 sturgeons from *Polyodon spathula* (Spathula paddlefish) specie of different ages (10 individuals P.s.$_{1+}$, 10 individuals P.s.$_{2+}$ and 10 individuals P.s.$_{3+}$). The selected individuals were provided from Hudeşti fish growing farm, Botoşani County.

Slaughter yield is the proportion between warm carcass weight or after refrigeration and live body mass before slaughter, being considered the most important index which characterised the meat quantitative production (*R = warm or cold carcass weight / live body mass before slaughter)*. Carcass of Spathula paddlefish was obtained after beheading, evisceration and shifting off the fins.

The cutting process of the analysed Spathula paddlefish, included: beheading, evisceration, fish cutting in carcasses and in fillé form.

Fish beheading is the detachment operation of the head around opercule and was applied for obtaining fish body. By head detachment was favoured blood elimination.

Fish evisceration is the technologic operation through which was removed from abdominal cavity all the internal organs of the fish together with the black membrane and blood clots. Operation consisted in a carefully cutting of the fish in a ventral plan (on the abdomen), between pectoral fins, from isthmus to anal orifice, avoiding deterioration of viscera. At fish evisceration, supplementary were removed the pectoral fins through a straight sectioning, transversal of fish body ago branham arc.

Cutting under the body form, with carcass obtaining, consisted in removal of all fins and also of the head. Abdomen was cut from isthmus to anal orifice, very carefully not to damage the gallbladder and were extracted all the internal organs together with the gonads.

Cutting in fillet consisted in along section, in two symmetrical halves, head, backbone, anterior belt and peritoneum being removed, and after that the internal organs were detached, black membrane was eliminated and also the blood clots were removed. Also we eliminate the skin and red muscle

RESULTS AND DISCUTIONS

At the analysed sturgeons individuals warm slaughter yield ranged between 56.12 and 57.78% (table 1). The best warm slaughter yield was obtained for Spathula paddlefish of 4th summer – 57.78%, with 2.87% higher than the one for sturgeons of 2nd summer and with 0.72% face to ones of 3rd summer.

This phenomenon is normal if we have in view the fact that in the first period of life these sturgeons are developing mainly in length and after that in thick.

Slaughter yield after refrigeration at the analysed *Polyodon spathula* sturgeons (Spathula paddlefish) was between 55.18 and 56.68% (table 1). The best slaughter yield, after refrigeration, was calculated for Spathula paddlefish of 4th – 56.68%, with 2.64% higher than at 2nd summer sturgeons and with 1.09% face to the ones of 3rd summer.

After calculation of cold slaughter yield, was observed that after refrigeration of carcasses these ones had a weigh lost between 1.67% (at 2nd summer Spathula paddlefish) and 2.24% (at 3rd summer Spathula paddlefish). Slaughter yield after refrigeration recorded values lower face to the ones obtained at warm slaughter yield being between 0.94% (at 2nd summer Spathula paddlefish) and 1.30% (at 3rd summer Spathula paddlefish).

The calculated values for the three growing summers of *Polyodon spathula* sturgeons (Spathula paddlefish) are placed between the cited limits in the literature – 55 – 58% [2] [4] [5].

Table 1. Slaughter yield calculated for the analysed Polyodon spathula sturgeons

Specification	Live weight (g)		Weight of warm carcass (g)		Warm slaughter yield (%)		Weight of cold carcass (%)		Cold slaughter yield (%)	
	$\bar{x} \pm s_{\bar{x}}$	V%	$\bar{x} \pm s_{\bar{x}}$	V%	$\bar{x} \pm s_{\bar{x}}$	V%	$\bar{x} \pm s_{\bar{x}}$	V%	$\bar{x} \pm s_{\bar{x}}$	V%
P.s.$_{1+}$	2050 ±108.14	15.25	1150.46 ± 9.53	5.32	56.12 ±14.32	2.64	1131.19 ±16.24	4.37	55.18 ±12.29	6.13
P.s.$_{2+}$	3750 ±201.18	16.21	2151.00 ±17.49	5.37	57.36 ±18.26	3.11	2102.62 ±13.29	3.93	56.06 ±13.05	5.25
P.s.$_{3+}$	4840 ±285.07	17.31	2796.72 ±19.83	6.49	57.78 ±20.25	2.72	2743.72 ±15.69	4.14	56.68 ±13.27	5.31

For human consumption is used only certain parts of the fish body, considered to be edible parts; the establishment of this parts differs from specie to specie. From the commercial point of view, form fish body interest presents muscle tissue which has the higher ratio. But in processing gravimetric composition is required and also technologic

anatomy of fish, because each species of fishes have a certain participation ratio of component parts. The fish is most valuable as its gravimetric composition (rate between each component and total weight of fish x 100) is in the favour of edible parts [8].

After slaughtering the analysed fishes we observe that the head ratio at specie *Polyodon spathula* (Spathula paddlefish) was 26.34% for 2nd summer, 27.04% for 3rd summer and 26.85% for 4th summer. The calculated values for the three studied ages were very close (table 2). Even if the aspect of Spathula paddlefish could suggest us the fact that head ratio is much higher, influencing the slaughter yield (due to the rostru which represents 1/3 from the total body length), we observe that the head ratio is not very big.

Table 2. Participation of cut portions provided from the analysed Spathula paddlefish

Specification		*Polyodon spathula* 2nd summer - P.s.$_{1+}$	*Polyodon spathula* 3rd summer - P.s.$_{2+}$	*Polyodon spathula* 4th summer - P.s.$_{3+}$
Live mass (g)	$\bar{x} \pm s_{\bar{x}}$	2050±108.14	3750±201.18	4840±285.07
	V%	15.25	16.21	17.31
Head mass (g)	$\bar{x} \pm s_{\bar{x}}$	540.00±9.31	1014.08±12.04	1299.58±11.98
	V%	4.48	5.38	4.62
Fin mass (g)	$\bar{x} \pm s_{\bar{x}}$	61.26±3.64	122.53±4.28	150.94±5.07
	V%	5.71	6.36	6.27
Carcass mass (g)	$\bar{x} \pm s_{\bar{x}}$	1150.46±9.53	2151.00±17.49	2796.72±19.83
	V%	5.32	5.37	6.49
Fillet mass (g)	$\bar{x} \pm s_{\bar{x}}$	600.67±8.42	1143.75±10.73	1509.76±12.24
	V%	5.18	5.61	6.31
Mass of filet removing (g)	$\bar{x} \pm s_{\bar{x}}$	546.79±8.16	1002.25±8.82	1280.96±11.36
	V%	5.41	5.52	5.84

The fins' ratio at specie *Polyodon spathula* (Spathula paddlefish) was ranged between 2.99 – 3.27%, the highest ration being obtained at Spathula paddlefish from 3rd summer (122.53g).

The carcass ratio at specie *Polyodon spathula* (Spathula paddlefish) was 56.12% for the 2nd summer, 57.36% for the 3rd summer and 57.78% for 4th summer; fact which show that the proportion is in the favour of edible parts, being with 50% higher and show the fact that specie *Polyodon spathula* (Spathula paddlefish) is a valuable fish from point of view of meat quantitative production.

Fillet ratio at Spathula paddlefishes studied was between 29.30 – 31.19%, values higher face to the ones presented in thge literature for Spathula paddlefish - 27% [2] and also for other species of fishes [7].

The highest value – 1509.76 g (31.19% from live body mass) was obtained at sturgeons from 4th summer.

The three gathered organs from Spathula paddlefish were: liver, spleen and heart. Also was weighted the visceral mass composed from internal organs, gonads and viscera (table 3).

Table 3. Weight of the internal organs and visceral mass

Specification	Liver (g)		Spleen (g)		Heart (g)		Visceral mass (g)	
	$\bar{x} \pm s_{\bar{x}}$	V%	$\bar{x} \pm s_{\bar{x}}$	V%	$\bar{x} \pm s_{\bar{x}}$	V%	$\bar{x} \pm s_{\bar{x}}$	V%
P.s.$_{1+}$	23.36±2.89	3.14	7.48±0.58	2.67	2.05±0.82	2.86	262.47±9.43	3.56
P.s.$_{2+}$	42.24±2.49	2.48	13.69±0.71	2.43	3.76±1.06	2.27	400.50±12.28	4.27
P.s.$_{3+}$	54.07±3.15	2.61	17.68±0.97	3.01	4.86±1.16	2.52	513.34±14.09	4.16

Analysing the weight of the three studied internal organs we observe that the highest ratio is at the most important organ involved in the metabolic process of the nutritive substances, respectively liver. So its ratio is between 1.0 and 1.2% from the organism of the studied fishes. In a decreasing order of the ratio in organism making-up was placed spleen, with a ratio of 0.3 – 0.4%, while heart had a much lower ratio of only 0.10 – 0.15%.

CONCLUSIONS

Warm slaughter yield and also after refrigeration show the fact the sturgeons *Polyodon spathula* (Spathula paddlefish) are valuable fishes from the point of quantitative production. The best slaughter yield both at warm and after refrigeration was recorded by Spathula paddlefish from 4th summer.

Gravimetric composition, respectively technologic anatomy of fish is in the favour of edible parts, the ratio of non-edible parts being fairly reduced. From the ones presented above we can conclude that at the same time with age at specie *Polyodon spathula* (Spathula paddlefish) muscular mass increase, having a ratio more and more important in the general economy of the body.

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