Lucrări ştiinţifice **Zootehnie şi Biotehnologii**, vol. **41 (2)** (**2008**), Timişoara

SOME COMPARATIVE BIOMETRIC ASPECTS IN *ARISTICHTHYS NOBILIS* AND *HYPOPHTHALMICHTHYS MOLITRIX*

UNELE ASPECTE BIOMETRICE COMPARATIVE LA *ARISTICHTHYS NOBILIS* ŞI *HYPOPHTHALMICHTHYS MOLITRIX*

VASILE GABRIELA *, CIORNEA ELENA *, MISĂILĂ ELENA RADA **, MISĂILĂ C.*

**Faculty of Biology, "Alexandru Ioan Cuza" University, Iaşi, România*
***S.C.D.A.E.A., Iaşi, România*

The paper performs a comparative analysis of some biometric (total length, standard length, head length and caudal footstalks length) in two cultured cyprinids species grown in a controlled system, namely: Aristichthys nobilis (bighead carp) and Hypophthalmichthys molitrix (silver carp), of various ages (starting with the first up to the fourth growth summer).
The results obtained evidenced that, along the four growing stages, the representatives of Hypophthalmichthys molitrix show slightly higher values than those of Aristichthys genus for the total and standard bodily length, while for the head length the situation is reversed.
Key words: biometry, age, *Aristichthys nobilis*, *Hypophthalmichthys molitrix*

Introduction

In our country, the most developed branch of aquaculture - *i.e.*, the controlled growing of animal and vegetal organisms in an aquatic medium - is represented by cypriniculture. In numerous countries, the products obtained from them containing essential aminoacids (absent in proteic constituents of vegetal nature), the proteic substances from the fish meat being 2 - 3 times more digestible than those contained in bovine, ovine and porcine meat (Grozea and Bura, 2002; Bud *et al*., 2004).

The particular nutritive value of the fish meat is reflected in its high concentration of proteins, glucides and lipids, as well as in the mineral salts and vitamins it contains (Stăncioiu *et al*., 2006).

Materials and Methods

The experimental researches were accomplished on two fishy species from Chinese carps complex of culture (bighead carp and silver carp), funded out on different evolutional levels (beginning with first summer of growth - 0_+ and up to fourth - 3_+). The main external corporal variables investigated were the total length, standard length, length of caudal footstalks and head length (Voican *et al*., 1974; 1975; Pojoga and Negriu, 1988). Finally, was realized a statistical analyze of obtained data being calculated the mean, the error and the standard deviation, variance, the mean variation and precision coefficient, as well as limit (superior and inferior) of the confidence interval in which each variable oscillates (Dragomirescu, 1998; Gomoiu and Skolka, 2001; Varvara *et al*., 2001).

Results and Discussions

The main objective of this study carried out the comparative analysis of some biometric (total length, standard length, caudal footstalks length and head length) on groups of age (0_+, 1_+, 2_+ and, 3_+, respectively) in *Aristichthys nobilis* and *Hypophthalmichthys molitrix*. As to the total bodily length, the obtained results were organized in table 1. The lowest coefficients of average variation are registered in the case of both genus in one summer-old individuals (5.853% in individuals of bighead carp and 5.705% in one of silver carp).

Table 1

Values of the main statistical indices of the average total bodily length in *Aristichthys nobilis* and *Hypophthalmichthys molitrix* of various ages

Species	*Aristichthys nobilis*				*Hypophthalmichthys molitrix*			
Age (years)								
Statistical indices	0_+	1_+	2_+	3_+	0_+	1_+	2_+	3_+
Mean	12.179	35.93	52.36	64.555	12.37	37.51	55.385	65.57
Standard error	0.071	0.23	0.337	0.793	0.07	0.278	0.444	0.489
Standard deviation	0.71	2.302	3.374	7.93	0.705	2.782	4.447	4.899
Variance	0.505	5.303	11.384	62.898	0.498	7.742	19.777	24.005
Confidence level	0.141	0.456	0.669	1.573	0.14	0.552	0.882	0.972
Upper limit	12.32	36.386	53.029	66.128	12.51	38.062	56.267	66.542
Lower limit	12.037	35.473	51.69	62.981	12.229	36.957	54.502	64.597
CV%	5.835	6.409	6.443	12.285	5.705	7.418	8.029	7.472
m%	0.583	0.64	0.644	1.228	0.57	0.741	0.802	0.747

CV% = mean variation coefficient, m% = mean precision coefficient

For all developmental stages taken into study, total bodily length presents the average enhanced values in the case of individuals belonging to the species *Hypophthalmichthys molitrix*, but the report among the total ultimate length and one initial as much to bighead carp quotient and to silver carp is 5.3 (fig. 1).

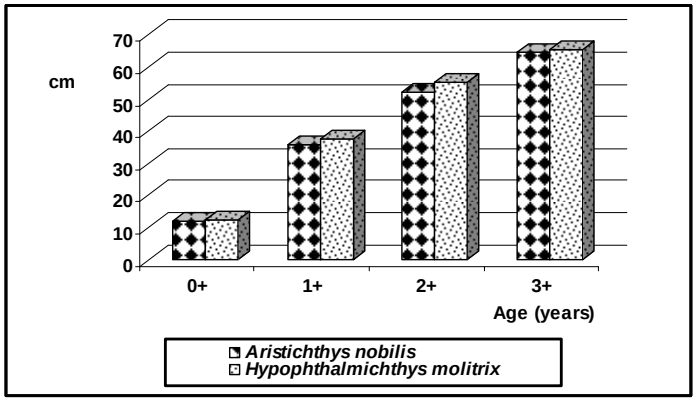

Fig.1. Comparative graphical representation of the average total bodily length in *Aristichthys nobilis* and *Hypophthalmichthys molitrix* of various ages

The comparative graphical representation of the average standard bodily length on ages (fig. 2) evidences, in this case too, some enhanced values in the case of silver carp. Conversely, the report among final standard length and one initial is 5.63 to bighead carp and 5.461 to silver carp (table 2).

Table 2

Values of the main statistical indices of the average standard bodily length in *Aristichthys nobilis* and *Hypophthalmichthys molitrix* of various ages

Species	*Aristichthys nobilis*				*Hypophthalmichthys molitrix*			
	Age (years)							
Statistical indices	0_+	1_+	2_+	3_+	0_+	1_+	2_+	3_+
Mean	10.004	30.402	44.475	56.33	10.37	31.915	48.05	56.635
Standard error	0.039	0.242	0.324	0.648	0.075	0.247	0.38	0.524
Standard deviation	0.395	2.423	3.24	6.487	0.75	2.478	3.8	5.243
Variance	0.156	5.847	10.501	42.081	0.563	6.141	14.446	27.489
Confidence level	0.078	0.480	0.643	1.287	0.148	0.491	0.754	1.04
Upper limit	10.082	30.882	45.118	57.617	10.518	32.406	48.804	57.675
Lower limit	9.925	29.921	43.831	55.042	10.221	31.423	47.295	55.594
CV%	3.957	7.972	7.826	11.516	7.24	7.765	7.91	9.257
m%	0.395	0.797	0.728	1.151	0.724	0.776	0.791	0.925

CV% = mean variation coefficient, m% = mean precision coefficient

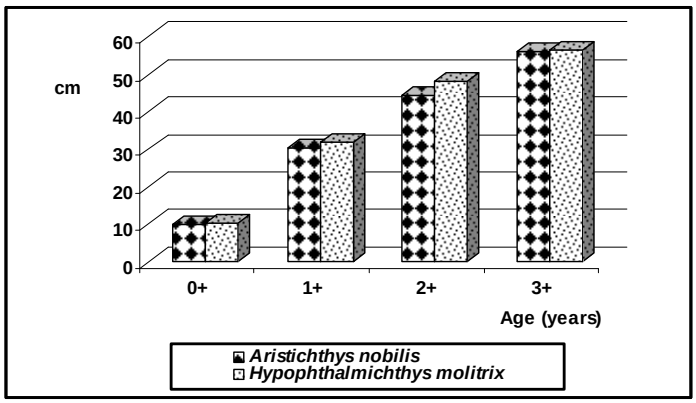

Fig.2. Comparative graphical representation of the average standard bodily length in *Aristichthys nobilis* and *Hypophthalmichthys molitrix* of various ages

Forward, for each species and developmental stage in part it has been calculating how part per cent represents the standard length from total bodily length. According as is noticed from figure 3, during on the four years of growth is not registered the significant difference between two species of cultured cyprinids and no between ages.

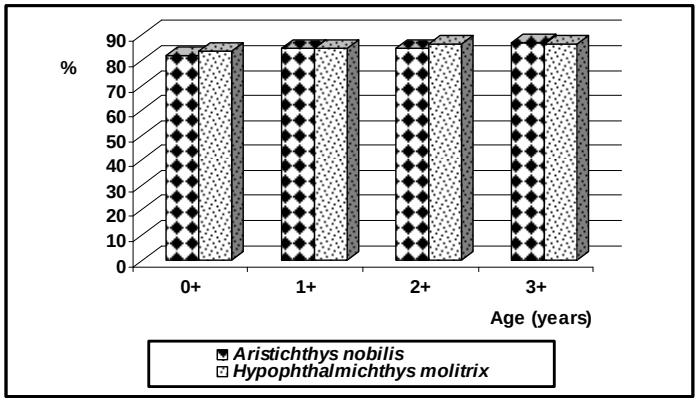

Fig.3. Comparative graphical representation of the standard length percent from the total bodily length in *Aristichthys nobilis* and *Hypophthalmichthys molitrix* of various ages

Thus, in the juvenile stage (one summer-old) in bighead carp the standard length represents 82.141% from total bodily length and in silver carp 83.831%, while in four summer-old the percentage report among standard average length and total average bodily length is 87.258% in bighead carp and 86.373% in silver carp.

From data presented in the table 3 is noticed that in bighead carp the average length of caudal footstalks varies between 2.073 - 2.276 cm in one summer-old, between 5.318 - 5.737 cm in two summer-old, between 7.714 - 8.055 cm in three summer-old and between 7.792 - 8.657 cm in four summer-old.

In silver carp average length of caudal footstalks oscillates in the interval of 1.949 - 2.05 cm in one summer-old, 5.433 - 5.756 cm in two summer-old, 7.018 - 7.651 cm in three summer-old and 8.7 - 9.169 cm in four summer-old.

Table 3

Values of the main statistical indices of the average length of the caudal footstalks in *Aristichthys nobilis* and *Hypophthalmichthys molitrix* of various ages

Species	*Aristichthys nobilis*				*Hypophthalmichthys molitrix*			
Age (years)								
Statistical indices	0_+	1_+	2_+	3_+	0_+	1_+	2_+	3_+
Mean	2.175	5.528	7.885	8.225	2	5.595	7.335	8.935
Standard error	0.051	0.105	0.086	0.218	0.025	0.081	0.159	0.118
Standard deviation	0.511	1.055	0.861	2.18	0.256	0.812	1.597	1.182
Variance	0.261	1.114	0.741	4.754	0.065	0.66	2.55	1.397
Confidence level	0.101	0.209	0.17	0.432	0.05	0.161	0.316	0.234
Upper limit	2.276	5.737	8.055	8.657	2.05	5.756	7.651	9.169
Lower limit	2.073	5.318	7.714	7.792	1.949	5.433	7.018	8.7
CV%	23.50	19.097	10.922	26.51	12.811	14.521	21.773	13.229
m%	2.35	1.909	1.092	2.651	1.281	1.452	2.177	1.322

CV% = mean variation coefficient, m% = mean precision coefficient

In the stage of fry the representatives of *Aristichthys nobilis* present the little high values (of 0.175 cm) against the individuals of *Hypophthalmichthys* genus, in three summer-old are registered a some significant difference of 0.55 cm against silver carp, and in the last developmental stage taken into consideration the situation is changed, in the sense that the individuals of silver carp hold the average values with 0.71 cm bigger than one of bighead carp (fig. 4).

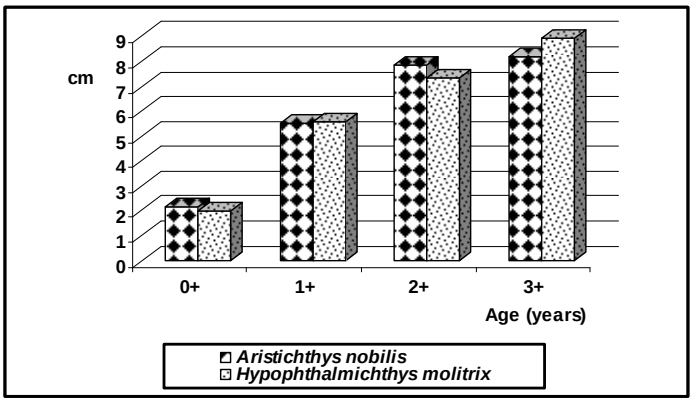

Fig.4. Comparative graphical representation of the average length of the caudal footstalks in *Aristichthys nobilis* and *Hypophthalmichthys molitrix* of various ages

In one summer-old the average head length presents the approximate identical values as much to bighead carp quotient and to silver carp (3.308 cm and, respectively, 3.25 cm), but beginning from the second summer of growth and up to the last developmental stage taken into study (the fourth summer), individuals of bighead carp register the superior values against the either individuals genus analyzed. Thus, if in *Hypophthalmichthys molitrix* the average head length is multiplied for 4.763 times against the initial average length, in *Aristichthys nobilis* is in progress a growth of this for 5.476 times (table 4, fig. 5).

Table 4

The values of the main statistical indices of the average head length in *Aristichthys nobilis* and *Hypophthalmichthys molitrix* of various ages

Species	*Aristichthys nobilis*				*Hypophthalmichthys molitrix*			
Age (years)								
Statistical indices	0_+	1_+	2_+	3_+	0_+	1_+	2_+	3_+
Mean	3.308	10.073	13.91	18.115	3.25	8.845	11.965	15.48
Standard error	0.022	0.115	0.133	0.246	0.025	0.083	0.124	0.19
Standard deviation	0.227	1.156	1.339	2.464	0.251	0.839	1.245	1.908
Variance	0.051	1.337	1.794	6.075	0.063	0.705	1.551	3.641
Confidence level	0.045	0.229	0.265	0.489	0.049	0.166	0.247	0.378
Upper limit	3.353	10.302	14.175	18.604	3.299	9.011	12.212	15.858
Lower limit	3.262	9.843	13.644	17.625	3.2	8.678	11.717	15.101
CV%	6.883	11.483	9.631	13.606	7.731	9.496	10.411	12.326
m%	0.688	1.148	0.963	1.36	0.773	0.949	1.041	1.232

CV% = mean variation coefficient, m% = mean precision coefficient

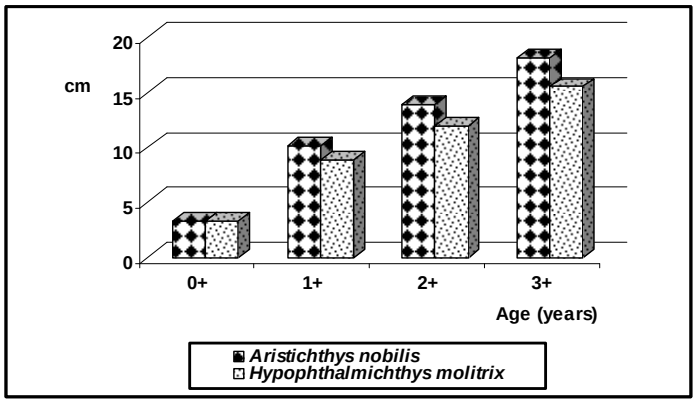

Fig.5. Comparative graphical representation of the average head length in *Aristichthys nobilis* and *Hypophthalmichthys molitrix* of various ages

Result obtained according with the literature of the field (Kászoni, 1966; Grozea and Bura, 2002), based on *Aristichthys nobilis* has an elder head comparative with silver carp, breadth, with the round ventral part and imposing jaws, reason for which in English is named "bighead carp".

Conclusions

➢Besides of biometric results obtained we can remark the fact that during the four growing stages individuals belonging to the species *Hypophthalmichthys molitrix* present the slightly higher values comparative with the representatives of *Aristichthys* genus in the case of total and standard bodily length, while, in the case of head length the situation is overturn.

➢In the two cyprinids species, the confidence interval limits, calculating on the basis of the average values and standard deviation, for all bodily variables taken into study are very limitary for all ages, what denote the existence of a phenotypic similarity between the individuals of two cultured carps genus.

Bibliography

1. **Bud, I., Diaconescu, Şt., Mudure, M.** (2004) - *Creşterea crapului şi a altor specii de peşti*, Ed. Ceres, Bucureşti, 546 p.
2. **Dragomirescu, L.** (1998) - *Biostatistică pentru începători*, Ed. Constelaţii, Bucureşti, 216 p.
3. **Gomoiu, T. M., Skolka, M.** (2001) - *Ecologie. Metodologii pentru studii ecologice*, Ed. Univ. „Ovidius" Constanţa, 170 p.
4. **Grozea, A., Bura, M.** (2002) - *Crapul-Biologie, sisteme de creştere, patologie***,** Ed. de Vest, Timişoara, 207 p.
5. **Kászoni, Z.** (1966) - *Creşterea peştilor în iazuri şi heleşteie*, Ed. Agro-Silvică, Bucureşti, 237 p.
6. **Pojoga, I., Negriu, R.** (1988) - *Piscicultura practică*, Ed. Ceres, Bucureşti, 213 p.
7. **Stăncioiu, S., Patriche, N., Patriche, Tanţi** (2006) - *Ihtiologie generală*, Ed. Didactică şi Pedagogică, Bucureşti, 356 p.
8. **Varvara, M., Zamfirescu, Şt., Neacşu, P.** (2001) - *Lucrări practice de ecologie*, Ed. Univ. „Alexandru Ioan Cuza" Iaşi, 152 p.
9. **Voican, V., Rădulescu, I., Lustun, L.** (1974) - *Călăuza piscicultorului*, Ed. Ceres, Bucureşti, 366 p.
10. **Voican, V., Lustun, L., Rădulescu, I.** (1975) - *Practica selecţiei şi reproducerii la peşti*, Ed. Ceres, Bucureşti, 192 p.