

## INVESTIGATION ON WEIGHT INCREASE IN CTENOPHARYNGODON IDELLA SPECIES

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**ABSTRACT** - *Ctenopharyngodon idella* species was fed with aquatic vegetation. Groups  $E_1$ , and  $E_{1(r)}$  achieved higher weight increases in comparison with the fish belonging to the control group, fed with mixed fodder. At  $E_1$  and  $E_{1(r)}$ , the mean daily increase was of 3.1 g and at the control group, of 2.9 g. At  $E_1$ , the index of aquatic vegetation consumption was of 28.8, respectively, 28.3 in  $E_{1(r)}$ . The consumption index for mixed fodder was of 5.27 at the control group, a great value if we take into account the value of the consumption index of 2, quoted by the specialty literature. At  $E_2$ , fishes, which were fed with mixed fodder and aquatic vegetation, obtained a mean daily increase of 3.2 g, greater than the increase of 2.9 g at the control and 3.1 g at  $E_1$  and  $E_{1(r)}$ . Therefore, *Ctenopharyngodon idella* consumed and capitalized well the aquatic vegetation due to some specific features of the digestive system, preferring the mixed fodder, when the aquatic vegetation was insufficient.

**Key words:** fish, mixed fodder, plants, macrophytes, food

**REZUMAT** - Cercetări privind creșterea în greutate la specia *Ctenopharyngodon idella*. Peștii de *Ctenopharyngodon idella*, hrăniți cu vegetație acvatică (loturile  $E_1$ ,  $E_{1(r)}$ ) au realizat sporuri de creștere în greutate mai mari, comparativ cu peștii din lotul martor, hrăniți cu nutreț combinat. Astfel, la  $E_1$  și  $E_{1(r)}$ , sporul mediu zilnic a fost de 3.1 g, iar la lotul martor, de 2.9 g. La lotul  $E_1$ , indicele de consum pentru vegetația acvatică a fost de 28.8, respectiv de 28.3 la lotul  $E_{1(r)}$ . Indicele de consum pentru nutrețul combinat a fost de 5.27 la lotul martor, valoare apreciabilă, având în vedere că literatura citează un indice de consum în jurul valorii de 2. La lotul  $E_1$ , peștii hrăniți cu nutreț combinat și vegetație acvatică au realizat un spor mediu zilnic de 3.2 g, sensibil mai mare, comparativ cu sporurile de 2.9 g la martor și 3.1 g la loturile  $E_1$  și  $E_{1(r)}$ . Prin urmare, *Ctenopharyngodon idella* consumă și valorifică bine vegetația acvatică,

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*datorită unor particularități ale sistemului digestiv, preferând nutrețul combinat când vegetația acvatică este insuficientă.*

**Cuvinte cheie:** pește, nutreț, plante, macrofite, hrană

## INTRODUCTION

Once with the acclimatization in Romania since 1960 of phytophagous fishes and especially, of *Ctenopharyngodon idella* species, a macrophyte consumer, the opportunity of capitalizing the aquatic vegetation and getting high weight increases has appeared (Battes, 1990, Cure, 1968).

In the first days after the resorption of the vitellicle, larvae nourish with animal origin microorganisms. When they are 2.5 cm long, they consume subaquatic vegetal food. At maturity, they prefer soft, submerge vegetation, but also land and immerse vegetation. Among land and aquatic macrophytes eaten by *Ctenopharyngodon idella*, there are: *Cladophora*, *Spirogyra*, *Chara*, *Carex*, *Hydrocharis*, *Iris*, *Lemna*, *Myriophyllum*, *Najas*, *Potamogeton*, *Phragmites*, *Rumex*, *Sagittaria*, *Scirpus*, *Trapa*, *Typha*, *Trifolium*, etc. (Huian, 1989).

Due to the consumption of aquatic vegetation, the fish gets high weight increases and contributes to the control of macrophyte excess, enriches water with biogene, organic and partially mineralized elements, improves the oxygen regime and ensures conditions for the development of plankton and bentofauna, and, finally, of fishes. The dejections from fishes represent a good fertilizer for ponds, because they contain proteins, fats, etc (Huian, 1989; Manea, 1985).

The paper has investigated the determination of the consumption index and weight increase in *Ctenopharyngodon idella*, by its feeding with aquatic vegetation and mixed fodder.

## MATERIALS AND METHODS

Experiments were set up at the Aquaculture and Aquatic Ecology Station of Ezăreni, Iași County, during the vegetative period of the year 2004, for 45 days (29 July-11 September).

The biological material aged of 2+ was brought from the Fish Breeding Farm of Fălticeni, Suceava County, and introduced in floating nursery containers with width of 2 m, length of 3 m and depth of 1.5 m. The experimental platform with metallic structure on floats was projected in the pond 1 at a distance of 1.5 m from the bank. The water from pond, with a depth of 2 m, rich in biogene substances, nutrients, and having a high temperature, has determined the development of a rich phytoplankton, resulting in the appearance of the eutrophization phenomenon.

Hydrobiological qualities of the environment are within the limits of eutrophe-cyprinicole water:

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- the temperature had values between 20-26°C;
- the quantity of oxygen dissolved into water did not decrease under 3 mg/l, the hypoxia periods being of short period;
- pH values varied between 6.5-7.6.

For testing, four groups of *Ctenopharyngodon idella* were formed (a control group and three experimental groups). Each group was made up of 10 samples. The biological material was homogeneous, with an initial mean weight of 450 g/sample.

For feeding, we have used a recipe of mixed fodder<sup>1,2</sup> with a protean level of 38%, protein and aquatic vegetation made of *Phragmites communis* (reed) and *Typha angustifolia* (bulrush). The amount of food administered daily represented 5% of the body weight/ day, being changed at intervals of two weeks, according to achieved weight increase. The food was administered six days/week (in the morning). The mixed fodder was administered under hydrolyzed shape.

The scheme of the experience:

- the control group was fed with mixed fodder, which composition is presented in *Table 1*;

**Table 1**

### Characteristics of the mixed fodder used in the food of *Ctenopharyngodon idella* at the age category 2+

Structure	%
Maize	8.5
Soybean grist	30.0
Sunflower grist	5.5
Wheat	20.0
Fish flour	30.0
Various fats	3.8
Salt	0.2
Premix	1.0
Binder	1.0
Total	100
<b>Composition:</b>	
Cal EM-kg	3300
Raw protein %	38
Methionine + cystine %	1
Lisine %	2
Raw celluloses %	4
Calcium %	0.3
Phosphorus %	0.65

<sup>1</sup> Oprea .L., 1996 – *Investigation on using fodder in fish feeding, under breeding systems*, Ph D Thesis, "Dunărea de Jos" University of Galați

<sup>2</sup> Georgescu Rodica, 1998 – *Influence of special fodder on breeding rate in fish species*, Ph D Thesis, "Dunărea de Jos" University of Galați

- the experimental group E<sub>1</sub> was fed with aquatic vegetation (*Phragmite* + *Typha*), which chemical composition is presented in *Table 2*;

**Table 2**

**Chemical composition of aquatic plants used in the food of  
*Ctenopharyngodon idella***

Name of the plant	Raw protein %	Raw fat %	Celluloses %	Ash %	DM %
<i>Phragmites comunis</i>					
- August	7.15	0.64	13.32	2.71	39.12
- September	6.65	0.71	12.34	2.58	37.02
<i>Typha angustifolia</i>					
- August	4.74	0.30	5.56	1.81	20.62
- September	3.79	0.15	4.12	1.36	15.25

- the experimental group E<sub>1(r)</sub> was fed with aquatic vegetation (*Phragmites* + *Typha*);
- the experimental group E<sub>2</sub> was fed with the same mixed fodder as the control group, and with aquatic vegetation, too (*Phragmites* + *Typha*).

The chemical composition was established according to the tables of nutritive value.

The chemical composition in *Phragmites communis* and *Typha angustifolia* was determined both in August and in September. The raw protein was determined by the Kjeldahl method.

## RESULTS AND DISCUSSION

The weight of fishes at populating for all the groups was of 450 g, and at the end of the experiment, it was of 582 g/sample at the control group, 592 g/sample at E<sub>1</sub>, 590 g/sample at E<sub>1(r)</sub> and 598 g/sample at E<sub>2</sub> (*Table 3*).

The weight increase/group was of 1220 g for the control group, which was fed only with mixed fodder, 1320 g for E<sub>1</sub>, which was fed only with aquatic vegetation, 1304 g for E<sub>1(r)</sub>, fed with aquatic vegetation and 1380 g for E<sub>2</sub>, which was fed with mixed fodder and aquatic vegetation. The final weight/group was of 5820 g at the control group, 5980 g at E<sub>1</sub>, 5904 g at E<sub>1(r)</sub> and 5980 g at E<sub>2</sub>.

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**Table 3**

**Main technological indices obtained in *Ctenopharyngodon idella* species after the experiment**

Specification	Group			
	Control	E <sub>1</sub>	E <sub>1(r)</sub>	E <sub>2</sub>
Mean fish weight (g)				
- at populating	450	450	450	450
- at the end of the experiment	582	592	590	598
Total increase/group (g)	1220	320	1304	1380
Duration of the experiment (days)	45	45	45	45
Daily mean increase (g)	2.9	3.1	3.1	3.2
Final weight/group (g)	5820	5920	5904	5980
Weight increase/sample and period (g)	132	142	140	148
Consumption index				
- For mixed fodder	5.27	-	-	3.2
- For aquatic vegetation	-	28.8	28.3	26.3
Number of samples (pieces)	10	10	10	10
Survival (%)	90	100	100	100

The weight increase/sample and period was of 132 g at the control, 142 g at E<sub>1</sub>, 140 g at E<sub>1(r)</sub> and 148 g at E<sub>2</sub>.

The daily mean weight increase was of 2.9 g at the control, 3.1 g at E<sub>1</sub>, 3.1 g at E<sub>1(r)</sub> and 3.2 g at E<sub>2</sub>.

The consumption index was of 5.27 for mixed fodder at the control group, 28.8 for aquatic vegetation at E<sub>1</sub>, 28.3 for aquatic vegetation at E<sub>1(r)</sub>, 26.3 kg for aquatic vegetation and 3.2 for mixed fodder at E<sub>2</sub>.

The survival percentage was of 90 % at the control and 100% at the other three groups.

## CONCLUSIONS

The results obtained show that *Ctenopharyngodon idella* fishes, fed with aquatic vegetation, respectively fishes from groups E<sub>1</sub>, E<sub>1(r)</sub> obtain higher weight increases in comparison with fishes from the control group, which were fed with mixed fodder. The daily mean increase for fishes from groups E<sub>1</sub> and E<sub>1(r)</sub> was of 3.1 g, while for fishes from the control group, it was of 2.9 g, proving that they capitalize better aquatic vegetation than mixed fodder.

The consumption index for aquatic vegetation was of 28.8 at E<sub>1</sub> and, respectively, 28.3 at E<sub>1(r)</sub>, which were good values, knowing that the highest value

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of DM for aquatic vegetation was found in *Typha* in August (39.12%). The consumption index for the mixed fodder at the control group was of 5.27, a high value if we take into account that the value of the consumption index in the specialty literature is 2.

Fishes from E<sub>2</sub>, fed with mixed fodder and aquatic vegetation, have obtained the best results, getting a daily mean increase of 3.2 g, higher in comparison with the other groups, respectively, 2.9 at the control group, and 3.1 at E<sub>1</sub> and E<sub>1 (r)</sub>. This shows that *Ctenoparyngodon idella* capitalizes better the aquatic vegetation due to some characteristics of the digestive system (pharyngeal teeth with long excrescences for putting into pieces the vegetation, very long digestive tract, proper enzyme equipment, etc.), preferring the mixed fodder only if the aquatic vegetation is insufficient.

The very good survival percentage shows that this species is less demanding to water physico-chemical parameters, having a good resistance.

The mortality of 10% found at the control group was caused by an improper handling during the control weighing and not by breeding conditions.

## REFERENCES

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