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# ANALYSIS OF INTENSIVE REARING PERFORMANCES OF JUVENILE FRĂSINET CARP

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***Abstract***

*In this study, were considered productive performance of juvenile Frăsinet carp, raised in intensive systems in a systematic ciprinicol farm. The inspection fishing activity carried out by an interval of about two weeks, at random, was body weight at different ages, and based on them, increase medium rais up. Also, main measurements were made tangible and corporal indexes have been calculated. Somatometric raw data were statistically processed and the following parameters were calculated: mean, standard error of the mean, variance, standard deviation and coefficient of variability. The summer I growth of populating, average weight of juveniles varied between 0.2-1.0 g/fish, and at the end of growth, fall, summer I juvenile has reached an average weight of 40-90 g/fish. Juveniles showed a good growth rate, according to the pond, the total average increase from populating the tanks until harvest fishing being 39.8-89.7 g/fish in 2009 (body weight increased by 199-299 times), 69.8-89.8 g/fish in 2010 (+349-449 times) and 74.0-89.0 g/fish in 2011 (+74 times). The main phenotypic features of summer carp Frăsinet, differs from the carp native populations, especially in relation to body length (total length and the standard 12.0 cm, respectively 11.5 cm,), the maximum height of the body (5.5 cm), high perimeter 11.5 cm, thickness trunk 5.4 cm, caudal of the peduncle length 3.7 cm. Except large trunk length and perimeter, the other body dimensions population analyzed is quite heterogeneous, as evidenced by the heritability coefficient values (13-28%). In first summer, the Frăsinet carp, demonstrated a correct conformation and a good body the proportionality of the optimal values of corporal indexes: 2% index of fattening, 2.1 profile index, 0.99 quality index, 47% index of thickness and 32.3% carnosity index.*

***Key words:*** *corporal indexes*, *Frăsinet carp, growth performance, juvenile.*

## INTRODUCTION

Maximize the efficiency and the fisheries productions of the carp culture sector, priority objectives of routed increasing carp, requires the application of intensive production systems or growth in fish facilities systematic and strict compliance with the technologies of growing, at each stage of the evolutionary cycle. Compared to traditional systems, intensive and superintensive systems allow management and rigorous monitoring of consumption, physical and chemical factors of the aquatic environment, growth and closer supervision of the health status of the fish.

At the same time, production may well be expected, technology can be adapted to the requirements of the consumer market, and for an efficient use of the resources of food from fish ponds and obtain higher yields for each pond, polyculture can be applied. Thus, intensive and superintensive growing of culture carp in ponds (including carp Frăsinet), is an effective way to revive and relaunch the fisheries sector in Romania, sector which, due to multiple causes (drastic reduction of areas intended for fisheries in favour of crops, insufficient fodder, populating pools mainly for carp angling and less fattening and marketing lack or inadequacy of subsidies etc.) a continuous decline in the past two decades (Bura et al., 1995; Diaconescu, 2003; Bud et al., 2004). Considering the aspects previously mentioned, the purpose of this paper was to analyze the main features of juvenile Frăsinet carp production raised in intensive systems, a unit of the fisheries south of the country. This species was chosen because it is one of the local populations of carp culture preferred by fish farmers, due to the bio-productive traits

particularly favorable growth directed: manifesting high plasticity in the early years of life, great capacity of adaptation, tolerates high density growth and harsh living conditions compared to other populations and species of fish raised in Romania.
At the same time, the topic is fully in line with the current concerns of the cyprinids, because growth, both nationally and worldwide, the system intensive is used increasingly more often.

## MATERIALS AND METHODS

Research was carried out in the "S.C. Trivale - Călăraşi" followed the establishment of productive performance of carp Frăsinet, during the period of intensive growth of juveniles. The increase was achieved in special pools, namely: BC 3A+3B, BC No. 1 and BP, with surface and shallow water (0.9-6.0 ha, respectively 1.0-1.5 m), which allowed easy monitoring of biological material, physical-chemical properties of communal skill water and timely intervention to remedy any shortcomings.
Working methods have been diverse and have assumed: the daily observation of behavior biological material in every watering rise in first summer; fish inspection (analytical examination) to highlight the qualities and faults of conformation and maintenance condition (body condition); gravimetria, individual weighing of respectively 100 fish on the occasion of fisheries control, about every two weeks and the calculation of the rate increase; we mean making the main body measurements (total body length, standard, ensure proper commercial, maximum and minimum height, large and small perimeter, thickness of body, head length, length of the ventral fins, dorsal, anal and caudal (Lustun, 1985; Bud and Vlădău, 2004; Turliu, 2008) using the graduated ruler, ichtiometer and the centimeter on the 50 copies, harvested in fisheries control achieved in July; calculation of corporal indexes (the index of fattening, shape, quality, thickness, carnosity (Bud and Vlădău, 2004).
Fisheries control has been carried out in different areas of the growth ponds, namely: different depths from the shore and offshore, in the areas of food and evacuation of water. Fisheries control targeted the health of the fish, and assessment of population from ponds, in order to increase or reduce the additional consumption, measures ihtio-sanitary, supplement the flow of river water to maintain the optimal physico-chemical parameters of the production environment. Raw data were processed statistically by calculating the following statistics: mean ($\bar{x}$), standard error of the mean ($S_{\bar{X}}$), variance ($S^2$), standard deviation (S), coefficient of variation ($CV_{\%}$) (Tacu, 1968; Sandu, 1995; Neagu, 2005).

## RESULTS AND DISCUSSIONS

In all the years analyzed, in summer I, Frăsinet crap recorded a good growth rate (table 1):
- in 2009, total average growth increase from populating the ponds until harvest fishing has been 89.7 g/fish in BC No. 3A+3B and 39.8 g in the BC No. 1. Therefore, juveniles increased body weight about 299 times in the first pool and about 199 times in the basin BC no. 1.
Regardless of the pond, the intensity increased with increasing age, the maximum increase was recorded in August and September (about 20-25 g/fish).
- in 2010, the results were reversed, meaning that the total average increase of growth of the populating fishing ponds to harvest was 69.8 g/fish in BC No. 3A + 3B and 89.8 g/fish in the pond BC 1. The first type of pool, juvenile increased body weight about 349 times, and in the second pool about 449 times. This year, body mass accumulation was higher in August and September.
- in 2011, from the populating fishing ponds until harvest was recorded average total growth increase 89 g/fish in BC No. 3A + 3B (weight of juveniles increased about 89 times) and the pool named BP 74 g (weight juveniles increased about 74 times). Per calendar month, growth rate showed a similar pattern to that in 2009 and 2010.
In general, the fall of the first year of growth, culture carp must achieve an average weight of about 50 g (Grozea and Bura, 2008). Voican et al. (1981) established that at the end of the first summer, young carp reach the weight between 25 to 30 g.
Bud (1990) report the following results on the dynamics of youth weight of farmed common carp Mărtineşti: 2-3 g control fishing

conducted on 15 June, to 1 July 5-7 g, 10-12 g on 15 July, 15-20 g from 1 August to 15 August 22-25 g, 28-30 g on September 1, 32-35 g on September 15, October 1, 38-40 g, 42-50 g 15 October and 1 November 51-50 g.

The results of this study demonstrate the superiority of young Frăsinet carp to young common carp, with regard to increased growth and body weight achieved at different ages.

For example, at harvest placed on November 1, young Frăsinet carp increased in pond BC no. 3A + 3B, in 2011, had the highest average weight, about 40 grams to the young common carp analyzed by Bud (1990).

*Table 1.* Weight dynamics of juvenile Frăsinet carp in summer I

| Fish pond | Introduction to pond | Data of control fishing and juvenile weight (g/fish) | | | | | | | Fishing harvest (g) |
|---|---|---|---|---|---|---|---|---|---|
| | | *18.06. 2009* | *08.07. 2009* | *24.07. 2009* | *15.08. 2009* | *29.08. 2009* | *10.09. 2009* | - | |
| BC nr. 3A+3B -6 ha- | 04.06.2009 0,3 g | 10 | 15 | 23 | 35 | 55 | 70 | - | 90 |
| BC nr. 1 -2,7 ha- | 02.06.2009 0,2 g | 8 | 10 | 15 | 21 | 30 | 35 | - | 40 |
| | | *10.07. 2010* | *17.07. 2010* | *24.07. 2010* | *31.07. 2010* | *14.08. 2010* | *28.08. 2010* | *12.09. 2010* | - |
| BC 3A+3B -6 ha- | 01.06.2010 0,2 g | 7,5 | 12,5 | 18,5 | 29 | 41,5 | 42 | 55 | 70 |
| BC nr.1 -2,7 ha- | 01.06.2010 0,2 g | 12 | 15 | 20 | 34 | 41 | 59 | 80 | 90 |
| BP -0,9 ha- | 01.06.2010 0,2 g | 10 | 14 | 19 | 35 | 46 | 60 | 75 | 90 |
| | | *20.06. 2011* | *12.07. 2011* | *29.07. 2011* | *12.08. 2011* | *30.08. 2011* | *25.09. 2011* | - | - |
| BC 3A+3B -6 ha- | 02.06.2011 1 g | 15 | 31 | 50 | 63 | 75 | 90 | - | 90 |
| BP -0,9 ha- | 02.06.2011 1 g | 15 | 30 | 40 | 51 | 60 | 70 | - | 75 |

In a study in "Fisheries Station – Nucet", Nicolae (2004) determined the average weights between 30–50 g/crap Frăsinet values recorded during the first summer of growth, comparable to those found for the material analyzed fish in this paper.

The main phenotypic characteristics of Frăsinet carp value expressed by morphometric traits analyzed on juvenile summer I (table 2) clearly differ from those of other populations of carp of the one hand due to specific growing conditions unity "SC Trivale - Călăraşi", on the other hand, distinct morphological features of Frăsinet carp resulting intense and crosses row selection practiced during the training process of the indigenous breeds.

Character analysis of total body length, the distance measured from the tip of the snout to the imaginary line joining the tips of the caudal fin lobes, show that the 50 individual measured had an average value of 12 cm, with a coefficient of variation of 5%.

The low coefficient indicates a good homogenity of the population on this quality body due to optimal growth conditions (feeding, physical and chemical parameters of the aquatic environment) provided during the first summer juvenile.

In terms of distance measured from the tip of the snout to the end of scaly sheath (base of the caudal fin), which expresses distance standard body length, mean measurements was about 11.5 cm, with a coefficient of variation lower (7%).

*Table 2.* Main body dimensions values of Frăsinet carp summer I registered to control fishing conducted in July 2011

| Analyzed feature | Statistical parameters analyzed | | | | |
|---|---|---|---|---|---|
| | Media ($\bar{x}$) | Standard error ($S_{\bar{x}}$) | Variance ($S^2$) | Standard deviation (S) | Coefficient of variation ($CV_{\%}$) |
| Total length trunk (cm) | 12,00 | 0,59 | 0,35 | 0,59 | 5 |
| Standard length trunk (cm) | 11,45 | 0,14 | 0,98 | 0,99 | 8 |
| Length statutory (cm) | 9,97 | 0,14 | 1,01 | 1,00 | 10 |
| Commercial length (cm) | 8,47 | 0,14 | 1,01 | 1,00 | 11 |
| Minimum height trunk (cm) | 3,90 | 0,14 | 1,02 | 1,00 | 25 |
| Maximum height trunk (cm) | 5,45 | 0,14 | 1,02 | 1,00 | 18 |
| Large perimeter trunk (cm) | 11,47 | 0,14 | 1,01 | 1,00 | 8 |
| Small perimeter trunk (cm) | 7,54 | 0,14 | 1,02 | 1,02 | 13 |
| Thick trunk (cm) | 5,37 | 0,14 | 1,02 | 1,00 | 18 |
| Caudal peduncle length (cm) | 3,70 | 0,14 | 1,02 | 1,00 | 27 |
| Head length (cm) | 3,70 | 0,14 | 1,02 | 1,00 | 27 |
| Dorsal fin length (cm) | 5,39 | 0,14 | 1,02 | 1,00 | 18 |
| Length of ventral fin (cm) | 3,57 | 0,14 | 1,02 | 1,00 | 28 |
| Anal fin length (cm) | 3,45 | 0,14 | 1,02 | 1,00 | 28 |
| Caudal fin length (cm) | 4,67 | 0,14 | 1,02 | 1,00 | 21 |
| Body weight (g) | 30 | 2,23 | 25 | 5 | 17 |

Percentage, standard length is about 95.4% of the total body length of juveniles, that is, in absolute terms, it is contained in about 1.05 times.

The other two lengths of particular importance for the recovery of fish consumption, both by angling and by fishery harvest had an average value of approximative 10 cm - statutory length and approximative 8.5 cm - commercial length. Expressed in relative values of total body length, length of statutory (distance measured from the middle of the eye to the tip of the caudal fin) is about 83.1%, and commercial length (distance measured from the middle of the eye to the point posterior anal fin base) is about 70.6%. The spread of values around the mean is reduced, as evidenced by the low estimated error accompanying central variables analyzed ($S_{\bar{x}}$=0.14).

Depth trunk was assessed by two measurements, ie the distance measured in the highest place of the trunk (about in the middle), which gives the maximum height dimension of the body youth and the distance measured in the region where the depth is less (caudal peduncle), distance expressing the minimum height of the body.

The values shown in Table 2, shows a ratio of 1.4 : 1.0 in favor of maximum height (5.5 cm to 3.9 cm), a result that indicates a defining characteristic of Frăsinet carp, namely, the body is muscular and stocky with convex top line, which features begin to emerge even in summer I rise.

Comparing the heights of the total body length youth, it is found that the maximum height is about 2.2 times includes long and a minimum height of about 3.1 times (on average comprise both heights are about 2.6 times). The results are comparable to the minimum provided by Bud I. (1988), which sets the values of the size of average height and body length of 1.0/3.1-1.0/4.2, adult specimen carp. Lower values determined for the population analyzed in this study are normal, because it's summer youth age category I.

For both dimensions of height (especially for minimum depth), the population of medium to large heterogeneity showed a coefficient of variation values showing 18-25%.

Analysis of body circumference, i.e. large perimeter measured at the maximum height of the body and the small perimeter determined by surrounding the body with ribbon at the caudal peduncle, suggesting good development in breadth and robustness of both the trunk and the third body segment (about 11.5 cm, respective about 7.5 cm).

As a result, small perimeter is about 65.2% of the largest perimeter, that is, in absolute terms, it comprises about 1.5 times that. In terms of variability for both traits (perimeters) population study showed a small to medium uniformity ($CV_{\%}$ = 8-13%).

Compactness body is emphasized by the high value of the character body thickness (5.4 cm), measured between the points where convexity is greatest. This attribute is less than about 2.1 times the perimeter of the large and small compared to the perimeter of about 1.4 times. Caudal peduncle showed the same average length of the head (3.7 cm), representing about 31% of total body length of juvenile (1/3.2).
Of fins, the longest presented a dorsal (5.4 cm), followed by the caudal (4.7 cm), ventral and anal (about 3.5 cm). In all cases, population heterogeneity was evident ($CV_{\%}$=18-28%).
In conclusion, for all analyzed traits except body length and large trunk perimeter, the population is quite heterogeneous, mainly due to parasitic diseases occurring throughout the period studied, the growth ponds. The occurrence of different parasites and net left its mark on both the homogeneity of most body size and the quantity of fish produced in fish harvest.
Analytical examination of the exterior which involves assessment of each region somatoscopic body in terms of shape, size, direction, catching the neighboring regions, highlighting any defects and diseases, must be completed exam synthesis. This examination aims assessment body development, body size and overall harmony. The harmony of the whole is determined by the quality of constitutive parts of the body, the quality of body regions, the way their joint and proportional development.
To assess the overall harmony, besides visual examination is necessary to study body proportions, size relationships between different regions, using for this purpose the results of measurements of body (previously presented and interpreted as absolute values) introduced formulas that are body indexes. Main body indices calculated values for Frăsinet summer I carp category, are presented in Table 3.

*Table 3.* The main body indexes values for Frăsinet carp summer I, 2011

| Specification | Number of individuals measured | Body index value |
|---|---|---|
| Fattening Index | 50 | 2.0% |
| Profile Index | 50 | 2.1 |
| Quality Index | 50 | 0.99 |
| Thickness Index | 50 | 47.0% |
| Carnosity Index | 50 | 32.3% |

*Fattening Index*: {body weight/(Standard length trunk)$^3$} x 100 = {30/(11.45)$^3$} x 100 = 2.0%
*Profile Index* = {Standard length body / Maximum height body} = 11.45/5.45 = 2.1
*Profile Index* = {Standard length body / Maximum height body} = 11.45/5.45 = 2.10
*Quality Index* = Standard length body / Large trunk perimeter = 11.45/11.47 = 0.99
*Thickness Index* = (Thickness trunk / Standard length trunk) x 100= (5.37/11.45) x 100= 47.0%
*Carnosity Index* = (Caudal peduncle length or head / Standard length trunk) x 100 = (3.7/11.45) = 32.3%

## CONCLUSIONS

The average weight of Frăsinet carp juveniles about 20 days old when transferring in growth summer I ponds (May-June) ranged from 0.2-1.0 g/fish, at the end of growth, autumn juveniles the summer I average weight reached 40-90 g/fish.
Populating density varied depending on the type of pond and the increase in monoculture or polyculture: 25000 - 80000 Frăsinet juveniles per hectare when practicing monoculture (years 2009, 2011), 20000-100000 Frăsinet juveniles per hectare option of applying polyculture (77.0% Frăsinet carp, 7.0% grass carp -*Ctenopharingodon idella* and 16.0% silver carp - *Hypophthalmichthys molitrix*, in 2010). Control fishing conducted bimonthly, showed good growth intensity of carp summer I Frăsinet according pond, the total average increase of growth of the populating fishing ponds to harvest being 39.8 - 89.7 g/fish 2009 (body weight increased by 199-299 times), 69.8 - 89.8 g/exemplary in 2010 (+ 349-449 times) and 74.0 - 89.0 g/exemplary in 2011 (+74 times).
The main phenotypic characteristics of Frăsinet carp summer I appreciated somatoscopic and somatometric in July 2011 clearly differ from those of native carp population, especially in terms of body lengths (total length 12.0 cm and length standard 11.5 cm), maximum body height (5.5 cm), high perimeter 11.5 cm, 5.4 cm thick trunk, caudal peduncle length 3.7 cm.
For all traits analyzed except large perimeter and lengths summer I Frăsinet carp is quite

heterogeneous (coefficient of heritability of 13-28%), mainly due to parasitic diseases occurring in 2011.

In the summer I had exemplary of carp Frăsinet harmonious conformation and good body proportionality, demonstrated good values of body indices.

In general, during the years examined the health status of fish material was good, except in 2011, when the control fishing conducted in July, was found the presence of ectoparasites *Lerna sp*. and *Eritrodermatita*, controlled by medication.

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