RESEARCH ABOUT HERITABILITY OF SOME TRAITS IN FRASINET, INEU AND ROPSA CARP BREEDS

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For any characterization of an animal population to be as complete as possible, the overall study of the particular population by analyzing the quantitative traits with biometric genetics, is essential.

The knowledge of heritability represents an important factor in all the improvement programmes; this importance derives from the fact the this parameter explains the correlation between the phenotype and improving value. With that point of view, the present work is to estimate the heritability for more traits into a pattern of three different breeds of carp individuals, Frasinet, Ineu and Ropsa. The studied traits was represented by: body weight, length, utmost height, H/l proportion and the rapidity of the rising process.

1. MATHERIAL AND METHOD

The biological stuff used in this experiment derives from the Dambovita district, "Fish Breeding Research Station", Nucet. It is composed by a group of individuals of three different carp breeds: Frasinet, Ineu si Ropsa.

The research was made on: 10 crofts of one summer age (0+) sapling, provided by ten families, a family being formed by a female and two males; 5 crofts of two summers (1+) sapling, provided by five of the ten families took for studying in the first summer.

In this research we used the variant's analysis method with two sources of variation. For finding the constituents of the different variation sources, we made the variant's analysis table (table 1).

Table 1

Variant's analysis ad two variation sources type

Variation source	Degree of freedom	Square sum	Square average	The variant
Between groups (I)	$GL_I=p-1$	$SP_I=\Sigma C-C_T$	$MP_I=SP_I/GL_I$	$V_I=(MP_I-MP_i)/n$
Into the group (i)	$GL_i=N-p$	$SP_i=\Sigma P^2-\Sigma C$	$MP_i=SP_i/GL_i$	$V_i=MP_i$
The sum (T)	$GL_T=N-1$	$SP_T=\Sigma P^2-C_T$	$MP_T=SP_T/GL_T$	$V_T=V_I+V_i$

in which: p = the number of groups (levels of the studied factor); N = the total number of observations; n = the average size of the group (of the brothers or halfbrothers family), N/p; ΣC = the sum of corrections on groups; ΣP^2= twice the sum of individual values; CT = total corrections.

With the square average we estimate the value of each source of variation, this being the observational constituents of variant ($S_F^2 = V_T$; $S_M^2 = V_I$; $S_e^2 = V_i$). On the basis of this values we persuade then the causative constituents of variant:

$V_F = S_F^2$ (V_F – variant of fenotype);

$V_A = 4 \cdot S_M^2$ (V_A – variant addition);

VM = VF – VA (VM – variant environment).

The outcome of fixing the degree of resembling between two individuals and estimating the constituents of variant, are useful for pointing the variation sources also, which are important for analysing the obtained yield and mostly to calculate the genetic parameters of populations and quantitative traits (heritability, repeatability and correlation).

Heritability is one of the most important genetic parameters of quantitative traits. The method used for establishing the heritability (noted h^2) of different traits, is in our case, based on the analysis of variant's constituents, which divides genetic variant from the entire variant, to make possible calculating the VA/VF = h2 ratio. In the variant analyse we used the halfbrothers groups method, which is the halfbrothers are groups of individuals with a common genetic matter provided by one of the parents, this common genetic matter beeing the same for all halfbrothers from the group.

This method is for dividing the genetic variant from the entire variant; the purpose was to identify the following variation sources:

- the inner halfbrothers groups variant, measured by the mothers and the environmental variant;

- the variant between halfbrothers groups, measured by the genetical variant of the males, and the inner halfbrothers groups variant.

The accuracy of estimating the heritability (standard digression of heritability) is very important for studying the heritability traits. The accuracy of one estimation depends on the test variant, meaning that, the lower variant is, the higher the accuracy of estimation will be.

The estimation of heritability error was peformed by using the Robertson's simplified method:

$$s_h^2 = (h^2 + \frac{4}{n}) \times \sqrt{\frac{2}{s}}$$, in which:

s – is the number of the families,

n – is the average size of this families.

The lower „s" 's and „n" 's values are, the higher the error of heritability is, and if the number of the used families, as much as the average size of those is high, the standard deviation of the heritability is low.

2. Research results

From the offspring of each breed was held back and introduced for breeding in first summer, ten lots of larvas of five days old provided from ten mothers. The lots was grown in folds, in the same fish pond, being under the same environment conditions. At the fishing was obtained the data presented into the table 2.

Table 2

Mean notable feats at one summer age old (0+) of the analysed effectives for Frasinet, Ineu, Ropsa breeds

Traits	N	$\overline{X} \pm s_{\overline{X}}$	S	CV%
Frasinet 0+				
Body weight (g)	100	39,24 ± 1,02	10,19	25,96
Body lenght (mm)	100	103,37 ± 0,95	9,53	9,22
Maximum hight (mm)	100	41,57 ± 0,40	3,99	9,59
H/l ratiol	100	40,22 ± 0,14	1,40	3,49
Ineu 0+				
Body weight (g)	100	25,35 ± 0,50	5,02	19,82
Ropsa 0+				
Body weight (g)	100	35,93 ± 0,78	7,83	21,80

Analysing this results, we fiind that the traits values took in the study are between the standard limits for each breed. So, for body weight, trait which was studied in all three breeds, we found that the highest mean value is in Frasinet(39,24g ± 1,02), follwed then by Ropsa (35,93g ± 0,78) and Ineu (35,93g ± 0,78).

The fluctuation coefficient of this trait has high values, which shows a great ununiformly of the lots. For the other characters, its values are lower.

Knowing that at the finish of the first growth period, the morphologycal breed traits are stumped, it requires carring on the research in the following years. In the second summer of growing, has been analysed five lots from each breed; in the table 3 are presented the obtained results.

Table 3

Mean notable feats at one year and a summer age old (1+) of the analysed effectives for Frasinet, Ineu, Ropsa breeds

Caracterul	$\overline{X} \pm s_{\overline{X}}$	S	CV%
0	1	2	3
Frasinet 1+			
Body weight (g)	505,00 ± 14,99	105,98	20,99
Body lenght (mm)	251,78 ± 2,83	20,04	7,96
Maximum hight (mm)	105,30 ± 1,12	7,89	7,49
H/l ratiol	45,93 ± 0,28	1,98	4,31
Speed of growth (g/zi)	1,28 ± 0,04	0,27	20,84
Ineu 1+			
Body weight (g)	594,48 ± 17,25	121,95	20,51
Body lenght (mm)	249,62 ± 2,82	19,94	7,99
Maximum hight (mm)	114,56 ± 1,35	9,53	8,32
H/l ratiol	46,51 ± 0,85	6,04	12,99
Speed of growth (g/zi)	594,41 ± 17,25	121,95	20,52

0	1	2	3
Ropsa 1+			
Body weight (g)	620,80 ± 14,34	101,40	16,33
Body lenght (mm)	304,80 ± 2,44	17,23	5,65
Maximum hight (mm)	96,32 ± 0,85	6,00	6,23
H/l ratiol	31,59 ± 0,12	0,84	2,65
Speed of growth (g/zi)	620,70 ± 14,34	101,38	16,33

The data from the table 2 mean that the average of weight realised by the Ropsa breed was the highest, of 620,80g ± 14,34, follwed by Ineu breed, with 594,48g ± 17,25 and Frasinet, with 505,00g ± 14,99. We established that the breeds with a high body, Frasinet and Ineu, realised in the second summer, values of growth lower then Ropsa breed, in the same conditions of environment and food. That is because the improved breeds are more exigent regarding the food conditions, more especially at the protein content. Ropsa breed gets high weight values, manifesting a good capacity of turning to good account of the food and natural resources at this age, a better rusticity and vigorousity.

After the calculation of the observational and causal constituents of variant was established the heritabilities for the main studied traits, in all the three breeds and for the two ages (table 4, 5).

Table 4

Heritability values and its errors for the studied traits at one summer age old in Frasinet, Ineu and Ropsa breeds

No. crt.	**Trait**	**$h^2 \pm S_{h^2}$**
Frasinet 0+		
1.	Body weight (g)	0,20 ± 0,27
2.	Body lenght (mm)	0,21 ± 0,27
3.	Maximum hight (mm)	0,32 ± 0,32
4.	H/l ratiol	0,30 ± 0,31
Ineu 0+		
1.	Body weight (g)	0,35 ± 0,34
Ropsa 0+		
1.	Body weight (g)	0,21 ± 0,27

The body weight at the age of one summer has a value which take this trait in the category of the weak to medium heritable The Frasinet and Ropsa breeds and in the sort of the intermediate heritable for Ineu breed. So, the weight at the age of one summer has values of 0,21 ± 0,27 in Frasinet, 0,21 ± 0,27 in Ropsa and 0,35 ± 0,34 in Ineu breed. Because of expressing the heritability the proportion of the entire variant, which can be assigned to the average effect on genes, we can say that the body weight at the age of one summer has a weak to medium genetic determinism in Frasinet and Ropsa, and medium in Ineu breed.

In Frasinet breed, body lenght has a weak to medium genetic determinism, while „body hight" and „ H/l ratio" have a medium genetic determinism.

Table 5

Heritability values and its errors for the studied traits at the age of one year and a summer in Frasinet, Ineu and Ropsa breeds

No. crt.	Trait	$h^2 \pm S_{h^2}$
Frasinet 1+		
1.	Body weight (g)	0,24 ± 0,40
2.	Body lenght (mm)	0,22 ± 0,39
3.	Maximum hight (mm)	0,13 ± 0,34
4.	H/l ratiol	0,37 ± 0,49
5.	Speed of growth (g/zi)	0,35 ± 0,47
Ineu 1+		
1.	Body weight (g)	0,25 ± 0,41
2.	Body lenght (mm)	0,50 ± 0,57
3.	Maximum hight (mm)	0,07 ± 0,30
4.	H/l ratiol	0,40 ± 0,50
5.	Speed of growth (g/zi)	0,20 ± 0,38
Ropsa 1+		
1.	Body weight (g)	0,25 ± 0,41
2.	Body lenght (mm)	0,27 ± 0,43
3.	Maximum hight (mm)	0,26 ± 0,42
4.	H/l ratiol	0,14 ± 0,34
5.	Speed of growth (g/zi)	0,24 ± 0,41

In all the three fish breeds, „body weight" obtained at the age of one year and a summer, is an intermediate heritable trait, with heritability values between 0,20-0,40. In the same sort is also the „body lenght" trait for the Ropsa and Frasinet breeds; we found a higher heritability value in Ineu breed, where this trait has a powerful genetic determinism.

The trait „maximum hight" is a weak heritable trait in the breeds with the arcuate line of back, Ineu and Frasinet, and intermediate heritable in Ropsa. As for the „H/l" ratio, in which the heritability has values that place it in the category of the intermediate heritable traits, for Ineu and Frasinet, and in the sort of the weak heritable ones, for Ropsa.

The „speed of growth", for all the three breeds, is in the group of intermediate heritable traits.

3. Conclusions

The present study led to the following conclusions:

Ø The mean notable feats of the ten lots from each breed took for study in the first summer of growth, is between the standard limits of the each breed.

Ø The high body breeds, Frasinet and Ineu realised in the second summer, lower growth indexes then Ropsa, in the same environment and food conditions.

Ropsa breed gets high values for weight, proving a good capacity of turn to good account the food and natural resources, a better rusticity and strenght.

Ø The highest „body weight" heritability at the age of one summer is for Ineu breed (0,35); the other two breeds gets values of: 0,20 for Frasinet and 0,21 for Ropsa.

Ø At the three breeds, „body weight" obtained at the age of one year and a summer, is un intermediate heritable trait, having the heritability values between 0,20-0,40. In the same category is the „body lenght" trait also, for the Frasinet and Ropsa, being a higher heritability value for Ineu breed.

Ø „Maximum hight" trait is a weak heritable trait for the breeds with an arcuate dorsal line of the body, Ineu and Ropsa respectively, and intermediate heritable for Ropsa.

Ø „H/l" ratio has values of heritability which place it in the sort of the intermediate heritable traits, for the breeds with an arcuate dorsal line of the body, Ineu and Frasinet respectively, and Ropsa breed, in the sort of the weak heritable ones.

Ø As for the „Speed of growth" we can say that all the three breeds are in the group of the intermediate heritable traits.

Ø "Maximum hight" is the only trait analysed, about which there are no data in the speciality literature. The results obtained in the second summer growth indicated that it is a weak heritable trait in Ineu and Frasinet, and intermediate heritable trait, in Ropsa breed.