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GROWTH OF DIFFERENT FORMS OF CARP (CYPRINUS CARPIO L.) IN KISKÖRE STORAGE-LAKE

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Abstract

Carps in Kisköre storage-lake (newly called the Tisza-lake) can be classified in three groups on the basis of their profile index (P_i: ratio of body length to body hight). The most widespread form is the usual wild carp characterized by a medium hight spine arch (P_i: 2,8—3,5), but beside it the low spine arch rangy carp ($P_i > 3,5$) and the markedly high spine arch culture-carp ($P_i < 2,8$) can be found as well.

No significant differences have been found in the longitudinal growth of the three forms. However, the wild forms are lagging behind in gain of weight as compared to the culture ones. Irrespective of this in natural waters the maintenance of wild forms in the first place seems to be justified, on the one hand because of their excellent sport characteristics (when hooked they struggle vigorously and persistantly), and on the other hand because they preserve the genetic diversity of the species. Supplementing or increasing of the carp population in the storage-lake is to be solved in the future preferably by propagation of wild carps in it and not by introducing culture ones as practiced formerly.

Introduction

Carps in Kisköre storage-lake (newly called the Tisza-lake) can be classified in three groups on the basis of their profile index (P_i) defined as the ratio of body length to body hight. The most widespread form is the usual wild carp characterized by a medium hight spine arch (P_i: 2,8—3,5), but beside it the low spine arch, so-called rangy carp (*C. c. morpha hungaricus* HECKEL; $P_i > 3,5$) and the markedly high spine arch culture-carp (*C. c. morpha acuminatus* HECKEL; $P_i < 2,8$) can be found as well.

While in a previous paper (HARKA 1988) the average growth of the carp population comprising the above three forms was investigated, the present paper deals with the growth of these forms separately.

Materials and Methods

In the study the data of 65 scaly carps caught between 1985 and 1987 in the north-eastern basin of the Tisza-lake, in the vicinity of Tiszafüred and Poroszló, were used. The body length of the specimens investigated ranged between 320 and 600 mm, and their body weight between 950 and 4780 g.

The age of the specimens was determined on the basis of scalimetric analysis according to LEE (1920). Bertalaffy's matematical model (BEVERTON and HOLT 1957, GULLAND 1963) was used for description of growth as suggested by DICKIE (1971). The relation between the body length and body weight was determined according to TESCH (1971).

Results

The profile index of the specimens studied varied between 2,32 and 3,86, the average value being 3,20. The frequency showed nearly normal distribution (Fig. 1). The occurrence of the three forms was as follows: 20,00% rangy carp, 69,23% usual wild carp, 10,77% culture-carp.

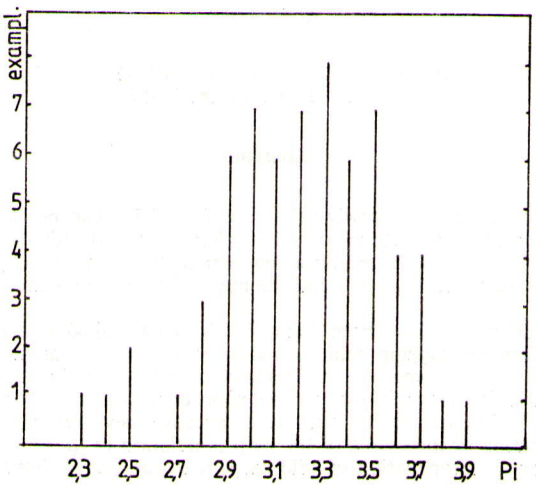

Fig. 1. Frequency distribution of profile indexes (P_i) of the specimens studied

1. Longitudinal growth

The following relations were obtained for the body length of carps at the age of "t" years (L_t: standard body length in mm):

a) rangy form $L_t = 823[1-e^{-0,1692(t-0,24)}]$

b) usual form $L_t = 886[1-e^{-0,1423(t+0,07)}]$

c) culture form $L_t = 929[1-e^{-0,1287(t+0,15)}]$ $(e = 2,718)$

To make the comparisons easier the expected body length was calculated for different ages and summarized in Table I. It can be seen that for age groups between 1 and 10 years no significant difference exists in the body length for the three forms. In this respect the three forms are of nearly equal value.

2. Relation between body length and body weight

The relation between body length (standard length: L_c) and body weight (w) is described by the lineary transformed function suggested by TESCH (1971)

$$\lg W = a + b \lg L_c$$

using the following equations:

a) rangy form $\lg W = -5{,}1188 + 3{,}1567 \lg L_c$

b) usual form $\lg W = -4{,}6095 + 2{,}9917 \lg L_c$

c) culture form $\lg W = -4{,}1351 + 2{,}8495 \lg L_c$

where body weight is given in *g* and body length — in mm.

Gradual changes are observed in the equation parameters. The value of constant "b" is the highest for rangy form, indicating the highest growth rate, however, for this form the value of constant "a" is the lowest, showing the lowest starting weight (Fig. 2). This initial drawback can not be overcome completely even at the symptotic body length (823 mm).

3. Body weight gain

The expected body weights at different ages are calculated from the data on body length summarized in Table 1 using the relation between body length and body weight described above (Table 2). Contrary to the results obtained for body length

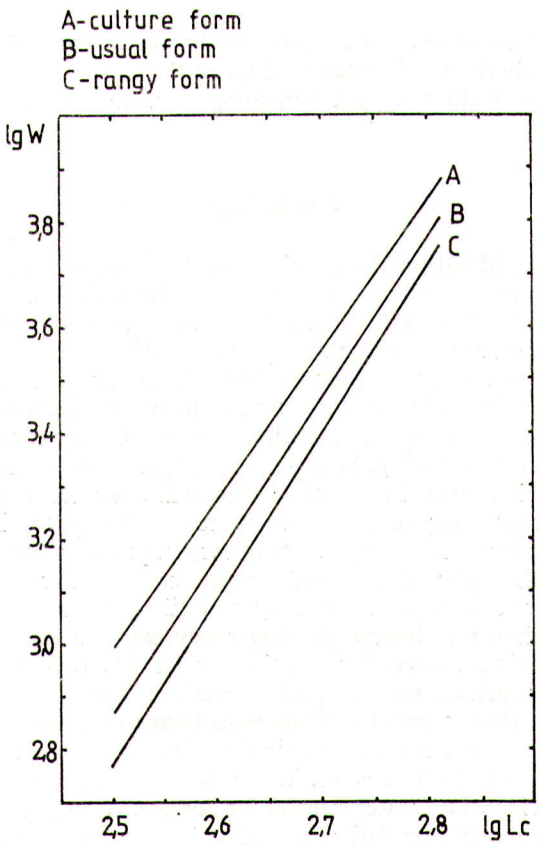

Fig. 2. Relation between body length (L_c) and body weight (W) for different forms (A: culture form, B: usual form, C: rangy form)

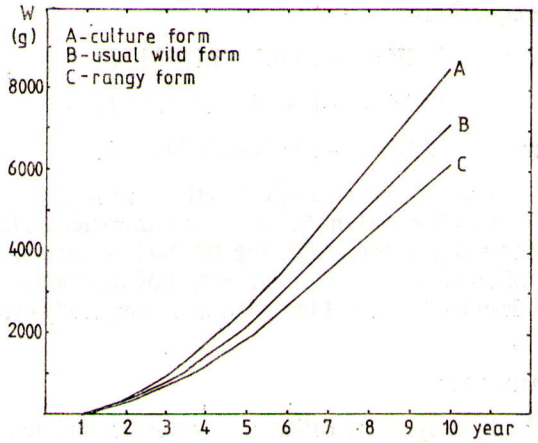

Fig. 3. Gain in body weight (W) in different forms (A: culture form, B: usual wild form, C: rangy form)

there are significant differences in expected body weight for different forms. From the curves showing body weight growth (Fig. 3) the advantage of the culture form and the disadvantage of the rangy form in comparison to the usual wild carp become obvious.

Conclusions

Taking into consideration the small number of specimens studied, the results can be considered only as preliminary information. Its reality, however, is supported by the fact that the present findings are in a good agreement with previous results involving a higher number of specimens (HARKA 1988).

Thus the body length growth for the three forms does not differ significantly, contrary to the gain in body weight showing differences increasing with age. Or, put in a different way, the specimens belonging to different forms reach the same body weight at different ages. E.g. body weight of specimens belonging to the culture form exceeds 6 kg already at the age of 8 years, while for those of the usual form it occurs at 9, and for the rangy form — only at the age of 10 years. It should be noted, however, on the one hand that the majority of carp population belongs to the younger age groups, where the differences are smaller, and on the other hand the draw-backs of the wild forms are only relative, since e.g. the wild carps in the Körös backwaters grow even slower than the slowest growing rangy carps in the Tisza-lake (TALAAT and OLÁH 1986). This statement is not valid for the first two years of life, but this fact is of no significance, since the specimens did not reach yet the catching size.

In spite of the slower growth of the wild forms still they are more valuable, not only because they preserve the genetic diversity of the species but also because of their excellent sport characteristics. When hooked they struggle vigorously and persistantly, thus being of a greater interest for anglers. At present the supplementing and increasing of the carp population is achieved by introducing culture carps from fish-farms, however, in the future it is desirable to use for the purpose wild carps propagated at the spot.

Table 1. *Longitudinal growth of different carp forms in the Tisza-lake*

Age in years	Body length in mm		
	rangy form	usual form	cultureform
1	99	125	127
2	212	226	225
3	307	314	310
4	387	390	384
5	455	455	450
6	512	512	508
7	561	562	559
8	602	605	604
9	636	642	643
10	665	675	677

Table 2. *Gain in body weight in different carp forms*

Age in years	Body weigth in g		
	rangy form	usual form	cultureform
1	15	46	72
2	168	271	369
3	540	725	921
4	1122	1387	1694
5	1870	2200	2662
6	2714	3132	3761
7	3621	4139	4939
8	4524	5160	6158
9	5381	6163	7360
10	6194	7160	8524

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A ponty (Cyprinus carpio L.) különböző formaváltozatainak növekedése a Kiskörei-tározótóban

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Kivonat

Profilindex (Pi: a standard testhossz és a testmagasság hányadosa) alapján a Kiskörei-tározótó (újabb nevén Tisza-tó) pontyai három csoportba sorolhatók. Leggyakoribb változat a mérsékelten magas hátú közönséges vadponty (Pi: 2,8—3,5), de előfordul az alacsony hátú nyurgaponty (Pi: nagyobb 5,5-nél) és a kifejezetten magas hátú nemesponty is (Pi: kisebb 2,8-nél).

Hossznövekedésben a három formaváltozat között nem mutatkozott lényeges eltérés, tömegnövekedésben azonban a vad formák elmaradnak a kultúrforma mögött. A természetes vizekben mégis indokolt a vad formák fenntartása, ugyanis ezek kiváló sporthalak (horogra akadva kitartóan és erősen küzdenek), másrészt a faj genetikai változatosságának őrzői. A tározótó pontyállományát jelenleg tógazdasági nemespontyokkal pótolják, illetve növelik, a jövőben azonban célszerű lenne ezt a vadpontyok helyben történő szaporításával megoldani.

РОСТ ОТДЕЛЬНЫХ РАЗНОВИДНОСТЕЙ КАРПА (CYPRINUS CARPIO L.) В ВОДОХРАНИЛИЩЕ КИШКЕРЕ

А. Харка

На основании значений профильного индекса (P_i: отношение стандартной длины к высоте туловища) карпы, обитающие в водохранилище Кишкере (новое название — Тисское озеро), могут быть разделены на три группы. Наиболее распространенной разновидностью является обычный карп, характеризуемый умеренно-высоким сводом спины ($P_i = 2{,}8—3{,}5$), но встречаются также сазан с низким сводом спины ($P_i > 5{,}5$) и культурный карп с подчеркнуто высоким сводом спины ($P_i < 2{,}8$).

В отношении продольного роста между этими тремя разновидностями не было существенных различий, в то время как в отношении увеличения их массы дикие формы отставали от культурных. Несмотря на это в естественных водах обосновано разведение диких форм, с одной стороны в связи с их превосходными характеристиками с точки зрения спорта (попавшись на удочку они долго и усилено сопротивляются), а с другой — для сохранения генетической вариабельности вида. Для пополнения и увеличения популяции карпов в водохранилище в настоящее время используют культурных карпов, разводимых в рыбных хозяйствах; в будущем, однако, целесообразно перейти к разведению диких карпов в водохранилище.

Prirast varijantnih oblika šarana (Cyprinus carpio L.) u rezervoaru za vodu Kisköre

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Rezime

Prema profil-indeksu (Pi: kvocijent standardne dužine tela i standardne visine tela) šarani u rezervoaru za vodu Kisköre (novije ime je: Tisa-jezero) poređaju se u tri grupe. Najčešći varijanti su divlji šarani sa umereno visokim leđima (Pi: 2,8—3,5) ali nalazi se i suvonjav šaran sa nižim leđima (Pi: >5,5) i maloljuskavi šaran sa izrazito visokim leđima (Pi: <2,8).

Prema dužinu tela nije nađen izrazita diferencija, s druge strane, divlji šarani zaostaju sa rastom težine. U prirodnim vodama ipak je potrebno održati divlje varijante, jer ove su odlične sportske ribe (prilikom ulova teško daju svoje živote), a one prenose multivarijantne genetske osobine. Sastav šarana u rezervoaru naknađuju odnosno povećavaju sa maloljuskavim šaranima. U budućnosti bilo bi celishodno ovaj proces dopuniti sa množenjem divljih šarana na licu mesta.