

Chemical composition of spawns and milt in *Cyprinus carpio* populations from Ariniş fishery complex, Maramureş area

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Abstract. Chemical analyzes of carp (*Cyprinus carpio*) milt have been achieved because scientific literature is poor in information in this chapter, although the chemical composition of milt is as well important as spawns. The research was conducted on two carp populations from Ariniş fishery complex, Maramures, belonging to Lausitz and Galician varieties. We specify the populations are not pure breed because in our country, in both extensive and semi-intensive farms occurred crossbreeding that generated hybrids of different generations between Lausitz and Galician breeds. Chemical composition in terms of the percentage of water and dry matter ranges from 64.80% in carp spawns from Lausitz variety and 73.63% in carp milt from the same variety. Protein values are among 67.30% in carp milt from Lausitz variety and up to 74.38% in carp spawns from Galitian variety. Non-nitrogenous extractive substances are high percentage in spawns, with values among 13.45% and 15.37% compared with milt where rates are 4.57% and 5.14% in Galitian variety. Fat is double in percentage of dry matter at carp milt (16.48%) compared to the spawns that average 8.38%.

Key Words: Lausitz breed, Galitian breed, protein, fat, ash, dry matter.

Introduction. Chemical analyzes of carp (*Cyprinus carpio*) milt have been achieved because scientific literature is poor in information in this chapter, although the chemical composition of milt is as well important as spawns. Chemical investigations started from the idea that there are significant differences in the composition of carp spawns analyzed by various authors (Hadjinikolova 2008; Olivera–Novoa et al 2002; Hadjinikolova & Tshkov 1990; Taati et al 2010; Maljarevskaja & Birgher 1965). The research was conducted on two carp populations from Ariniş fishery complex, Maramures, belonging to Lausitz and Galician varieties. We specify the populations are not pure breed because in our country, in both extensive and semi-intensive farms occurred crossbreeding that generated hybrids of different generations between Lausitz and Galician breeds.

The purpose of this study is to trace the percentage of water and dry matter from carp spawns and carp milt of the two populations, as well as: protein, fat, ashes and non-nitrogenous extractive substances calculated in percentage of dry matter analysis. The results were compared with data from scientific literature, and chemical composition of carp spawns with the species of *Coturnix coturnix* (Japanese quail) to see quantitative and qualitative differences among the two poikylothermic species, one from water and other from land.

Material and Method. The biological material was collected in the reproduction period (20-25 May 2012) from Ariniş fishery complex, Maramures area, and then it was subjected to analysis: 1 g of spawns from each female (25 samples of Lausitz and 25 samples of Galitian breeds). From males we collected 0.5 ml carp milt/head, 20 samples of each variety. We elected this period of reproduction because oocytes are big (> 1 mm), and spawns can be extruded through a gentle pressure on them, being in stage four of maturation. During this time, in males there are distinguished very well lobules,

they are large and separated by interstitial tissue. Carp milt can easily get through the low pressure along the ventral side of the body cavity (Billard 1999; Horvath et al 2002). The samples have been separately placed in an oven at 105°C for 24 hours, to establish the percentage of water and dry matter. Proteins were determined by Kjeldahl quantitative method, fats by Soxhlet method and ashes by calcination at 550°C.

Results and Discussion. The general conclusion data, reflecting the chemical composition of the investigated group of eggs and carp spawn have been given in Tables 1 and 2.

Table 1

Chemical composition of spawns and milt from carp breeds

Specification	No	Water (%)	Dry matter (%)	Protein (%)	Fats (%)	Ashes (%)	Non-nitrogenous extractive substances (%)
<i>Spawns</i>							
Carp Lausitz*	25	64.80	35.20	72.50	10.40	3.65	13.45
Carp Galitian*	25	65.80	34.20	74.38	6.35	3.90	15.37
Average		65.30	34.70	73.44	8.38	3.78	14.41
Differences		-1.00	+1.00	-1.88	+4.05	-0.25	-1.92
Lausitz-Galitian							
<i>Carp milt</i>							
Carp Lausitz**	20	73.63	26.37	67.30	18.43	9.70	4.57
Carp Galitian**	20	68.35	31.65	70.21	14.52	10.15	5.14
Average		70.99	29.01	68.76	16.48	9.93	4.86
Differences		+5.28	-5.28	-2.91	+3.91	-0.45	-0.57
Lausitz-Galitian							

* females; ** males

Table 2

Chemical analysis comparison between spawns of carp and eggs of Japanese quail (*Coturnix coturnix*) (Oroian et al 2002a, 2002b)

Specification	No	Water (%)	Dry matter (%)	Protein (%)	Fats (%)	Ashes (%)	Non-nitrogenous extractive substances (%)
Carp spawns	50	65.30	34.70	73.44	8.38	3.78	14.41
Glair <i>C. coturnix</i>	25	88.06	11.94	81.23	-	1.23	17.54
Egg yolk <i>C. coturnix</i>	25	75.40	24.60	79.31	18.45	0.75	1.49

The average of the 25 samples of each variety of carp female analysis shows the percentage of water value 64.80% at Lausitz and 65.85% at Galitian lower than those found in Hadjinicolova (2008), where the average ranges between 65.57 and 68.83% according to the weight of carp female.

In our researches, spawns dry matter is 34.20% in Galitian variety and 35.25% in Lausitz variety, values comparable to those provided by Hadjinicolova (2008) which have values between 31.18% to 34.43%.

Protein reported on dry matter shows the superiority of 1.88% to Galitian variety compared to Lausitz variety which is 72.5%.

Spawns fat in Lausitz variety represents 10.40% from dry matter and in Galitian variety is 6.35% from dry matter.

Ashes is in the normal range between 3.65 and 3.90% and non-nitrogenous extractive substances are 13.45 respectively 15.37% of dry matter.

Differences observed between the two carp varieties which are living in the same environment with the same food type supplemented, having four summers and an average of 3.5 kg, we believe there are attributable to breeds origin, Galitian breed is more precocious than Lausitz breed, with good adaptability in all farms (Table 1).

Regarding carp spawns, chemical analysis revealed a percentage of 68.35% water in Galitian variety and 73.63% in Lausitz. The difference of 5.28% for the Lausitz carp cannot be attributed to sample error because we analyzed samples of 20 individuals from each variety.

Dry matter is 26.37% in Lausitz variety and 31.65 in Galitian variety.

Protein is expressed on dry matter: 67.30% in Lausitz variety and 70.21% in Galitian variety. Average of fat varies among 14.52% and 18.43% and ashes among 9.7% and 10.15%. If we analyze the differences of water and dry matter, we found that in carp milt the water quantity is superior with 5.69% and dry matter is inferior to spawns of the same species with 5.28%.

Protein has an average of 73.44% in spawns, and 68.76% in carp milt, where fats reaches to an average of 16.48% compared to 8.38% in spawns.

Large differences are detected in a chemical analysis and among non-nitrogenous extractive substances from spawns which achieve an average of 14.41% compared to 4.86% in carp milt (Table 1).

To Cyprinidae species is distinguished a higher dry matter compared with Japanese quail glair and egg yolk of protein is slightly lower and fats entirely lacking in glair (Table 2).

Conclusions. Chemical composition in terms of the percentage of water and dry matter ranges from 64.80% in carp spawns from Lausitz variety and 73.63% in carp milt from the same variety.

Protein values are among 67.30% in carp milt from Lausitz variety and up to 74.38% in carp spawns from Galitian variety.

Non-nitrogenous extractive substances are high percentage in spawns, with values among 13.45% and 15.37% compared with milt where rates are 4.57% and 5.14% in Galitian variety.

Fat is double in percentage of dry matter at carp milt (16.48%) compared to the spawns that average 8.38%.

The Cyprinidae species and Japanese quail are both poikylothermic, but there are significant differences in terms of chemical composition of eggs because of the different life environment.

References

- Billard R., 1999 Carp: biology and culture. Springer-Praxis Series in Aquaculture and Fisheries, Chichester, UK, 342 pp.
- Hadjinikolova L., 2008 Investigations on the chemical composition of carp (*Cyprinus carpio* L.), bighead carp (*Aristichthys nobilis* Rich.) and pike (*Esox lusius* L.) during different stages of individual growth. Bulgarian Journal of Agricultural Science 14: 121-126.
- Hadjinikolova L., Tshekov A., 1990 Chemical composition of carp (*Cyprinus carpio* L.) from different breeding strains. Journal of Animal Science 27: 75-79.
- Horvath L., Tamas G., Seagrave C., 2002 Carp and pond fish culture. 2nd edition. Fishing News Books, Blackwell Scientific Publications Ltd., UK, 154 pp.
- Maljarevskaja A. J., Birgher T. I., 1965. Biochemical composition of producers, eggs and larvae of gardon (*Rutilus rutilus heckeli*) and bream (*Abramis brama*). A Coll of Sci W., Institute of Hydrobiology, Kiev, pp. 5-34 [in Russian].
- Olivera-Novoa M. A., Olivera-Castillo L., MartinezPalacios C. A., 2002 Sunflower seed meal as a protein source in diets for *Tilapia rendalli* (Boulanger, 1896) fingerlings. Aquaculture Research 33(3): 223-229.
- Oroian T., Vlaic A., Cighi V., 2002a Some aspects concerning the egg production performances in two Japanese quail varieties. Buletinul USAMV Cluj-Napoca 57: 118-121.
- Oroian T., Vlaic A., Odagiu A., Paşcalău S., 2002b Chemical composition of eggs in two colour varieties Japanese quail. Buletinul USAMV Cluj-Napoca 57: 122-123.

Taati M. M., Jafaryan H., Mehrad B., Golpour A., 2010 Changes of ovarian fluid compositions and sperm quality parameters in koi (ornamental *Cyprinus carpio*) during spawning season. *ABAH Bioflux* 2(2):83-90.

Received: 25 October 2013. Accepted: 09 November 2013. Published online: 15 November 2013.

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How to cite this article:

Oroian T. E., Cighi V., Oroian R. G., Gavrilă V., 2013 Chemical composition of spawns and carp milt in *Cyprinus carpio* populations from Ariniş fishery complex, Maramureş area. *AACL Bioflux* 6(6):614-617.