

6. Лужин Б.П. Этапы развития личинок карпа // Рыбоводство и рыболовство. — 1976. — № 3. — С. 10–12.
7. Желтов Ю.О. Методичні вказівки з проведення дослідів з годівлі риб // Рибне господарство. — 2003. — Вип. 62. — С. 23–28.
8. Алексин О.А., Семенов А.Д., Скопинцев Б.А. Руководство по химическому анализу вод суши. — Л.: Гидрометеоиздат, 1973. — 262 с.
9. Сяра Я.И. Методические указания по гидрохимическим исследованиям в прудовых рыбных хозяйствах. — Львов: Изд-во “Вільна Україна”, 1978. — 17 с.
10. Плохинский Н.А. Биометрия. — Новосибирск: Изд-во Сибирск. отд. АН СССР, 1961. — 364 с.

ЭФФЕКТИВНОСТЬ ИСПОЛЬЗОВАНИЯ КОЖЕВЕННО-МЕЗДРОВОГО ПРЕПАРАТА В СОСТАВЕ СТАРТОВОГО КОМБИКОРМА ПРИ ПОДРАЩИВАНИИ ЛИЧИНОК КАРПА

Ю.А. Желтов, А.А. Алексеенко

Приведены результаты исследований влияния скармливания личинкам карпа влажного кожевенно-мездрового препарата (КМП) в составе стартовых комбикормов на эффективность их подращивания. Представлена сравнительная питательность зоопланктона и комбикормов с добавлением 10 и 20% КМП.

EFFICIENCY OF THE USE OF SCRAPINGS PREPARATION IN COMPOSITION THE STARTING FEEDSTUFF BY ONGROWING OF CARP LARVAE

Yu. Zheltov, O. Oleksiyenko

The results of researches of carp larvae feeding by moist scrapings preparation (SP) in composition the starting feedstuffs, and its influencing on efficiency of their on-growing are resulted. The comparative food value of zooplankton and feedstuffs with addition 10 and 20% SP is presented.

UDK 597-1.05:639.371.52

CARP FEEDING INFLUENCE ON HIGH FATT ACIDS PROFILE

K. W. glarzy^{1,2,3}, M. Ligaszewski¹, S. Krazhan⁴, J. Stekla², A. Pellar²

¹ National Research Institute of Animal Production in Cracow

² National Research Institute of Animal Production Experimental Station Grodziec Śląski

³ University of Bielsko-Biała

⁴ National Academy of Agrarian Sciences in Ukraine Institute of Fisheries in Kiev

The research has showed that the ponds with the same fertility used feeding had an influence on high fatty acids profile of carp meat. Content of examined fractions, therein the most important from consumer point of view MUFA and PUFA-3 together with EPA and DHA fractions was higher in carp fed with granulate with 60% of rape cake than in carp fed with crops. The dynamics of changes in HFA profile was much lower in experimental carps than in control carps.

Knowledge about high fatty acids (HFA) profile in carp muscle (*Cyprinus Carpio* L.) is still insufficient. It can be very important because fishes in human nutrition are adjusted mainly in a way of percentage of some fraction of polyunsaturated fatty acids in HFA profile of their meat, such as EPA (20:5 n-3) and DHA (22:6 n-3) fractions

of PUFA-3 (Kuza et al., 2006). In regard to biofuels consumption increment from renewable energy sources development there is an opportunity of carp feeding with granulate containing rape cake a by-product of biodiesel production (Węglarzy and Stekla, 2007). It was confirmed that some feeds have a strong influence on high fatty

acids profile in carp muscles (Hadji Nikola, 2004), as well as received plankton (Ligaszewski et al., 2007).

AIM OF THE RESEARCH

The aim of the research was evaluation of an influence of a granulate with 60% of high-protein rape cake containing 7–12% of crude oil in carp diet as well as ponds fertilization on HFA profile improvement in comparison to HFA profile in carp fed with crop.

MATERIAL AND METHODS

The research was carried out at two 2,5 ha ponds belonging to Experimental Station of National Research Institute of Animal Production in Grodziec Śląski, with 1000 pieces of carp from the last year of 3-years production cycle per hectare.

2008 — first year of research	2009 — second year of research
<i>First pond</i>	
<ul style="list-style-type: none"> fertilizing with 15 tons of cow dung feeding with crop 	<ul style="list-style-type: none"> feeding with crop
<i>Second pond</i>	
<ul style="list-style-type: none"> fertilizing with 15 tons of cow dung feeding with granulate 	<ul style="list-style-type: none"> feeding with granulate

From both ponds samples of 10 pieces of carp in July, August and October were taken and every two weeks samples of zooplankton and water for physicochemical analyses. Samples of granulate were also collected.

RESULTS

Statistically significant differences in MUFA content in carps from both ponds muscles were not noticed in first year of research. For carps from fertilized ponds statistically significant differences between HFA profiles of their muscle were noticed in summer and autumn, while in an experiment variant without fertilization — already in spring. Percentage of the most valuable HFA fractions — PUFA-3 and especially EPA and DHA fraction was statistically highly significantly higher ($P < 0,01$) in commercial carp from autumn catguts in both years from ponds fed with granulate comparing to carp fed with crops, despite seasonal decrement tendency from spring to autumn (Tab. 1). From spring to autumn percentage of MUFA fractions in muscle HFA profile was increasing very dynamically.

Lower diluted oxygen level in water from first pond in both years was noticed comparing to second pond.

Percentage of high fatty acids fraction

Fraction (% HFA)	Granulate + with rape cake	Zooplankton*		Carp muscle					
		first pond	second pond	first pond			second pond		
				spring	summer	autumn	spring	summer	autumn
<i>2008</i>									
SFA	9,9	31,8	32,7	29,2	27,3	25,1	28,9	28,4	26,3
MUFA	53,7	27,7	15,3	44,1	29,7	62,9	46,4	49,6	59,3
EPA	0,01	15,4	11,8	3,1	0,9	0,5	2,3	2,4	1,1
DHA	0,2	3,1	19,1	4,6	1,0	0,6	3,3	3,5	1,2
PUFA-6	27,4	8,1	12,4	14,3	7,3	7,5	14,1	11,9	8,7
PUFA-3	8,1	32,2	39,4	10,5	3,6	2,1	8,5	8,2	3,4
PUFA 6/3	3,38	0,25	0,31	1,7	2,6	2,6	1,4	2,6	3,7
<i>2009</i>									
SFA	9,9	46,2	41,0	33,7	30,8	29,8	34,1	32,0	26,6
MUFA	53,7	13,2	14,5	27,4	43,6	50,8	31,5	49,8	57,3
EPA	0,01	9,1	10,8	7,2	2,7	1,7	3,8	1,3	0,7
DHA	0,2	23,6	10,6	6,3	5,3	2,5	5,2	2,9	1,2
PUFA-6	27,4	0,5	10,3	14,0	11,4	9,9	20,0	10,1	9,7
PUFA-3	8,1	36,4	33,5	23,1	11,5	6,6	12,7	5,7	3,0
PUFA 6/3	3,38	0,01	0,31	0,61	1,74	1,6	1,72	1,96	3,20

* Results of research carried out on plankton collected in Grodziec Śląski by dr Stalina Krazhan.

DISCUSSION

Carried research allowed to conclude that carp from autumn catguts fed with granulate showed in average 10% better musculature.

Content of very valuable from consumer point of view fatty acids from PUF-3 group in muscle of commercial carp from autumn catguts oscillated from 3,3 to 6,6% in muscle from carp fed with granulate and only 2,1 to 3,0% in muscle from carp fed with crop. Stated differences were always statistically highly significant ($P < 0,01$) in favor of carp fed with granulate.

Consider high MUFA level in carps from both feeding systems, but simultaneously regularly higher level of valuable PUFA-3 fractions for both years in muscles of carp fed with granulate on the level of statistically significant differences ($P < 0,01$) it is proper to recognized that carp feeding with this granulate has an advantage-

ous influence on prohealthy meat properties.

Consider a possibility of variability of climatic and environment conditions in each year that together with feeding can influence HFA profile in carp muscles it is necessary to carried out research in the following production seasons.

CONCLUSIONS

Best results in HFA profiles in carp muscle were obtained in first year of research in first pond, fertilized with cow dung and fed with granulate.

Content of valuable acids from PUFA-3 group (EPA and DHA) was highly significantly higher in carps fed with granulate with rape cake comparing to muscle of carps fed with traditional crops.

High fatty acids profile in carp meat is as good for a consumer health as profile in sea fish meat.

REFERENCES

1. *Hadji Nikolova L.* The influence of nutritive lipid sources on the growth and chemical and fatty acid composition of carp (*Cyprinus carpio* L.) // Archives of Polish Fisheries. — 2004. — Vol. 12, Fasc. 2. — P. 99–110.
2. *Kuza K., Zapletal K., Pustkowiec H., Węglarz A., Skrzyński G.* The fatty acid composition of frozen klaps of Atlantic Herling (*Clupea harengus*) // Animal Sciences. — 2006. — Vol. 1. — P. 188–189.
3. *Ligaszewski M., Węglarz K., Pilarczyk A., Łysak A., Berezina M.* Relation between the profile of major fraction of unsaturated fatty acids in common carp meat (*Cyprinus carpio* L) in the second year of life and their profile in zooplankton // Polish Journal of Food and Nutrition Sciences, 2007. — Vol. 57, № 3 (A). — P. 77–81.
4. *Węglarz K., Stekla J.* Dlaczego klimatyczne być albo nie być. Referat na Konferencji Naukowo-Technicznej “Biopaliwa dźwignią postępu w rolnictwie”. — 2007. — P. 3–10.

ВПЛИВ ЖИВЛЕННЯ КОРОПА НА ВМІСТ ВИЩИХ ЖИРНИХ КИСЛОТ

К. Венгляржі, М. Лігашевські, С. Кражан, Ю. Стекла, А. Пеллар

Дослідження показало, що у водоймах з однаковою продуктивністю застосована годівля справляла вплив на вміст вищих жирних кислот м'яса коропа. Вміст досліджених фракцій, зокрема найважливіших з точки зору поживної цінності для людини мононенасичених і поліненасичених жирних кислот-3 з фракціями ейкозапентаєнової і декозагексаєнової кислот, був вищим у коропів, годівлю яких здійснювали гранульованим кормом з 60% вмістом ріпакової макухи, порівняно з тими, яких годували зерновими. Динаміка змін у складі вищих жирних кислот була набагато меншою в експериментальних коропів, ніж у контрольних.

ВЛИЯНИЕ ПИТАНИЯ КАРПА НА СОДЕРЖАНИЕ ВЫСШИХ ЖИРНЫХ КИСЛОТ

К. Венгляржи, М. Лигашевски, С. Кражан, Ю. Стекла, А. Пеллар

Исследование показало, что в водоемах с одинаковой продуктивностью применяемое кормление оказывало влияние на содержание высших жирных кислот мяса карпа. Содержание исследованных фракций, в частности наиболее важных с позиций питательной ценности для человека мононенасыщенных и полиненасыщенных жирных кислот-3 с фракциями эйкозапентаеновой и декозагексаеновой кислот, было выше у карпов, кормление которых осуществляли гранулированным кормом с 60% содержанием рапсового жмыха, по сравнению с теми, которых кормили зерновыми. Динамика изменений в составе высших жирных кислот была намного меньше у экспериментальных карпов, чем у контрольных.