ISSN 2518-1629 (Online),
ISSN 2224-5308 (Print)

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ
Өсімдіктердің биологиясы және биотехнологиясы институтының

Х А Б А Р Л А Р Ы

ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН
Института биологии и биотехнологии растений

N E W S

OF THE NATIONAL ACADEMY OF SCIENCES
OF THE REPUBLIC OF KAZAKHSTAN
of the Institute of Plant Biology and Biotechnology

SERIES
OF BIOLOGICAL AND MEDICAL

1 (331)

JANUARY – FEBRUARY 2019

PUBLISHED SINCE JANUARY 1963

PUBLISHED 6 TIMES A YEAR

ALMATY, NAS RK

«ҚР ҰҒА Хабарлары. Биология және медициналық сериясы».
ISSN 2518-1629 (Online),
ISSN 2224-5308 (Print)
Меншіктенуші: «Қазақстан Республикасының Ұлттық ғылым академиясы» РҚБ (Алматы қ.)
Қазақстан республикасының Мәдениет пен ақпарат министрлігінің Ақпарат және мұрағат комитетінде 01.06.2006 ж. берілген **№5546-Ж** мерзімдік басылым тіркеуіне қойылу туралы куәлік

Мерзімділігі: жылына 6 рет.
Тиражы: 300 дана.

Редакцияның мекенжайы: 050010, Алматы қ., Шевченко көш., 28, 219 бөл., 220, тел.: 272-13-19, 272-13-18,
http://biological-medical.kz/index.php/en/

Типографияның мекенжайы: «Аруна» ЖК, Алматы қ., Муратбаева көш., 75.

«Известия НАН РК. Серия биологическая и медицинская».
ISSN 2518-1629 (Online),
ISSN 2224-5308 (Print)
Собственник: РОО «Национальная академия наук Республики Казахстан» (г. Алматы)
Свидетельство о постановке на учет периодического печатного издания в Комитете информации и архивов Министерства культуры и информации Республики Казахстан **№5546-Ж**, выданное 01.06.2006 г.

Периодичность: 6 раз в год
Тираж: 300 экземпляров

Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28, ком. 219, 220, тел. 272-13-19, 272-13-18,
www:nauka-nanrk.kz / biological-medical.kz

Адрес типографии: ИП «Аруна», г. Алматы, ул. Муратбаева, 75

News of the National Academy of Sciences of the Republic of Kazakhstan. Series of biology and medicine.
ISSN 2518-1629 (Online),
ISSN 2224-5308 (Print)
Owner: RPA "National Academy of Sciences of the Republic of Kazakhstan" (Almaty)
The certificate of registration of a periodic printed publication in the Committee of information and archives of the Ministry of culture and information of the Republic of Kazakhstan N 5546-Ж, issued 01.06.2006

Periodicity: 6 times a year
Circulation: 300 copies

Editorial address: 28, Shevchenko str., of. 219, 220, Almaty, 050010, tel. 272-13-19, 272-13-18,
http://nauka-nanrk.kz / biological-medical.kz

Address of printing house: ST "Aruna", 75, Muratbayev str, Almaty

N E W S
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
SERIES OF BIOLOGICAL AND MEDICAL
ISSN 2224-5308
Volume 1, Number 331 (2019), 69 – 75 **https://doi.org/10.32014/2019.2518-1629.10**

E. V. Fedorov[1], N. S. Badryzlova[2], A. R. Lozovskiy[2]

[1]"Kazakh scientific and research institute of fishery" LLP, Almaty, Kazakhstan,
[2]"Astrakhan State University", Astrakhan, Russia.
E-mail: osztas@mail.ru ns_nina@mail.ru

THEMAIN CHEMICAL PARAMETERS OF WATER HABITAT BY BREEDING OF THE RUSSIAN STURGEON IN AGE FROM TWO-YEARS TO FIVE-YEARS IN ALMATY REGION PONDS OF KAZAKHSTAN

Abstract. The dynamic of values of pH of the aquatic environment of ponds and the oxygen content in the water of experimental fish pondsare presented in numerical execution. Descriptions of observable facts of pH dynamic values of the aquatic environment of ponds are given. The minimal and maximal values of studied parameters of water habitat, coefficients of variation of values of studied parameters of water habitat during the fish-breeding season, authenticity of differences between the values of studied parameters of water habitat during one day for the concrete periods of time are presented. The equations of regression of studied parameters of water habitat during the fish-breeding season are shown. The conclusions in which all the results of work according to the theme of this article are given. The results of comparison of database with the analogical recommendations from foreign researches are presented.

Keywords: experimental ponds, fish-breeding in ponds, pH of water habitat, number of oxygen in water, dynamic of parameters of water habitat.

Introduction. In the period between 2008 - 2011 LLP "Kazakh Research Institute of Fisheries" conducted large-scale research on the development of biotechnical methods of commercial sturgeon farming in relation to the modern conditions of the Republic of Kazakhstan, in particular, the cultivation of large fish stock of sturgeon fish and their hybrids in the adapted ponds of carp fish farms, water supplied by mountain rivers, in conditions of fish farms of Almaty region.A Russian sturgeon is recognized as the most perspective object of sturgeons-breeding from the domestic sturgeon species.

Compliance of values of the parameters by aquatic habitats of fishes normative is a prerequisite in order to recommend those or others biotechnical methods of growing fish in specific conditions.

Studies of the aquatic environment are an integral part of researches of fishery.

The purpose of the researches is to track the dynamics of the main chemical indicators of aquatic environment of the Russian sturgeon with age from two-years to five-years (pH of the aquatic environment, oxygen content in the water of fish ponds supplied by water of mountain rivers) in fish-breeding farms in Almaty region.

Material and methods. There searches were heldin the fish-breeding farm of Almaty region of Kazakhstan.The ponds adapted for breeding the russian sturgeon in ages of two-years, three-years, four-years and five-years were used as an experimental (figure).

Sources of water supplyboth for all the pond farm and the experimental part of pond farm where the works were carried out were the mountain rivers Lavar and Bala-Teskensu flowing through the territory of Enbekshi-Kazakh district of Almaty region. The database of quality of water by the water supply which was the head pond of the farm supplied by the water of named rivers are presented in table 1.

According to the databaseoftheresearchesthewaterfromwatersupplyof the "Chilik ponds farm" in June according to the parameter of pH which was 7,40 was neutral, number of organic substances was non-high.

The experimental pond in the experimental part by "Kazakh scientific and research institute of fishery" LLP

Table 1 – Hydrochemical and toxicological parameters of water from water supply of the "Chilik ponds farm"

Parameters	Unit of measure	Values	
		in June	in September
pH	–	7,40	7,56
Permanganate oxidability	mg O/dm^3	4,0	3,2
Ammoniate	mg/dm^3	0,03	0,03
Nitrites	mg/dm^3	0,088	0,006
Nitrates	mg/dm^3	2,63	0,35
Phosphorus	mg/dm^3	0,01	0,004
Iron	mg/dm^3	0,05	0,06
Rigidity of water	mg-equiv./dm^3	5,6	5,4
Hydrocarbonates	mg/dm^3	317	305
Sulfates	mg/dm^3	110	107
Chlorides	mg/dm^3	26,9	21,3
Calcium	mg/dm^3	59,3	56,9
Magnesium	mg/dm^3	32,5	31,1
Sodium	mg/dm^3	40,3	60
Potassium	mg/dm^3	3,9	
Mineralization	mg/dm^3	590	580
Copper	mg/dm^3	0,0087	1,5
Zinc	mg/dm^3	0,0057	5,5
Lead	mg/dm^3	0,077	4,0

Number of the biogenicelementsinthewaterwasenoughforthe development of water plants. The ammoniates were founded in number of 0,03-0,05 mg/dm^3, mineral phosphorus – in number of 0,010 mg/dm^3. Concentrationofnitriteswas 0,088mg/dm^3, what is more than the limited concentration 1,1 times. Thenitrateswereinnumberof 2,63 mg/dm^3,whatisthehighvalue for the natural water basins. Numberofthecopper was 8,7 mcg/dm^3 what is more that the limited concentration 8,7 times. Cadmium was no founded in the water. Concentrationofthezincandtheleadwere less than the limited concentration.

Accordingtothedatabaseoftheresearchesthewaterfromwatersupplyof the "Chilik ponds farm" in September according to the parameter of pH which was 7,56 was neutral. Contentofcarbondioxidein period of researches was on the level of limited concentration (44 mg/dm^3). Number of the biogenicelementsinthewaterwasnon high. Thenitritesandthephosphorus were characterized of less values on level of 0,004-0,006 mg/dm^3. Theammoniatesandtheironwereanalogicalaccording to content in

limits0,03 and 0,06 mg/dm^3 respectively. Thenitrateswerefoundedinnumber 0,35 mg/dm^3. The copper was foundedinlimits of 1,5 of limited concentration, zinc in limits of 5,5 mg/dm^3, leadin limits of 4,0 mg/dm^3. That is less than limited concentration. Cadmiumwasnofoundedinthewater.

Accordingtotheions, according to classification by O.A. Alyokin this water is related to hydrocarbonate class, groupofcalcium, II type. Accordingtothetechnical properties which are characterized of summa of mg-equiv./dm^3 of calcium and magnesiumthe water ismoderatery hard with common hardness 5,6 mg-equiv./dm^3.

So, the water from water supply of the "Chilik ponds farm" in summer and autumn period propertied to the regulatory requirements which are presented to fishery reservoirs. This water is fresh, middle hard, with low content of organic substances and nutrients, with neutral reaction of water, relatively weakly contaminated with heavy metals.

The database show that with such indicators the quality of water from the water of Chilik ponds farm supply channel is likely to have a low bio-mass of food organisms. The water quality of the well complied with the requirements for fisheries purposes[1].

ThematerialbycarryingouttheresearchesaccordingtothethemeofthisarticlewerethevaluespHofwater environment, content of the oxygeh of water by experimental ponds using for two-years, three-years, four-years and five-years of the russian sturgeon.

Gotdatabasewasprocessedbythemethodsofbiological statistic [2].

The results and discussion of them. Thefeatures of dynamic of the parameters of hydrology and hydro chemical parameters in basins with one-years of russian sturgeon were studied earlier [3].

The values ofcontentofoxygeninthewaterofexperimentalpondsfor4 years of carrying out of researches (2008 – 2011) by breeding the different groups of russian sturgeon are presented in table 2.

Table 2 – Content of oxygen in the water of experimental ponds for the period 2008 – 2011thyears,mg/dm^3

Month	Decade	Years of carrying out the researches, age group of russian sturgeon				
		2008, 1+	2009, 2+	2010, 3+	2011, 4+	middle value
May	II	7,57±0,15	7,66±0,23	7,35±0,41	6,71±0,28	7,32±0,21
	III	7,17±0,13	7,24±0,27	7,87±0,39	7,81±0,40	7,52±0,18
June	I	8,44±0,23	7,59±0,29	7,45±0,25	7,49±0,31	7,74±0,23
	II	8,52±0,27	8,84±0,26	7,86±0,28	7,97±0,34	8,30±0,23
	III	8,38±0,19	9,42±0,23	8,89±0,31	8,76±0,29	8,86±0,22
July	I	8,87±0,14	9,52±0,20	9,57±0,28	9,65±0,27	9,40±0,18
	II	9,67±0,21	9,53±0,22	9,76±0,22	9,71±0,24	9,67±0,05
	III	10,45±0,27	10,68±0,19	9,69±0,24	9,74±0,26	10,14±0,25
August	I	10,14±0,22	9,97±0,18	10,80±0,34	10,28±0,29	10,30±0,18
	II	9,52±0,17	9,96±0,19	10,36±0,19	10,37±0,27	10,05±0,20
	III	9,70±0,13	11,17±0,20	10,12±0,19	10,27±0,25	10,32±0,31
September	I	10,28±0,25	10,90±0,19	11,09±0,19	10,83±0,21	10,78±0,17
	II	9,83±0,29	11,88±0,15	12,06±0,15	11,10±0,19	11,22±0,51
	III	10,03±0,21	11,26±0,21	11,46±0,21	10,27±0,16	10,76±0,36
October	I	10,09±0,19	10,95±0,18	10,81±0,14	9,59±0,15	10,36±0,32
	II	9,13±0,17	9,28±0,16	9,39±0,12	9,48±0,11	9,32±0,08

Valueofthecoefficientofvariationbycontentofoxygeninthewaterofexperimentalpondsbyresearchesofperennialdynamicsofthisparameterwasless than 9,04%.

The significant differences ($p<0,001$) of valuesofoxygeninthewater of experimental ponds gotinthemorningandintheevening (1,79 mg/dm^3 (C_v = 6,59%) (IIIdecade of September - IIdecade of October) – 3,60mg/dm^3(C_v = 9,67%)(IIIdecade of July - Idecade of August)) during the period "IIdecade of May–IIdecade of September" (120 days, 60% of duration of the fish-breeding season (April – IIdecade of Octoberдекада)) was identified.

An equation of regression of the contentofoxygeninthewaterofexperimentalponds according to the database of researches of 2008th yearhas the form (R^2 = 0,842480):

$$y = 6{,}56802 + 0{,}60025\text{x} - 0{,}02602x^2 \quad (1)$$

An equation of regression of thecontentofoxygeninthewaterofexperimentalponds according to the database of researches of 2009th yearhas the form (R^2 = 0,821980):

$$y = 6{,}19955 + 0{,}75047\text{x} - 0{,}03035x^2 \quad (2)$$

An equation of regression of thecontentofoxygeninthewaterofexperimentalponds according to the database of researches of 2010th yearhas the form (R^2 = 0,824210):

$$y = 6{,}08852 + 0{,}72671\text{x} - 0{,}02789x^2 \quad (3)$$

An equation of regression of thecontentofoxygeninthewaterofexperimentalponds according to the database of researches of 2011th yearhas the form (R^2 = 0,895610):

$$y = 6{,}19214 + 0{,}72174\text{x} - 0{,}03104x^2 \quad (4)$$

Based on the kept resultsthemiddle equation of regression of thecontentofoxygeninthewaterofexperimentalponds was got (R^2 = 0,84607):

$$\text{y} = 6{,}15378 + 0{,}72409\text{x} - 0{,}03000\text{x}^2 \quad (5)$$

As a result of research was revealed afact thataccordingtotheparameterof content of oxygeninthewaterofexperimentalpondstheperiodfavorableforthebreedingofrussiansturgeoninagesoftwo-years, three-years, four-yearsandf0ve-yearsis“IIdecade of May – IIdecade of October” (150 days). Minimal value ofthecontentofoxygeninthewaterofexperimentalponds(5,0 mg/dm^3) was marked in IIIdecade of May – Idecade of June later 15 – 30 days afterapplying the organic fertilizerson a dry bed, followed after 2 days flooding the ponds.

Generally according to the researches during 4 years the values of parameter of content of oxygen in the waterofexperimentalpondswere like the base of valuesrecommended by Russian scientists [4-22].

The values ofpH of water environment inthewaterofexperimentalpondsfor 4 years of carrying out of researches (2008 – 2011) by breeding the different groups of russian sturgeon are presented in table 3.

Table 3 – pH of water environment in the water of experimental ponds for the period 2008 – 2011thyears

Month	Decade	Years of carrying out the researches, age group of russian sturgeon				
		2008, 1+	2009, 2+	2010, 3+	2011, 4+	middle value
May	II	7,90±0,16	7,87±0,09	8,17±0,03	8,09±0,04	8,01±0,07
	III	7,83±0,17	7,50±0,06	7,97±0,09	8,02±0,06	7,83±0,12
June	I	7,83±0,12	7,53±0,15	7,60±0,10	7,81±0,09	7,69±0,08
	II	8,03±0,09	7,57±0,09	7,63±0,15	7,69±0,11	7,73±0,10
	III	8,67±0,17	7,47±0,09	7,67±0,09	7,63±0,10	7,86±0,27
July	I	8,40±0,05	7,43±0,03	7,57±0,09	7,56±0,10	7,74±0,22
	II	8,18±0,08	7,43±0,09	7,63±0,09	7,54±0,11	7,70±0,17
	III	8,60±0,13	7,30±0,06	7,50±0,06	7,49±0,07	7,72±0,30
August	I	8,07±0,15	7,30±0,06	7,40±0,06	7,42±0,07	7,55±0,18
	II	7,92±0,03	7,97±0,09	8,20±0,12	7,69±0,09	7,95±0,10
	III	8,67±0,11	8,03±0,09	8,17±0,07	7,91±0,06	8,20±0,17
September	I	8,30±0,14	7,90±0,06	8,17±0,09	8,01±0,06	8,10±0,09
	II	7,97±0,12	8,00±0,06	8,33±0,17	8,14±0,12	8,11±0,08
	III	7,85±0,12	7,87±0,09	8,23±0,12	8,21±0,11	8,04±0,10
October	I	7,78±0,15	7,96±0,06	8,25±0,11	8,24±0,12	8,06±0,11
	II	7,64±0,09	7,98±0,09	8,28±0,14	8,25±0,14	8,04±0,15

ThevalueofcoefficientofvariationbythepHofwaterenvironmentofexperimentalponds by researches of perennialdynamicsofthisparameterwaslessthan 7,67%.Authentic differences by pHof water environment of experimental ponds during the fish season according to 4-year observationsnot found.

An equation of regression of thepHofwaterenvironment ofexperimentalponds according to the database of researches of 2008th yearhas the form (R^2 = 0,512910):

$$y = 7{,}58882 + 0{,}19123x - 0{,}01189x^2 \quad (6)$$

An equation of regression of thepHofwaterenvironment ofexperimentalponds according to the database of researches of 2009th yearhas the form (R^2 = 0,513890):

$$y = 7{,}70323 + 0{,}06461x - 0{,}00578x^2 \quad (7)$$

An equation of regression of thepHofwaterenvironment ofexperimentalponds according to the database of researches of 2010th yearhas the form (R^2 = 0,578960):

$$y = 8{,}04159 + 0{,}11128x - 0{,}00885x^2 \quad (8)$$

An equation of regression of thepHofwaterenvironment ofexperimentalponds according to the database of researches of 2011th yearhas the form (R^2 = 0,827960):

$$y = 8{,}21804 + 0{,}17047x - 0{,}01163x^2 \quad (9)$$

Based on the kept resultsthemiddle equation of regression of thepHofwaterenvironment ofexperimentalponds was got (R^2 = 0,608430):

$$y = 7{,}88792 + 0{,}13440x - 0{,}00954x^2 \quad (10)$$

There was no clear difference in pH of water environment of experimental ponds between the years of research and by the breeding of various size groups of Russian sturgeon.

Generallyaccordingtotheresearchesduring 4 yearsbetween thevaluesofparameterof pH of water environment of experimental ponds were like the base of values recommended by Russian scientists [4-22].

Conclusions.

1. The minimal value of the content of oxygeninmorninghoursinthewaterofexperimentalpondsused for the breeding of the russiansturgeonwhichareinagesfromtwo-yearstofive-yearsaccordingtoresultsof 4-year observations was7,32 mg/dm^3(IIdecade of May), maximal value was 11,22 (III decade of October). Valueofthecoefficientofvariationbycontentofoxygeninthewaterofexperimentalpondsbyresearchesofperennialdynamicsofthisparameterwasless than 9,04%.

2. The significant differences ($p<0{,}001$) of values of oxygenin the water of experimental ponds gotinthemorningand in the evening (1,79 mg/dm^3 (C_v = 6,59%) (IIIdecade of September - IIdecade of October) – 3,60mg/dm^3 (C_v = 9,67%) (IIIdecade of July - Idecade of August)) during the period "IIdecade of May – IIdecade of September" (120 days, 60% of duration of the fish-breeding season (April – IIdecade of Octoberдекада)) was identified.

3. TheminimalvalueofpHofwaterenvironmentofexperimentalpondsusedforthebreeding of russian sturgeon in age from two-years to five-years, according to the database of observations during 4 years was 7,55 in Ithdecade of August, maximal value was8,20 in IIIth decade of August.

ThevalueofcoefficientofvariationbythepHofwaterenvironmentofexperimentalponds by researches of perennial dynamicsofthisparameterwaslessthan 7,67%.

4. Authentic differences by pH of water environment of experimental ponds during the fish season according to 4-year observations not found.

Е. В. Федоров[1], Н. С. Бадрызлова[1], А. Р. Лозовский[2]

[1]«Қазақ балық шаруашылығы ғылыми зерттеу институты» ЖШС, Алматы, Қазақстан,
Астрахан мемлекеттік университеті, Астрахан, Ресей

ОРЫС БЕКІРЕСІН ЕКІ ЖАЗДЫҚ КЕЗЕҢІНЕН БЕС ЖАЗДЫҚ КЕЗЕҢГЕ ДЕЙІН ӨСІРУ БАРЫСЫНДАҒЫ ТӘЖІРИБЕЛІК ТОҒАНДАРДАҒЫ СУ КӨЗДЕРІНІҢ НЕГІЗГІ ХИМИЯЛЫҚ КӨРСЕТКІШТЕРІ

Аннотация. Орыс бекіресін екі жаздық кезеңінен бес жаздық кезеңіне дейін өсіру барысында тоғандардың pH, судағы еріген оттегі мәндерінің динамикалық есебі көрсетілді. Тәжірибелік тоғандарда зерттелген су көрсеткіштерінің динамикалық фактілеріне сипаттама берілді. Сулы орта бойынша зерттелген көрсеткіштердің минимальды және максимальды мәндері, барлық балық өсіру кезеңінде зерттелген көрсеткіштердің ауытқу коэффициенті, белгілі бір кезеңдерге сай бір тәулік көлемінде зерттелген көрсеткіштердің айырмашылықтары нақтыланды. Балық өсіру кезеңдерінде зерттелген сулы орта мәндерінің регрессиялық теңдігі көрсетілді. Мақаланың тақырыбына сай алынған зерттеу нәтижелеріне қорытынды жасалды және осы нәтижелерді таяу шет ел ғалымдарының зерттеулерімен салыстыру жүргізілді.

Түйін сөздер:тәжірибелік тоғандар, балықтарды тоғанда өсіру, сулы ортаның pH көрсеткіштері, судағы еріген оттегі, сулы орта көрсеткіштерінің динамикасы.

Е. В. Федоров[1], Н. С. Бадрызлова[1], А. Р. Лозовский[2]

[1]ТОО «Казахский научно-исследовательский институт рыбного
хозяйства», Алматы, Казахстан,
[2]Астраханский государственный университет Астрахань, Россия

ОСНОВНЫЕ ХИМИЧЕСКИЕ ПАРАМЕТРЫ ВОДНОЙ СРЕДЫ ЭКСПЕРИМЕНТАЛЬНЫХ ПРУДОВ ПРИ ВЫРАЩИВАНИИ РУССКОГО ОСЕТРА В ВОЗРАСТЕ ОТ ДВУХЛЕТОК ДО ПЯТИЛЕТОК

Аннотация. Представлена динамика значений pH водной среды прудов, содержания кислорода в воде экспериментальных рыбоводных прудов, занятых под выращивание русского осетра в возрасте от двухлеток до пятилеток, в числовом исполнении. Даны описания наблюдаемых фактов динамики значений изучаемых параметров в воде экспериментальных прудов. Представлены минимальные и максимальные значения исследуемых параметров водной среды, коэффициенты вариации значений изучаемых параметров в течение рыбоводного сезона, достоверность различий между значениями изучаемых параметров в течение суток за конкретные периоды времени. Показаны уравнения регрессии значений исследуемых параметров водной среды, исследуемых на протяжении рыбоводного сезона. Даны выводы, в которых представлены основные результаты работы по тематике данной статьи, сравнение полученных результатов с аналогичными, рекомендуемыми учеными ближнего зарубежья.

Ключевые слова: экспериментальные пруды, прудовое выращивание рыбы, pH водной среды, содержание кислорода в воде, динамика параметров водной среды.

Information about authors:

Fedorov E.V., senior scientific elaborator, “Kazakh scientific and research institute of fishery” LLP, Almaty, Kazakhstan; https://orcid.org/0000-0002-7088-8397

Badryzlova N. S., junior scientific elaborator, “Astrakhan State University”, Astrakhan, Russia; ns_nina@mail.ru

Lozovskiy A. R., docent, “Astrakhan State University”, Astrakhan, Russia

REFERENCES

[1] Rukovodstvo po himicheskomu analizu poverhnostnyh vod sushi. L.: Gidrometeoizdat, 1977. 541 p. [Handbook according to the chemical analyze of surface waters of the land] (in Rus.).

[2] Rekomendacii po tehnologii vyrashhivanija osetrovyh ryb v bassejnah i prudah v uslovijah rybovodnyh hozjajstv juga Kazahstana. Almaty, 2009. 56 p. [Recommendations according to the technology of breeding the sturgeon fishes in tanks and ponds in conditions of fish-breeding farms of south of Kazakhstan] (in Rus.).

[3] Badryzlova N.S., Bazhanova N.B., Muhramova A.A., Fedorov E.V. Vlijanie himicheskogo sostava vody na rybovodno-biologicheskie pokazateli molodi i segoletok russkogo osetra i ego gibridov pri vyrashhivanii v bassejnah // Izvestija NAN RK. Serija biologicheskaja i medicinskaja. 2014. N 6. P. 47-55. [An influence of chemical composition of water for the fish-breeding and biological parameters of fingerlings and one-years of russian sturgeon and his hybrids by the breeding in basins] (in Rus.).

[4] Vasil'eva L.M., Abrosimova N.A. Biologicheskoe i tehnicheskoe obosnovanie dlja organizacii tovarnoj fermy po vyrashhivaniju osetrovyh ryb. Astrahan', 2000. 23 p. [Biological and technical rationale for organization of the good farm according to the breeding of sturgeon fishes] (in Rus.).

[5] Chebanov M.S., Galich E.V. Rukovodstvo po iskusstvennomu vosproizvodstvu osetrovyh ryb. Ankara: FAO, 2010. 319 p. (in Rus.).

[6] Lakin G.F. Biometrija. M.: Vysshaja shkola, 1990. 293 p. [Biometry] (in Rus.).

[7] Vasil'eva L.M., Jakovleva A.P. i dr. Tehnologii i normativy po tovarnomu osetrovodstvu v VI rybovodnoj zone / Pod red. N. V. Sudakovoj. M.: VNIRO, 2006. 100 p. [Technologies and norms according to the good sturgeon-breeding in VI zone of fish-breeding] (in Rus.).

[8] Vasil'eva L.M., Jakovleva A.P. i dr. Tehnologii i normativy po tovarnomu osetrovodstvu v VI rybovodnoj zone / Pod red. N. V. Sudakovoj. M.: VNIRO, 2006. 100 p. [Technologies and norms according to the commercial fish-breeding in the VIth zone of fish-breeding] (in Rus.).

[9] Badryzlova N.S., Barakbaev T.T., Nurgazy K.Sh. Ocenkaprodukci-onnogopotenciala russkogo osetra pri vyrashhivanii vprisposoblennyhkarpovyhprudah // Issledovanija, rezul'taty. Nauchnyj zhurnal. 2013. N 4(060). P. 11-15. [Evaluation of production potential of russian sturgeon by the breeding in adapted carp ponds] (in Rus.).

[10] Vasil'eva L.M. Biologicheskie i tehnologicheskie osobennosti tovarnoj akvakul'tury osetrovyh v uslovijah Nizhnego Povolzh'ja. Astrahan', 2000. 190 p. [Bioligical and technical features of commercial aquaculture of sturgeons in conditions of Lower Volga] (in Rus.).

[11] Govorunova V.V., Podushka S.B. Uspehi i problemy Donskogo osetrovogo zavoda // Nauchno-tehnicheskij bjulleten' laboratorii ihtiologii INJeNKO. 2003. N 7. P. 11-18. [Successes and problems of Don factory of reproduction of sturgeons] (in Rus.).

[12] Instrukcija po razvedeniju i tovarnomu vyrashhivaniju belugi so sterljad'ju // Sbornik instrukcij i metodicheskih rekomendacij po tovarnomu rybovodstvu. M., 1978. P. 166-182. [An instruction according to the breeding and the commercial breeding of hybrid between *Huso huso* and the sterlet] (in Rus.).

[13] Karachev R.A. Jeffektivnost' vyrashhivanija osetrovyh i karpovyh ryb v polikul'ture v uslovijah sadkovogo teplovodnogo hozjajstva. 06.02.04. Chastnaja zootehnija, tehnologija proizvodstva produktov zhivotnovodstva. Avtoref. dis. … kand. sel'skohoz. nauk. M., 2009. 26 p. [The effectively of breeding the sturgeons and carps in polyculture in conditions of cage farm with the warm water] (in Rus.).

[14] Katalog porod, krossov i odomashnennyh form ryb Rossii i SNG. M., 2001. 206 p. [The catalogue of rocks, crosses and domesticated forms of fishes by Russia and CIS] (in Rus.).

[15] Kovalenko M.V. Optimizacija metodov vyrashhivanija osetrovyh ryb v upravljaemyh uslovijah vodnoj sredy. 03.00.10. Ihtiologija. Avtoref. dis. … kand. biol. nauk. Astrahan', 2007. 24 p. [Optimization of methods of breeding of sturgeons in control conditions of water environment] (in Rus.).

[16] Kozlov V.I., Abramovich L.S. Spravochnik rybovoda. M.: Rosagropromizdat, 1991. 237 p. [The fisher's handbook] (in Rus.).

[17] Kozlov V.I., Abramovich L.S. Tovarnoe osetrovodstvo. M.: Ros-sel'izdat, 1986. 117 p. [The commercial fish-breeding] (in Rus.).

[18] Kokoza A.A. O standarte i nekotoryh drugih voprosah v osetrovodstve // Materialy Mezhdunar. otraslevoj nauch. konf. Professorsko-prep. Sostava AGTU (54 PPS) (g. Astrahan', 19 – 23 aprelja 2010 g.). Astrahan', 2010. P. 88-89. [About the standard and some another problems in the sturgeons-breeding] (in Rus.).

[19] Krylova V.D. Biotehnika tovarnogo vyrashhivanija bestera i lenskogo osetra v trehletnem cikle // Rybnoe hozjajstvo. Analiticheskaja i referativnaja informacija. Serija: Vosproizvodstvo i pastbishhnoe vyrashhivanie gidrobiontov: Vyp. 2. M.: VNIJeRH, 2003. 42 p. [The biotechnic of commercial breeding the bester and sturgeon of Lena river in cycle of three years] (in Rus.).

[20] Lagutkina L.Ju., Lagutkin O.Ju. Akvakul'tura: prioritety, resursy, tehnologii // Materialy Mezhdunar. otraslevoj nauch. konf. Professorsko-prep. Sostava AGTU (54 PPS) (g. Astrahan', 19 – 23 aprelja 2010 g.). Astrahan', 2010. P. 89-90. [The aquaculture: priories, recourses, technologies] (in Rus.).

[21] Magomaev F.M. Tovarnoe rybovodstvo. Astrahan': KaspNIRH, 2007. 600 p. [The commercial dish-breeding] (in Rus.).

[22] Kamakin A.M., Ushivcev V.B. Podvodnye nabljudenija osobennostej povedenija ryb osetrovyh vidov v nagul'nyh prudah // Akvakul'tura osetrovyh ryb: Problemy i perspektivy. Sbornik statej Mezhdunarodnoj nauchno-prakticheskoj konferencii 10 – 12 oktjabrja g., g. Astrahan', AGU, izd. dom «Astrahanskij universitet», 2017. P. 97-101. [The under-water observation features of behavior of fishes by species of sturgeons in thefeeding ponds] (in Rus.).

Publication Ethics and Publication Malpractice in the journals of the National Academy of Sciences of the Republic of Kazakhstan

For information on Ethics in publishing and Ethical guidelines for journal publication see http://www.elsevier.com/publishingethics and http://www.elsevier.com/journal-authors/ethics.

Submission of an article to the National Academy of Sciences of the Republic of Kazakhstan implies that the described work has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see http://www.elsevier.com/postingpolicy), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. In particular, translations into English of papers already published in another language are not accepted.

No other forms of scientific misconduct are allowed, such as plagiarism, falsification, fraudulent data, incorrect interpretation of other works, incorrect citations, etc. The National Academy of Sciences of the Republic of Kazakhstan follows the Code of Conduct of the Committee on Publication Ethics (COPE), and follows the COPE Flowcharts for Resolving Cases of Suspected Misconduct (http://publicationethics.org/files/u2/New_Code.pdf). To verify originality, your article may be checked by the Cross Check originality detection service http://www.elsevier.com/editors/plagdetect.

The authors are obliged to participate in peer review process and be ready to provide corrections, clarifications, retractions and apologies when needed. All authors of a paper should have significantly contributed to the research.

The reviewers should provide objective judgments and should point out relevant published works which are not yet cited. Reviewed articles should be treated confidentially. The reviewers will be chosen in such a way that there is no conflict of interests with respect to the research, the authors and/or the research funders.

The editors have complete responsibility and authority to reject or accept a paper, and they will only accept a paper when reasonably certain. They will preserve anonymity of reviewers and promote publication of corrections, clarifications, retractions and apologies when needed. The acceptance of a paper automatically implies the copyright transfer to the National Academy of Sciences of the Republic of Kazakhstan.

The Editorial Board of the National Academy of Sciences of the Republic of Kazakhstan will monitor and safeguard publishing ethics.

Правила оформления статьи для публикации в журнале смотреть на сайте:

www:nauka-nanrk.kz

ISSN 2518-1629 (Online), ISSN 2224-5308 (Print)

http://biological-medical.kz/index.php/en/

Редактор *М. С. Ахметова, Т. М. Апендиев, Д. С. Аленов*
Верстка на компьютере *Д. Н. Калкабековой*

Подписано в печать 13.02.2019.
Формат 60x881/8. Бумага офсетная. Печать – ризограф.
6,4 п.л. Тираж 300. Заказ 1.