N E W S
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
SERIES OF AGRICULTURAL SCIENCES
ISSN 2224-526X
Volume 5, Number 53 (2019), 73 – 82 **https://doi.org/10.32014/2019.2224-526X.63**

UDC 556.54

Zh.S. Mustafayev[1], A.T. Kozykeyeva[1], A.A. Sagaev[2], E.N. Alimbaev[2]

[1]Kazakh national agrarian university, Almaty, Kazakhstan,
[2]Korkyt-Ata Kyzylorda State University, Kyzylorda, Kazakhstan.
E-mail: z-mustafa@rambler.ru, aliya.kt@yandex.ru, sagaev_51@mail.ru; hagrid25@mail.ru

ANTHROPOGENIC CHANGES IN DRAIN IN LOWERS OF THE SYRDARYA RIVER

Abstract. Based on the analysis of information and analytical materials of the Main Administration of the USSR Hydrometeorological Service, RSE «Kazgidromet» and the «Aral-Syrdarya Basin Inspectorate for Regulation of Use and Protection of Water Resources» atthe Committee on Water Resources of the Ministry of Agriculture of the Republic of Kazakhstan has estimated the anthropogenic flow change in the lower reaches of the Syrdarya River on hydrological posts, with the determination of the coefficient of desiccation, characterized by a decrease in the carrying capacity of the river under the influence of not only changes in the hydrological regime of the river in the upper reaches, but also economic activities carried out in the catchments of the river basin.

Keywords: river, basin, hydrology, regime, natural, anthropogenic, modern, analysis, assessment, equation.

Introduction. Currently, there is a catastrophic water-ecological situation in the Syrdarya river basin, which is explained, first of all, by its transboundary position, as well as by the confinement of the lower part of the basin to arid inland areas where the river receives almost no tributaries. The situation is aggravated by the fact that it is in these areas within Kazakhstan that the Syrdariya river is the main waterway and the source of water supply for the population and various sectors of the economy, the main areas of population as well as industrial and agricultural development to its valley. Irrational economic activity in the catchment area, including the use of water resources, also has a great influence on the ecological status of the basin-river system in the lower reaches of the Syrdarya river [1-8].

Purpose of the study based on the analysis of information and analytical materials of the Main Directorate of the Hydrometeorological Service of the USSR, RSE «Kazgidromet» and the «Aral-Syrdarya Basin Inspectorate for Regulation of Use and Protection of Water Resources»at the Committee on Water Resources of the Ministry of Agriculture of the Republic of Kazakhstan in the lower reaches of the Syrdarya river under the influence of economic activity.

The object of research. Syrdarya is the second in terms of water content and the first in length along the river of Central Asia. From the sources of Naryn, its length is 3019 km, and the basin area is 219 thousand km^2. The sources of the Syrdarya lie in the Central (Inner) Tien Shan. After the confluence of Naryn and Karadarya, the river is called Syrdarya. The power of the river is glacial and snowy, with the latter predominating. For the water regime is characterized by spring-summer flood. The largest stock falls in June. The main flow of the Syrdarya is formed on the territory of the Kyrgyz Republic. Then Syrdarya crosses Uzbekistan and Tajikistan and flows into the Aral Sea on the territory of Kazakhstan. The total length of the channel in the catchment area of the Syrdarya River is 22,212 km and the basin area is 219,000 km^2 [4-9].

The reservoir of the Syrdarya river basin has several reservoirs: Toktoguls (19.5 km^3, Kyrgyzstan), Kairakkum (4.2 km^3, Tajikistan), Lake Aydarkul (41 km^3, Uzbekistan) and Shardarins (5.7 km^3, Kazakhstan). In order to regulate spring floods and water discharges from the Toktogul hydropower plant, Kazakhstan built the Koksaray reservoir (45 km dam length) in the South Kazakhstan region with a volume of three billion cubic meters, which was first filled in spring 2010 [10].

Syrdarya previously flowed into the Aral Sea, now, due to the catastrophic decline in its level and the collapse of the sea into two parts in 1989, the river flows into the northern part of the sea, (the so-called "Small Sea"). The waters of the Syrdarya are largely dismantled for economic needs; therefore, the current volume of flow in the estuary has decreased by more than 10 times (from 400 to 30 m^3/s) as compared with the conditionally natural period (until 1960) [9].

Materials and research methods. The study of long-term hydrological data on the hydrological posts of the Syrdarya River, located below the Shardara reservoir, was based on the materials of the Main Directorate of the Hydrometeorological Service of the USSR, RSE «Kazgidromet» and the «Aral-Syrdarya Basin Inspectorate for Regulation of Use and Protection of Water Resources, the Committee on Water Resources of the Ministry of Agriculture» of the Republic of Kazakhstan[10-14].

The hydrological study of the Syrdarya river in the lower reaches is comparatively satisfactory, since the hydrological posts Shardara, Tomenaryk, Kyzylorda and Kazalinsk and the upper reaches of the Naryn river and the Naryn hydrological post from 1911 to 2015 have the longest observations. . At the same time, the hydrological posts «Naryn» and «Shardara» have constant observations from 1911 to the present, which can serve as analogs when restoring the average annual discharge of the river along the hydrological posts «Tomenaryk», «Kyzylorda» and «Kazalinsk», i.e. the hydrological post «Naryn» is located on the zones of formation of the flow of the Syrdarya river, and the hydrological post «Kazalinsk» is located as a closing target in the area of flow drainage (figure 1-6).

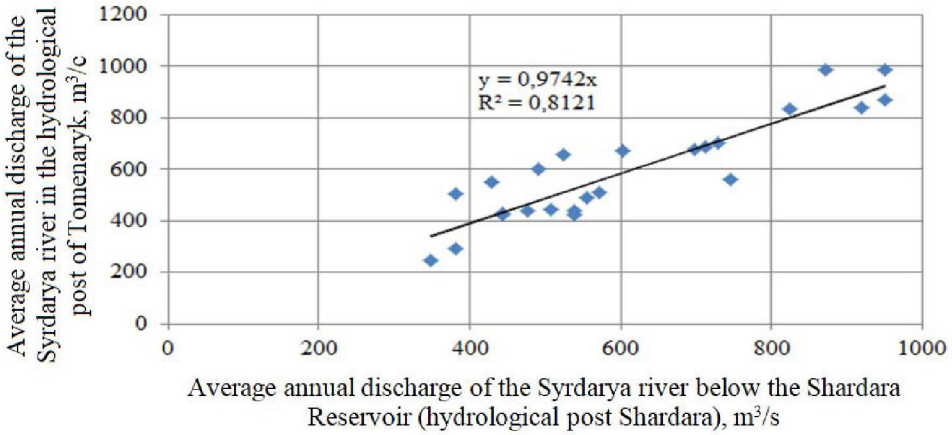

Figure 1 – Dependence of the average annual discharge of the Syrdarya river water in the Tomenaryk hydrological station on the average annual discharge of the Syrdarya river below the Shardara reservoir (hydrological post Shardara) during the natural regime

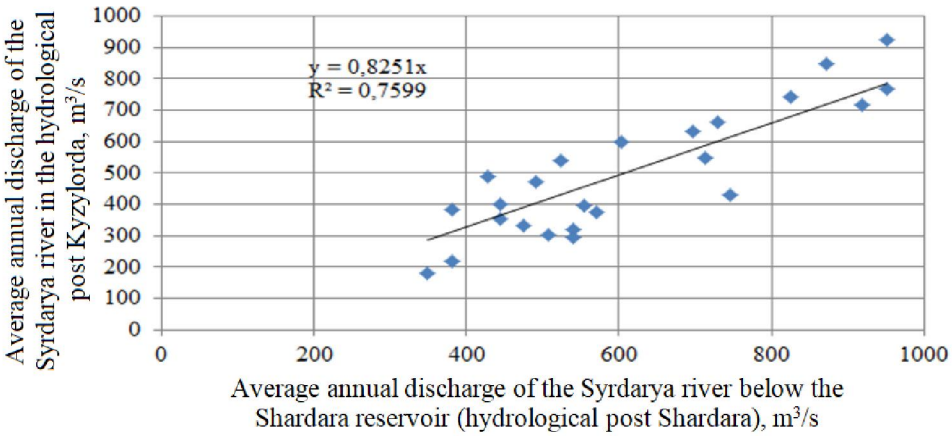

Figure 2 – Dependence of the average annual discharge of the Syrdarya river in the hydrological station Kyzylorda on the average annual discharge of the Syrdarya river below the Shardara reservoir (the hydrological post Shardara) during the natural regime

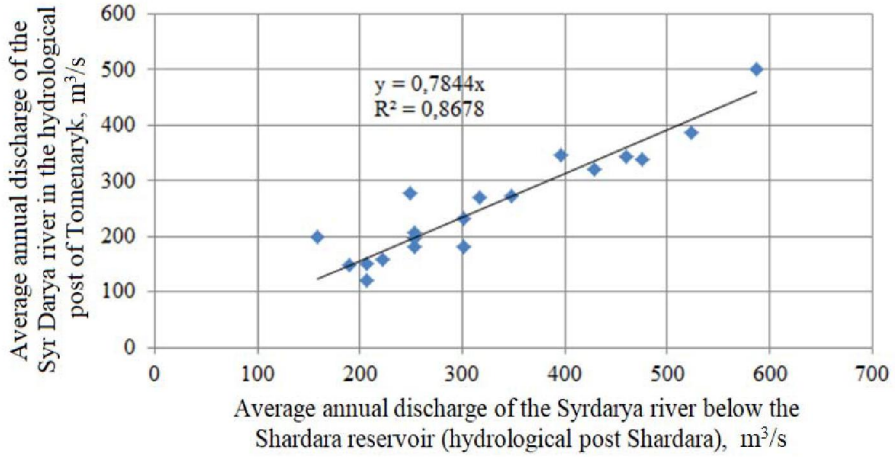

Figure 3 – Dependence of the average annual discharge of the Syrdarya river water in the Tomenaryk hydrological station on the average annual discharge of the Syrdarya river below the Shardara reservoir (hydrological post Shardara) during the anthropogenic regime

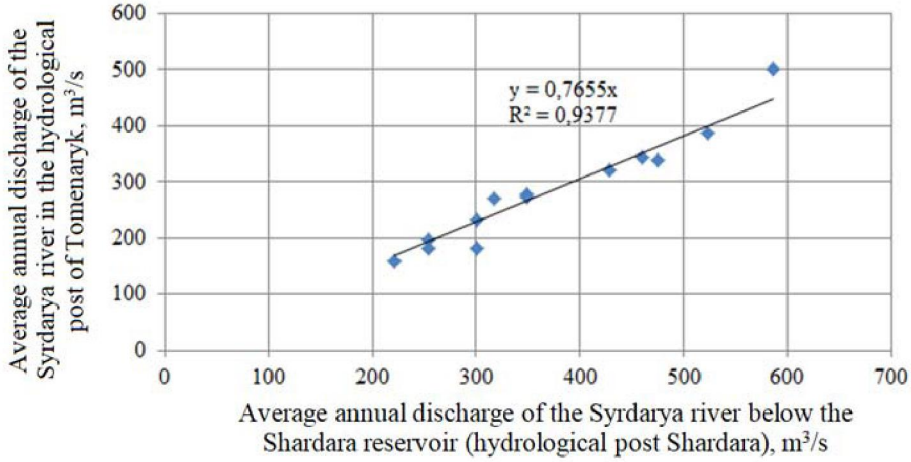

Figure 4 – Dependence of the average annual discharge of the Syrdarya river water in the Tomenaryk hydrological station on the average annual discharge of the Syrdarya river below the Shardara reservoir (the Hydrological post Shardar) during the modern regime

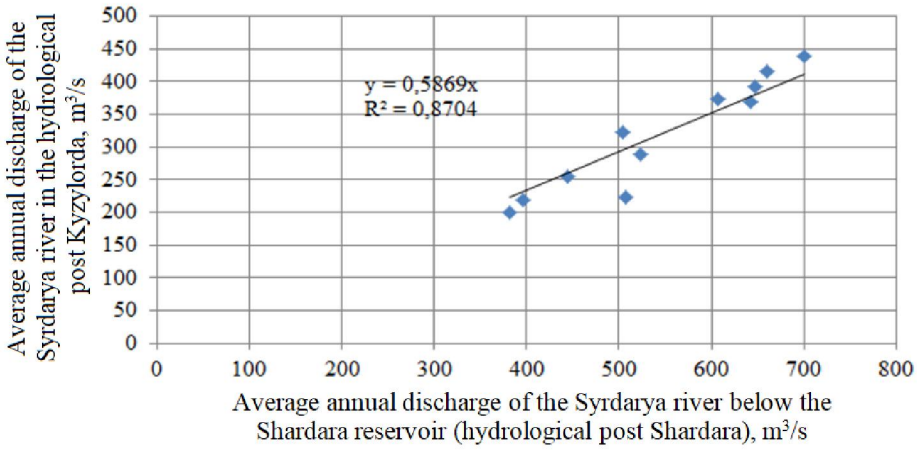

Figure 5 – Dependence of the average annual discharge of the Syrdarya river in the hydrological post Kyzylorda on the average annual discharge of the Syrdarya river below the Shardara reservoir (the hydrological post Shardara) in the period of the modern regime

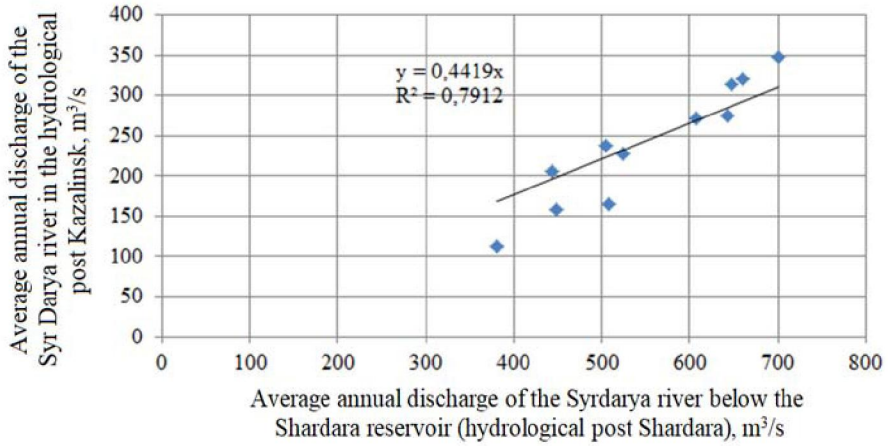

Figure 6 – Dependence of the average annual discharge of the Syrdarya river water in the Kazalinsk hydrological station on the average annual discharge of the Syrdarya river below the Shardara reservoir (the hydrological post Shardara) during the modern regime

Thus, as a result of statistical analysis of information and analytical materials of the Main Directorate of the Hydrometeorological Service of the USSR, RSE «Kazgidromet» and the «Aral-Syrdarya Basin Inspectorate for the regulation of the use and protection of water resources» at the Committee on Water Resources of the Ministry of Agriculture of the Republic of Kazakhstan hydrological posts by the method of hydrological analogy obtained regression equation with a high correlation coefficient (table 1).

Table 1 – Information on the reconstruction of the rows of the average annual discharge of the water of the Syrdarya River

River	River analogues, hydrological post	Regression equation	Correlation coefficient
Natural regime			
Tomenaryk	Shardara	$Y = 0{,}9742 \cdot X$	$R = 0{,}90$
Kyzylorda	Shardara	$Y = 0{,}8251 \cdot X$	$R = 0{,}87$
Anthropogenic regime			
Tomenaryk	Shardara	$Y = 0{,}7844 \cdot X$	$R = 0{,}93$
Modern regime			
Tomenaryk	Shardara	$Y = 0{,}7655 \cdot X$	$R = 0{,}97$
Kyzylorda	Shardara	$Y = 0{,}5869 \cdot X$	$R = 0{,}93$
Kazalinsk	Shardara	$Y = 0{,}4419 \cdot X$	$R = 0{,}89$

Assessing the impact of economic activity on the formation of runoff watersheds in the Recmi basin presents great difficulties, since their complexity lies in the fact that the influence of anthropogenic factors has to be estimated against the background of natural fluctuations in runoff and natural flow-forming factors.

Research results. Based on the use of the regression equation obtained by the method of hydrological analogs, the average annual discharge of the Syrdarya river water by the «Tomenaryk», «Kyzylorda» and «Kazalinsk» hydro posts in the absence of observation, which allowed us to imagine the long-term average annual discharge in the Syrdarya river sections, that is, the hydrological posts «Naryn», «Shardara», «Tomenaryk», «Kyzylorda» and «Kazalinsk» (figure 7–11).

As can be seen from figure 1–5, the long-term and modern period tends to increase in the hydrological posts of Naryn and Shardara, and the hydrological posts of Tomenaryk, Kyzylorda and Kazalinsk located below the Shardara reservoir, on the contrary, there is a constant decrease in the average annual discharge of the Syrdarya river. It should be noted that in the long-term fluctuations in the average annual water discharge of the hydrological posts of Naryn located above the Toktogul reservoir and the hydrological posts of Shardara located below the Shardara reservoir, there is a weak positive trend during

the observation period, which did not particularly affect the general direction of change in the average annual discharge for many years.

Thus, the analysis of observational data on the average annual discharge of water in the lower reaches of the Syrdarya River showed that, beginning in the 1970s, the average annual discharge began to change significantly under the influence of anthropogenic factors and economic activity.

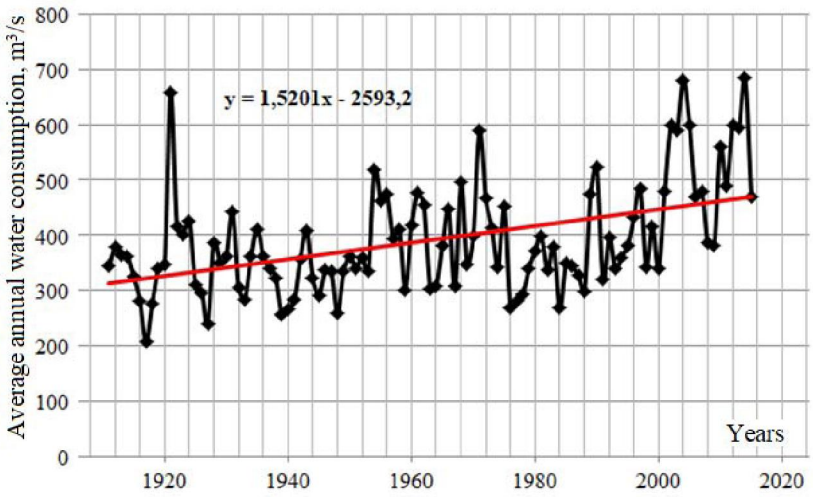

Figure 7 – The long-term course of the average annual water discharge at the hydrological posts of the Naryn River of the Syrdarya

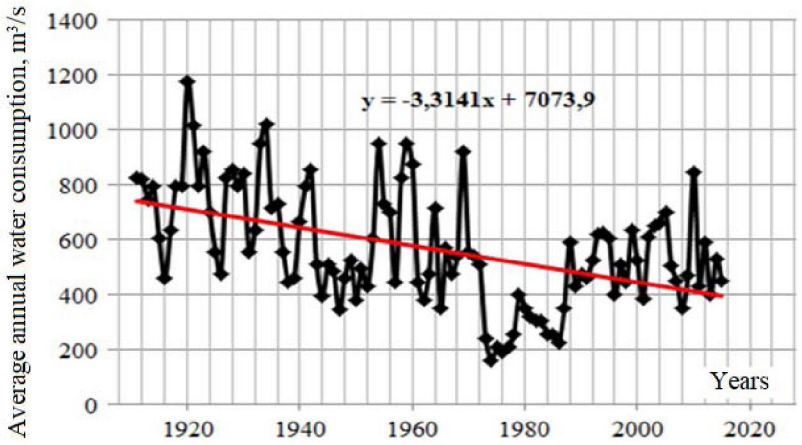

Figure 8 – The long-term course of the average annual discharge of the hydrological posts of Shardara (below the Shardara reservoir) of the Syrdarya river

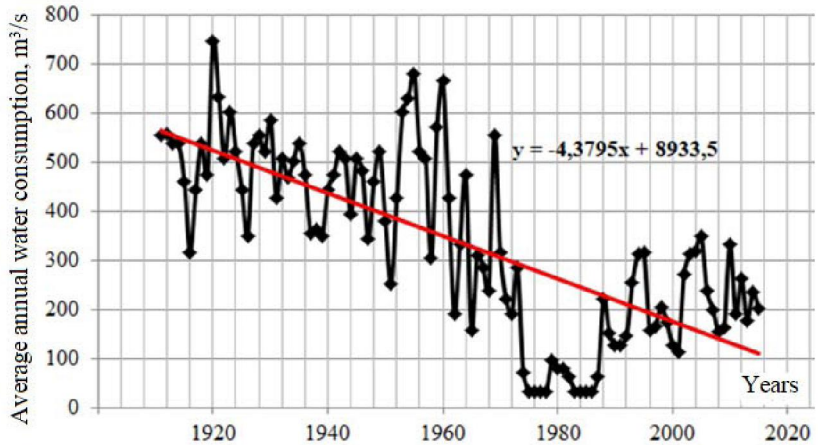

Figure 9 – The long-term course of the average annual water discharge of the hydrological posts of the Tomenaryk of the Syrdarya River

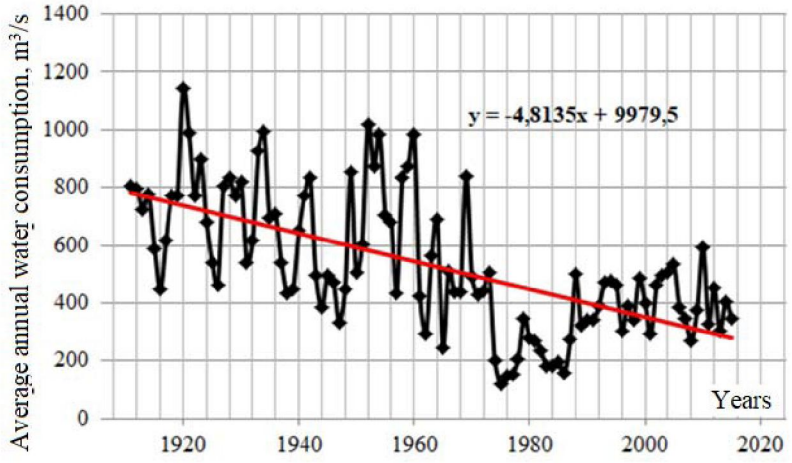

Figure 10 – The long-term course of the average annual water discharge at the Kyzylorda hydrological posts of the Syrdarya River

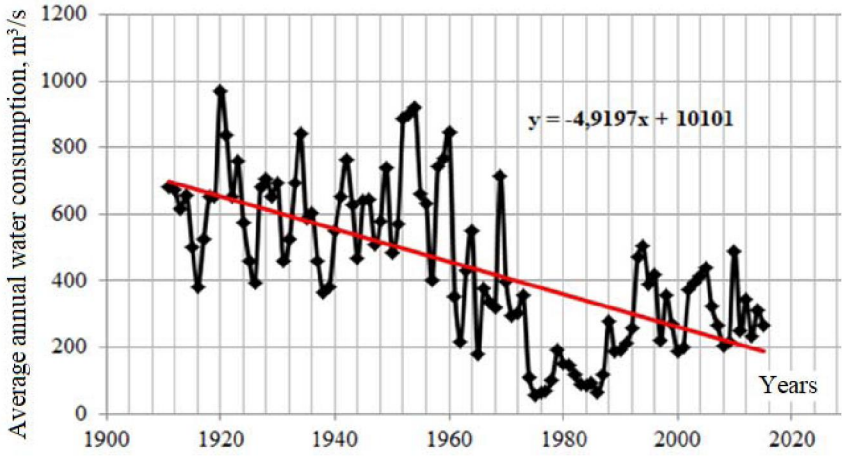

Figure 11 – The long-term course of the average annual water discharge of the hydrological posts of the Kazalinsk,Syrdarya River

Figure 12 shows the difference integral curve for the hydrological posts Naryn, Shardara, Tomenaryk, Kyzylorda and Kazalinsk, as well as the trend line in the area of maximum slope of curve 6 (1970-2015).

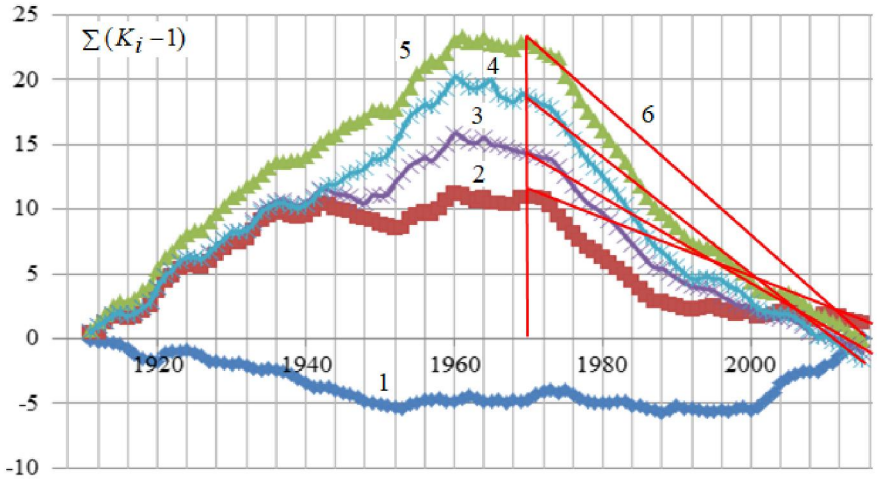

Figure 12 – Integral difference curve in the lower reaches of the Syrdarya river by hydrological posts (1 - Naryn; 2 - below the Shardara reservoir (Shardara); 3 - Tomenaryk; 4 - Kyzylorda; 5 - Kazalinsk)

At the same time, the integral difference curve shows that in the zone of their increase a growth in the average annual water flow is observed, and in the zone of maximum inclination of the trend line there is a decrease in the average annual water flow in the below Shardara reservoir [15].

Based on the maximum slope of the trend line, which characterize the decrease in the average annual discharge of the lower reaches of the Sydarya River, then below the Shardara reservoir, the trend line equation on curve 6 (Figure 6) has the following form:

- for the hydrological station Shardar (below Shardarareservoirs): $Y = -0{,}4796 \cdot X + 955{,}43$;
- for the hydrological station Tomenaryk: $Y = -0{,}5000 \cdot X + 1010{,}46$;
- for the hydrological station Kyzylorda: $Y = -0{,}3359 \cdot X + 675{,}73$;
- for the hydrological station Kazalinsk: $Y = -0{,}4463 \cdot X + 897{,}62$.

Thus, the representative period was determined by difference integral curves of the average annual water discharge at the hydrological posts located in the catchment area of the Syrdarya river basin, namely in the flow formation zone at the hydrological posts of Naryn and in the store area at the hydrological posts of Shardar, Tomenaryk, Kyzylorda and Kazalinsk located below Shardara reservoir. A multi-year period from 1911 to 2015, which was chosen as the calculation, includes three periods [9]:

- conditionally natural (1911-1970);
- sustainable water consumption - irrigation regime of the Toktogul hydroelectric station (1976-1992):
- sustainable water consumption - energy mode of operation of the Toktogul hydroelectric station (1993-2015).

The division of the period of sustainable water consumption into two is due to the fact that since 1993 the Toktogul reservoir regime has changed, that is, it previously worked in the irrigation mode, where discharges from it were carried out mainly in the autumn-summer period and made up about 75% of the total flow. In the middle of the 90s of the last century, the Toktogul reservoir operation mode changed dramatically, that is, to generate the necessary electricity for Kyrgyzstan, the main water releases were carried out in the winter months, during which about 60% of the total flow volume was triggered, which led to some increase in the lower reaches of the Syrdarya River [9; 15-17].

The current hydrological situation in the lower reaches of the Syrdarya River urgently requires a balanced use of water resources, necessitates an assessment of the impact of anthropogenic factors on the flow and hydrological regime. The issues of assessing the direction and magnitude of changes in river flow under the influence of climate change and human economic activities are of paramount practical and scientific and methodological importance, since their solution allows to take into account the nature and extent of changes in both water resources and the complex environmental conditions of the river basin watershed [9; 18; 19].

Thus, the cited dynamics of changes in expenditures of the lower reaches of the Syrdarya River in the hydrological posts Shardara, Tomenaryk, Kyzylorda and Kazalinsk during the period of observations from 1911 to 2015 showed that as the flow in the upper reaches was regulated by reservoirs from 1955 to 1980, that is, Kairakkum's (1956), Shardara's (1965), Sharvak's (1970), Toktogul's (1975) and Andijan's (1978) with a total usable capacity of 33.1 km3, which was commensurate with the annual flow of the Syr Darya River. Consequently, the felting of such hard anthropogenic activities in the lower reaches of the Syrdarya river began the process of drying out, which radically changed the weight of the hydraulic and geomorphological conditions of water flow, flow and channel indicators.

The dynamics of river drying is expressed by a coefficient that takes into account the ratio of costs left in the river bed to maintain its hydro-ecological balance between adjacent gauging stations [10]:

$$\eta = Q_{noc} / Q_{np},$$

where η – river drying coefficient; Q_{np} – consumption of upper gauging station; Q_{noc} – consumption of lower gauging station.

The change in the coefficient of river desiccation between adjacent hydrological posts below the Shardara reservoir and relative to the hydrological post Shardar is shown in table 2.

Table 2 – Changes in the coefficient of drying in different periods of anthropogenic impacts in the lower Shardara reservoir

Hydrological post	Indicators	Periods of anthropogenic impacts in the lower Shardara reservoir					
		1911-1920	1921-1930	1931-1940	1941-1950	1951-1960	1961-19700
1	2	3	4	5	6	7	8
Shardara	$Q_{пр}$, m^3/s	764,2	776,9	672,8	524,5	699,3	542,2
Tomenaryk	$Q_{пос}$, m^3/s	744,4	756,8	655,4	559,0	798,4	493,1
	η	0,97	0,97	0,97	1,07	1,14	0,91
Kyzylorda	$Q_{пос}$, m^3/s	630,5	737,8	545,9	611,2	733,2	387,0
	η	0,82	0,95	0,81	1,16	1,05	0,71
Kazalinsk	$Q_{пос}$, m^3/s	517,2	526,4	443,5	459,4	516,7	329,1
	η	0,68	0,68	0,66	0,88	0,74	0,61
Tomenaryk	$Q_{пр}$, m^3/s	744,4	756,8	655,4	559,0	798,4	493,1
Kyzylorda	$Q_{пос}$,m^3/s	630,5	737,8	545,9	611,2	733,2	387,0
	η	0,85	0,97	0,83	1,09	0,92	0,78
Kazalinsk	$Q_{пос}$, m^3/s	517,2	526,4	443,5	459,4	516,7	329,1
	η	0,69	0,70	0,68	0,82	0,65	0,67
Kyzylorda	$Q_{пос}$,m^3/s	630,5	737,8	545,9	611,2	733,2	387,0
Kazalinsk	$Q_{пос}$, m^3/s	517,2	526,4	443,5	459,4	516,7	329,1
	η	0,82	0,71	0,81	0,75	0,70	0,85

Continuation of table 2

1	2	9	10	11	12	13
Hydrological post	Indicators	Periods of anthropogenic impacts in the lower Shardara reservoir				
		1971-1980	1981-1990	1991-2000	2001-2010	2011-2015
Shardara	$Q_{пр}$,m^3/s	304,4	348,8	533,4	561,7	478,8
Tomenaryk	$Q_{пос}$, m^3/s	282,4	265,6	406,2	436,0	366,5
	η	0,93	0,76	0,76	0,82	0,76
Kyzylorda	$Q_{пос}$, m^3/s	170,1	136,6	329,2	331,7	281,0
	η	0,56	0,39	0,62	0,59	0,59
Kazalinsk	$Q_{пос}$, m^3/s	107,1	83,4	198,7	245,8	213,1
	η	0,35	0,24	0,37	0,44	0,44
Tomenaryk	$Q_{пр}$, m^3/s	282,4	265,6	406,2	436,0	366,5
Kyzylorda	$Q_{пос}$,m^3/s	170,1	136,6	329,2	331,7	281,0
	η	0,60	0,51	0,81	0,76	0,77
Kazalinsk	$Q_{пос}$, m^3/s	107,1	83,4	198,7	245,8	213,1
	η	0,38	0,31	0,49	0,56	0,58
Kyzylorda	$Q_{пос}$,m^3/s	170,1	136,6	329,2	331,7	281,0
Kazalinsk	$Q_{пос}$, m^3/s	107,1	83,4	198,7	245,8	213,1
	η	0,63	0,60	0,60	0,74	0,76

Analysis of the coefficient of desiccation of the lower reaches of the Sydarya River below the Shardara's reservoir for the period under review, that is, from 1911 to 2015 at intervals of 10 years showed that between the hydrological posts of Tomenaryk, Kyzylorda and Kazalinsk in unfavourable conditions there were areas below the Kyzylorda hydroelectric complex, where the coefficient of desiccation in the period of anthropogenic activities, that is, sustainable water consumption – the irrigation regime of the Toktogul hydroelectric station (1976-1992) was below 0.56.

Therefore, the long-term analysis of the average annual water discharge and the integral difference curve along the hydrological posts located in the lower Shardara reservoir and based on their obtained trend line equation show that an intensive process occurs in the lower reaches of the Syrdarya River, that is, an intensive process of drying up of the river takes place from the Shardara reservoir to the Small Aral Sea.

Conclusions. In order to make an appropriate decision when using the water resources of the Syrdarya river basin, there is a need to change the modern principles in the field of environmental management, and the fundamental change of traditional methods and methodology of natural science to a new one, based on the properties of the natural environment, considered independently of our activities, and on the basis of laws of nature.

Ж. С. Мустафаев[1], А. Т. Козыкеева[1], А. А. Сагаев[2], Е. Н. Алимбаев[2]

[1]Казахский национальный аграрный университет, Алматы, Казахстан,
[2]Кызылординский государственный университет им. Коркыт-Ата, Кызылорда, Казахстан

АНТРОПОГЕННЫЕ ИЗМЕНИЯ СТОКА В НИЗОВЬЯХ РЕКИ СЫРДАРЬИ

Аннотация. На основе анализа информационно-аналитических материалов Главного управления гидрометеорологической службы СССР, РГП «Казгидромет» и «Арало-Сырдарьинской бассейновой инспекции по регулированию использования и охране водных ресурсов» Комитета по водным ресурсам Министерствасельского хозяйства Республики Казахстан произведена оценка антропогенного изменения стока в низовьях реки Сырдарьи по гидрологическим постам, с определением коэффициента усыхания, характеризующегося уменьшение пропускной способности реки под влиянием не только изменения гидрологического режима реки в верховьях, но и хозяйственной деятельности, проведенной в водосборах бассейна реки.

Ключевые слова: река, бассейн, гидрология, режим, естественный, антропогенный, современный, анализ, оценка, уравнение.

Ж. С. Мұстафаев[1], Ә. Т. Қозыкеева[1], Ә. А. Сағаев[2], Е. Н. Әлімбаев[2]

[1]Қазақ ұлттық аграрлық университеті, Алматы, Қазақстан,
[2]Қорқыт-Ата атындағы Қызылорда мемлекеттік университеті, Қызылорда, Қазақстан

СЫРДАРЬЯ ӨЗЕНІНІҢ ТӨМЕНГІ АЛАБЫНДАҒЫ СУ АҒЫНЫНЫҢ ТЕХНОГЕНДІК ӨЗГЕРУІ

Аннотация. ССРО-ның гидрометеорологиялық қысметінің бас басқармасының, «Қазгидромет» РММ-нің және Қазақстан Республикасының Ауылшаруашылық министерлігіне қарасты Су ресурстар комитетінің «Арал-Сырдарья алабының су ресурстарын пайдалануды реттеу және қорғау инспекциясының» ақпараттық-талдау мәліметтерін жүйлеудің негізінде Сырдарья өзенінің төменгі алқабында орналасқан гидрологиялық бекеттер бойынша құрғау көрстеткішін анықтау арқылы су ағынының өтімінің техногендік өзгеруіне баға берілген, ал ол тек қана өзеннің гидрологиялық режимінің өзгеруінің әсерінен өзеннің су өткізу қабілетінің төмендегенін ғана сипаттап қоймайды және ол өзеннің сужинау алабындағы жүргізілген шараушылық қызметтерге байланысты екендігін көрсетеді.

Түйін сөздер: өзен, сужинау алабы, гидрология, режимі, табиғи, техногендік, сқазіргі, талдау, бағалау, теңдеу.

Information about authors:

Mustafaev Zh. S., Doctor of Technical Sciences, Professor, Kazakh national agrarian university, Almaty, Kazakhstan; z-mustafa@rambler.ru; https://orcid.org/0000-0003-2425-8148

Kozykeeva A. T., Doctor of Technical Sciences, Professor, Kazakh national agrarian university, Kazakh national agrarian university, Almaty, Kazakhstan; aliya.kt@yandex.ru; https://orcid.org/0000-0003-0581-0881

Sagaev A. A., Candidate of Technical Sciences, Professor Kyzylorda State University named after Korkyt-Ata, Kyzylorda, Kazakhstan; sagaev_51@mail.ru; https://orcid.org/0000-0003-2544-2596

Alimbaev E. N., Master, senior lecturer Kyzylorda State University named after Korkyt-Ata, Kyzylorda, Kazakhstan; hagrid25@mail.ru; https://orcid.org/0000-0002-5596-7791

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N E W S
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
SERIES OF AGRICULTURAL SCIENCES
ISSN 2224-526X
Volume 5, Number 53 (2019), 83 – 87 **https://doi.org/10.32014/2019.2224-526X.64**

UDC 636.1.612.64.089.67

D. M. Bekenov[1], A. A. Spanov[1], N. S. Kenchinbayev[1], A. D. Baimukanov[2]

[1]Educational Scientific and Production Center Bayserke-Agro LLP, Talgar district, Almaty region, Kazakhstan,
[2]Russian State Agrarian University – Moscow Agricultural Academy named after K. A. Timiryazev, Moscow, Russia.
E-mail: unpcbayserke-agro@mail.ru, abzal16@mail.ru, nazymnazym13@gmail.com, aidartaidar98@mail.ru

UPDATING THE TREATMENT METHOD OF THE FOLLICULAR OVARIAN CYSTS IN COWS OF THE DAIRY PRODUCTIVITY DIRECTION IN THE EAST-KAZAKHSTAN REGION

Abstract. The article gives data on the use of releasing hormone for the treatment of follicular ovarian cysts of milk cows. Herewith, a comparison of two treatment options for follicular cysts using releasing hormone was carried out.

Treatment regimens consisted of injecting the gonadotropin-releasing hormone and prostaglandin F2α drugs in various variants. For therapy of the sexual function of cows with follicular ovarian cysts, the drug Surfagon was used. As for the first regimen, from the day of finding a cyst formation in the ovary, the preparation was injected intravenously once for 3 days at a dose of 50 μg with an ultrasound scan of the ovaries on the 4th day for the detecting a follicular cyst. According to the second regimen, the classical scheme of follicular cyst treatment was used based on a single intramuscular injection of releasing hormone (Surfagon) in the diagnosis of a follicular ovarian cyst at a dose of 50 μg and prostaglandin F2α injections on the 10-12 day and artificial insemination in the presence of estrus.

At the mean, of all the experimental groups during the first treatment regimen, recovery of ovulation and estrous cycle rhythm was recorded in 75.1% of animals, in the second treatment option - in 38.7% of animals. Cured animals on coming to the estrus were artificially inseminated with the sperm of bulls, tested on the quality of the offspring. 35 days after artificial insemination, the experimental animals underwent a rectal examination and ultrasound scan to determine pregnancy. In all groups of animals, fruitful insemination was on average 66.9% with the first treatment regimen and 53.5% with the second treatment regimen.

These results indicate a fairly high therapeutic efficacy of releasing hormone in the form of the Surfagon drug or its analogues when it is applied to cows with a follicular ovarian cyst during the period of manifestation of estrus or the formation of a new cyst. In terms of the share of cows that had recovered, the efficiency of the first regimen is 75.1%, of the fertilized animals - 66.9%.

Keywords: monitoring, releasing hormone, follicular cyst, treatment, cow.

Introduction. The decrease in fertility of cattle is associated with functional disorders of the reproductive organs that are often detected in animals, including ovarian dysfunction, manifested in the form of their hypofunction or cyst and inflammation of the uterine lining (endometritis). The problems associated with the reproduction of highly productive dairy cattle, especially the long period of the reproductive cycle, lactation dominant and the risk of infertility are among the acutest problems in dairy cattle breeding [1-3].

The onset of (follicular) cysts is caused by out-of-time or insufficient secretion of luteinizing hormone during the estrus due to the inability of the hypothalamic-pituitary system to respond adequately to estrogenic stimulation through positive feedback mechanisms. The consequences leading to excessive secretion of fluid in the follicles is a fairly common dyshormonal pathology, resulting in temporary infertility in most cases in dairy cows. Herewith, most cows recover without treatment in the period from

13 to 28 days, but in 35-40% of cases anovulatory cycles and cystic formations reappear. According to the results of our own research, functional disorder of the ovaries in the form of follicular cysts in high-milk herds is registered in up to 20% of the cows of the production department [4, 5].

At cyst formations in the ovaries, an active treatment policy is rational than waiting for self-healing, leading to a lengthening of the calving interval. At the same time, during rectal examination and detection of cyst signs, it is noted that 8-12 days after the establishment of the primary diagnosis, treatment is required only for 50% of previously diagnosed animals. In the opinion of some researchers, active identification and treatment of cows with cyst ovarian formations is recommended based on repeated confirmation of the diagnosis [6].

In view of these circumstances, a comprehensive study of this pathology is necessary, as well as the improvement of diagnostics and methods of treating cows with the ovarian cyst [7].

Materials and methods of research. The research work was carried out within the framework of the budget program upon the project "Development of effective breeding methods in the dairy cattle breeding industry", for the event "Increasing the reproductive ability of dairy cows in the eastern region", where the task was to study and improve restoration methods of the reproductive functions of dairy cows. The research work was conducted using the Simmental cows on the base farms of Kamyshinskoe and Zeitenov LLP of the East Kazakhstan region.

The state of the reproductive organs of cows was checked by rectal palpation and ultrasound diagnostics in order to determine the prevalence and risk factors for the development of cyst formations in the ovaries of experimental animals.

Treatment regimens consisted of injecting gonadotropin-releasing hormone and prostaglandin F2α drugs in various variants. For correction of estrus of cows with follicular ovarian cysts, the Surfagon was used. At the first regimen, from the day of the finding a cyst formation in the ovary, the preparation was injected intravenously once for 3 days at a dose of 50 μg with an ultrasound scanning of the ovaries on the 4th day for the presence of a follicular cyst. In cases of detection of cysts, mechanical extrusion was performed by rectal palpation. When mechanical extrusion was not possible due to the compacted wall and small volume, they were re-processed by the releasing hormone. If the cyst formation was successfully ruptured after 10–12 days, re-rectal palpation or ultrasound diagnostics of the ovary for the presence of cyst formation or corpus luteum was conducted. Cows with the corpus luteum in the ovary were injected with prostaglandin F2α at a dose of 0.3 mg and in the presence of signs of estrus (48-72 hours), they were artificially inseminated. Animals come to the estrus within 10-12 days were immediately artificially inseminated.

According to the second regimen, the classical scheme of treatment of follicular cysts was used based on a single intramuscular injection of releasing hormone (Surfagon) at a dose of 50 μg and injections of prostaglandin F2α group drugs on the 10-12 day and artificial insemination in the presence of estrus [8].

In both cases, the effectiveness of insemination was taken into account, i.e. sperm dose consumption for 1 fruitful insemination, duration of treatment time and service period.

Research results. In the basic farms of Kamyshinskoe and Zeitenov LLP of the East-Kazakhstan region, animals with cystic pathology were selected and divided into 2 groups according to treatment regimens.

As can be seen from table 1, investigations on the use of releasing hormone in the treatment of follicular cysts were conducted on 53 cows of the Simmental breed in Zeitenov LLP, which was 10.6% of the 500 diagnosed cows, 34 Simmental cows in the Kamyshinskoe farm, which accounted for 13.6% of the 250 diagnosed cows. In each farm, cows with ovarian cysts were divided into two experimental groups for the treatment of follicular cysts using the releasing hormone in two different variants. The conditions for feeding and keeping animals in the experimental groups were similar.

Table 2 shows that in Zeitenov LLP in the first regimen, 23 animals were treated, 17 of which had an ovarian cyst, it amounted to 73.9%. As for the second treatment regimen, of 22 cows 8 animals had a cyst, which amounted to 36.3%. On the Kamyshinskoe farm, according to the first regimen, 17 animals were treated, 13 of which had a cystic formation, which accounted for 76.4%. According to the second treatment option, of 17 cows, a cyst was detected in 7 animals, which amounted to 41.1%. On average, of all the experimental groups in the first treatment regimen, recovery of ovulation and estrus rhythm was recorded in 75.1% of animals, in the second treatment option - in 38.7%.

Table 1 – Diagnosed cows with cystic pathology in the context of farms

No	Name of farm	Breed	Cows with cystic pathology	
			n	%
1	Zeitenov LLP, East-Kazakhstan region	Simmental	53	10.6
2	Kamyshinskoe farm, East-Kazakhstan region	Simmental	34	13.6

Table 2 – Results of the treatment of animals according to two regimens

No	Name of farm, Cow breed	Treatment regimen	Number of cows	The number of cured and artificially inseminated cows	
				n	%
1	Zeitenov LLP, Simmental breed	1	23	17	73.9
		2	22	8	36.3
2	Kamyshinskoe farm, Simmental breed	1	17	13	76.4
		2	17	7	41.1

Cured animals on coming to estrus were artificially inseminated with sperm of bulls, tested on the quality of the offspring. 35 days after artificial insemination, the experimental animals underwent a rectal examination and ultrasound scanning to determine pregnancy.

As can be seen from table 3, in the Zeitenov LLP, the pregnancy was detected in the first treatment regimen in 11 cows of total of 17 artificially inseminated animals, fruitful insemination amounted to 64.7%. According to the second option, of 8 cows 4 animals got pregnant, which amounted to 50% of fruitful insemination. On the Kamyshinskoe farm, according to the first treatment regimen, of 13 artificially inseminated cow 9 animals were pregnant, which accounted for 69.2% of fruitful insemination. According to the second regimen, of 7 cows 4 animals got pregnant, the fruitful insemination was 57.1%. In all groups of animals, fruitful insemination was on average 66.9% according to the first treatment regimen, and 53.5% according to the second treatment regimen.

The application of the first treatment option for cows with a follicular ovarian cyst ensured restoration of the estrus rhythm and fertility in most experimental animals. These results indicate a fairly high therapeutic efficacy of releasing hormone in the form of the drug Surfagon or its analogues when it is applied to cows with a follicular ovarian cyst during the period of manifestation of estrus signs or the formation of a new cyst. In terms of the shares of cows recovered, the efficiency of the first option is 75.1%, the share of the fertilized - 66.9%.

Highly synthetic GN-RH analogue of domestic production - Surfagon, administered to cows with follicular ovarian cysts intravenously at a dose of 50 μg, normalizes the functional activity of the gonads with the restoration of ovulation. With its differentiated three-time use (in the absence of the effect of previously conducted hormone therapy), under ultrasound control, recovery was observed in 75.1% of animals with a fertility rate of 66.9% compared to the classical treatment regimen based on a single injection of releasing hormone, where recovery was observed in 38.7% of cows with a fertility rate of 53.5%.

Table 3 – Results of artificial insemination of cows by two treatment regimens

No	Name of farm	Treatment regimen	The number of artificially inseminated cows	The number of pregnant cows	
				n	%
1	Zeitenov LLP	1	17	11	64.7
		2	8	4	50
2	Kamyshinskoe farm	1	13	9	69.2
		2	7	4	57.1

Conclusion. The solution of the tasks allowed to improve some technological aspects used in the reproduction of cattle. During the testing and development of estrus stimulation schemes for cows, new data were obtained, which expanded the possibility of reproduction management. Despite the achieved results, there is a need to improve and develop effective treatment regimens for follicular cysts.

The ground for doing research. Scientific and technical program of the Ministry of Agriculture of the Republic of Kazakhstan for 2018-2020. "Improving the efficiency of breeding methods in cattle breeding", project 3. "Development of effective breeding methods in the dairy cattle breeding industry", the event "Improving the reproductive ability of dairy cows in the eastern region"

Д. М. Бекенов[1], А. А. Спанов[1], Н. С. Кенчинбаева[1], А. Д. Баймуканов[2]

[1] "Байсерке-Агро "оқу ғылыми-өндірістік орталығы" ЖШС, Талғар ауданы, Алматы облысы, Қазақстан,
[2] Ресей мемлекеттік аграрлық университеті –
К. А. Тимирязева атындағы Мәскеу ауылшаруашылық академиясы, Мәскеу, Ресей

ШЫҒЫС ҚАЗАҚСТАН ОБЛЫСЫ ЖАҒДАЙЫНДА СҮТТІ БАҒЫТТАҒЫ СИЫРЛАРДА АНАЛЫҚ БЕЗ ФУНКЦИЯСЫНЫҢ ФОЛЛИКУЛЯРЛЫҚ КИСТА ТҮРІНДЕ БҰЗЫЛУЫМЕН КҮРЕСУ ӘДІСІН ЖЕТІЛДІРУ

Аннотация. Мақалада сүт өнімділігі бағытындағы сиырлардың аналық бездерінің фолликулярлы кисталарын емдеуге арналған релизинг-гормонды пайдалану туралы деректер келтіріледі. Бұл ретте фолликулярлы кисталарды емдеудің екі нұсқасын релизинг-гормонды пайдалану арқылы салыстыру жүргізілді.

Емдеу схемалары гонадотропин релизинг-гормон және простагландин F2α тобының препараттары әртүрлі нұсқаларда инъекцияда болды. Аналық бездің фолликулярлық қылқаламымен сиырлардың жыныстық қызметін түзету үшін сурфагон препаратын қолданған. Бірінші нұсқа бойынша, аналық безде кистозды пайда болған күннен бастап препарат көктамыр ішіне бір рет 50 мкг дозада 3 күн бойы инъекцияланды, төртінші күні аналық бездерді фолликулярлы кистаның болуына ультрадыбыстық сканерлеу арқылы тексереді. Екінші нұсқа бойынша фолликулярлы кистаны емдеудің классикалық сызбасы қолданылды, бұл ретте, бұлшықет ішіне бір реттік инъекцияға негізделген релизинг-гормон (сурфагон) 50 мкг дозада аналық бездегі фолликулярлық кистаны диагностикалау және 10-12 күнге простагландин F2α тобының препараттарын инъекциялау және жыныстық даму болған жағдайда жасанды ұрықтандыру кезінде.

Орташа алғанда барлық тәжірибелі топтардың ішінен емдеудің бірінші нұсқасы бойынша, овуляция мен жыныстық циклдің ырғағын қалпына келтіру жануарлардың 75,1%-да, емдеудің екінші нұсқасы бойынша 38,7%-да тіркелді. Жыныстық аң аулауға келген жануарлар ұрпағының сапасы бойынша тексерілген бұқалардың ұрығымен қолдан ұрықтандырылды. Қолдан ұрықтандырғаннан кейін 35 күн өткеннен кейін тұяқты жануарларға ұлттықты анықтау мақсатында ректалдық зерттеу және УДЗ жүргізілді. Жануарлардың барлық топтары бойынша нәтижелі ұрықтандыру орташа есеппен емдеудің бірінші нұсқасы бойынша 66,9 %, ал емдеудің екінші нұсқасы бойынша 53,5% болды.

Келтірілген нәтижелер "сурфагон" препараты немесе оның аналогтары түріндегі релизинг-гормонның жеткілікті жоғары терапиялық тиімділігі жыныстық аң аулау белгілерін манифестациялау немесе жаңа киста қалыптастыру кезеңінде аналық бездің фолликулярлы қылқаламымен сиырларды қолданғанда немесе оның аналогтары туралы куәландырады. Сауықтырылған сиыр үлесі бойынша бірінші нұсқаның тиімділігі 75,1 %, ұрықтандырылған 66,9% құрайды.

Түйін сөздер: мониторинг, релизинг-гормон, фолликулярлы киста, емдеу, сиыр.

Д. М. Бекенов[1], А. А. Спанов[1], Н. С. Кенчинбаева[1], А. Д. Баймуканов[2]

[1]ТОО «Учебный научно-производственный центр «Байсерке-Агро»,
Талгарский район, Алматинская область, Казахстан,
[2]Российский государственный аграрный университет –
Московская сельскохозяйственная академия им. К. А. Тимирязева, Москва, Россия

УСОВЕРШЕНСТВОВАНИЕ МЕТОДА БОРЬБЫ С РАССТРОЙСТВОМ ФУНКЦИЙ ЯИЧНИКОВ В ФОРМЕ ФОЛЛИКУЛЯРНОЙ КИСТЫ У КОРОВ МОЛОЧНОГО НАПРАВЛЕНИЯ ПРОДУКТИВНОСТИ В УСЛОВИЯХ ВОСТОЧНО-КАЗАХСТАНСКОЙ ОБЛАСТИ

Аннотация. В статье приводятся данные по использованию релизинг-гормона для лечения фолликулярных кист яичников коров молочного направления продуктивности. При этом было проведено сравнение двух вариантов лечения фолликулярных кист с использованием релизинг-гормона.

Схемы лечения заключались в инъекции гонадотропин релизинг-гормона и препаратов группы простагландин F2α в различных вариантах. Для коррекции половой функции коровам с фолликулярными кистами яичников применяли препарат сурфагон. По первому варианту со дня обнаружения кистозного образования в яичнике препарат инъецировали внутривенно однократно в течение 3-х дней в дозе по 50 мкг. с ультразвуковым сканированием яичников на четвертый день на наличие фолликулярной кисты. По второму варианту использовали классическую схему лечения фолликулярных кист основанная на однократной внутримышечной инъекции релизинг-гормона (сурфагон) при диагностировании фолликулярной кисты в яичнике в дозе 50 мкг и инъекции препаратов группы простагландин F2α на 10-12 день и искусственного осеменения при наличии половой охоты.

В среднем из всех опытных групп по первому варианту лечения, восстановление овуляции и ритма полового цикла зафиксировали у 75,1 % животных, по второму варианту лечения 38,7 %. Вылеченные животные по приходу в половую охоту были искусственно осеменены спермой быков, проверенных по качеству потомства. По истечению 35 дней после искусственного осеменения подопытным животным было проведено ректальное исследование и УЗИ с целью определения стельности. По всем группам животных плодотворное осеменение было в среднем по первому варианту лечения 66,9 %, а по второму варианту лечения 53,5 %.

Приведенные результаты свидетельствуют о достаточно высокой терапевтической эффективности релизинг-гормона в виде препарата «сурфагон» или же его аналогов при его применении коровам с фолликулярной кистой яичников в период манифестации признаков половой охоты или же формирования новой кисты. По доле выздоровевших коров эффективность первого варианта составляет 75,1 %, оплодотворившихся 66,9 %.

Ключевые слова: мониторинг, релизинг-гормон, фолликулярная киста, лечение, корова.

Information about authors:

Bekenov Dauren Maratovich, Master of Natural Sciences and Biotechnology, Director of ESPC Bayserke-Agro LLP, Talgar District, Almaty Region, Kazakhstan; unpcbayserke-agro@mail.ru; https://orcid.org/0000-0003-2244-0878

Spanov Abzal Abushakipovich, Senior Researcher, ESPC Bayserke-Agro LLP, Talgar District, Almaty Region, Kazakhstan; abzal16@mail.ru; https://orcid.org/0000-0001-9303-3722

Kenchindayeva Nazym Serzhanovna, Scientific Secretary, ESPC Bayserke-Agro LLP, Talgar District, Almaty Region, Kazakhstan; nazymnazym13@gmail.com; https://orcid.org/0000-0002-6624-0125

Baimukanov Aidar Dastanbekouly, Master student of the Faculty of Zootechnics and Biology of the Russian State Agrarian University – Moscow Agricultural Academy named after K. A. Timiryazev, Moscow, Russia; aidartaidar98@mail.ru; https://orcid.org/0000-0001-9669-864X

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