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КАК СПАСТИ ПОПУЛЯЦИЮ САЙГАКА В КАЗАХСТАНЕ?

Исследовалось изменение климата и его влияния на динамику численности сайгаков в Казахстане. Анализ концентрируется на изучении изменения климата, влияющие на массовый падеж антилоп (Сайга) с начала нового века.

С начала нового века их количество сократилось в 3-10 раз по двум причинам: эпизоотический пастереллез, вызванный изменением климата и резким снижением генетического разнообразия. Экологическая катастрофа, связанная с массовой мутацией сайгаков, обусловлена полной недостаточностью информации о поле ветра (сдвигов) в нижних слоях атмосферы.

Надо внести Доплер-радар в обязательный список метеорологических приборов для оперативного определения распределения поля ветра (порывы ветра) в нижних слоях атмосферы. Особенно это касается регионов, путей миграции популяции сайгака. В противном случае экологические катастрофы из-за опасного внешнего воздействия окружающей среды-поля ветра (сдвиги) будут продолжаться.

Эпизоотии в зоне в течение одной недели превышали 3-4 месячные нормы, обусловленные изменением западного циклона на северный. Высокая влажность, основной фактор мутации сайгака, вызывает анаэробную энтеротоксемию и пастереллез.

Ключевые слова: сайгак, популяция, пастереллез, методы, спасение сайгака

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HOW TO SAVE THE SAIGA IN KAZAKHSTAN?

This article submits the analysis of the study of the climate change and its influence on dynamics of the number of saigas in Kazakhstan, which appeared 20 thousand years ago as a mammoth and a rhinoceros. The analysis concentrates on the study of the climate change influencing the mass murrain of antelopes (saigas) from the beginning of a new century.

Since the beginning of a new century their quantity has decreased by 3-10 times owing to two factors: epizooty pasteurellosis caused by the climate change and sharp reduction of a genetic variety. The environmental disaster connected with the mass murrain of saigas is caused by full insufficiency of information about the field of the wind (shifts) in the lower layers of the atmosphere.

It is necessary to bring the Doppler-radar installation in the obligatory list of meteorological devices by the expeditious definition of distribution of the field of the wind (wind shears) in the lower layers of the atmosphere. Especially it concerns the regions of the way of migration of the population of saigas. Otherwise, environmental disasters due to the dangerous external influence of the environment – fields of the wind (shifts) will continue.

In epizooty, the zone during one week had 3-4 norms of a monthly deposit, caused by the change of the western cyclone into the northern one.

High humidity, the main factor of the murrain of saigas, causes anaerobic enterotoxemia and pasteurellosis.

Key words: Saiga, population, pasteurellosis, methods, save the saiga

The most ancient Eurasian ungulate is saiga, who is the age-mate of mammoth and woolly rhinoceros and who suffered an ice age 20 thousand years ago. Saiga tatarica L. is the most widely spread animal among ancient ungulates in Kazakhstan. Not so far ago, saigas were a fundamental specie of ungulates with the head of more than 1,0 million heads. Today there are three populations of saiga living in completely isolates areas of Kazakhstan, which are betpak-dalinsk-aryssk, ustyurtsk and ural [1], [2], [3], [4], [5].

It was noted, that in Kazakhstan seasonal accommodation of saigas has a certain consistant pattern. On wintering animals' habitat is the South of the republic (including certain areas of the territory of Uzbekistan), in spring antelope migrates to the North of the republic where lambing takes place. Further they wander to pastures (summer pasture) and dwell in semi desert and steppe zones. As fall comes back animals return to the South of republic [6], [7], [8].

Saigas are well-known for their constant movements, within a year they move 3–4 thousand kil-

ometers. Areas of wintering and mass lambing are the most constant and limited areas of saiga's habitat. Since there is no special competition between saigas and domestic animals very weak contact was noted between them. They often change pastures, and as a rule, only partially pit vegetation. Diet of saigas consists of such plants, that are reluctant or completely not eaten by livestock (anabasis, bug-infested, Kermek, ephedra, etc.) [9].

Among domesticated animals horses, eating every eighth of all vegetation, are the ones who are most selective on vegetation, at the same time saigas consume only 20 of thousands of species of steppe plants, i.e. every fiftieth. It was defined by investigating betpak-dala population in lower reaches of the Sarytorgay on their food selection behavior. In general, they choose juicy grasses, which are glassworts, an ephedra, different types of ice-holes, a wheat grass pectineal, Kentucky bluegrass, fescue, Kermekboyalych, Kokpek, Anabasis salsa, kohii, sorrel that made 98% of volume of contents of stomachs. Thereby, only 12 to 23 kg/hectare of vegetation a year (about 1,5–2% of a crop) is used as food by saigas, while domesticated livestock consumes 100 and more kg/hectare (12–18%), which proves a weak load to pastures. The feeding capacity of pastures of the republic can provide fully an annual ration of 2 to 3 million saigas without damaging the environment [10].

Large on scales last epizooty was detected in May 2015 on the territories of three regions. Zholab's natural boundary of the Zhangeldinsky area of Kostanay region is the place where the first case (117 heads) with saigas was registered, on May 11. At the same time, a mass case was detected in the Aktobe and Akmola regions. As of June 22, 2015 in total of 148800 carcasses of saigas were utilized. In Kostanay region – 127775, in Aktobe – 10358, and in Akmola – 10667. About 50,4% of all livestock of saigas in Kazakhstan or 61,4% of these ungulates of betpak-dala population died out. As for now, there are two main hypotheses of the reasons of existence of massive loss.

The first reason, which is considered as the main, was based on a climate change occurred on that region, when in one week 3–4 norms of precipitation took place within one week, caused by change of the western cyclone to the southern cyclone. According to Kazgidromet's data sharp temperature fall and wind strengthening was caused by the exceeding norm of precipitations on saigas' mass case place of Kostanay region. In addition, according to meteorological station areas on the first decade of May 17 to 75 millimeters of rainfall dropped out, while the norm is 8–10 millimeters (Ekidyn – 17mm, Railway – 35mm, Zhitigara – 75 mm and Karabalyk – 53 mm). theses stations are located in ways of betpak-dala population migration [1].

Effect of «a bottle neck»

Pasteurellosis epizooty often arises in May when saigas' lambing comes to an end. Mothers, which already gave birth, and their newborn posterity are physically weak for some time. The exhausted gene pool of the population causes weakening of the general immunity of this species. Decrease in the resilience of an organism (immunity) to the banal microflora, passerelle (which are often present in the organisms of healthy animals), provokes the fast increase of virulence of these microbes and as a result a high lethality of saigas (mothers and descendants).

In our opinion, exhaustion of a gene pool of a saiga is caused by close inbreeding (closely related crossing) of individuals in a lineage for the last 60 years. Initial Kazakhstani population of saigas in the late forties of the XX-th century didn't exceed 2–3 thousand heads. This phenomenon in the population of animals in genetics is called the effect of "a bottle neck" (Baytanayev et al. 2014a; Nurushev et al. 2016a). The concept of the effect of "a bottle neck" reflects the sharp decrease in a genetic variety or a gene pool of the population that occurs between two next cycles of dynamics of the quantity (critical recession and rise). The curve of the presence of livestock in the narrowest part is similar to a bottle neck and got such figurative name. The effect of "a bottle neck" was affected by laws of genetics, mainly, viability of animals. Earlier it was proved on the example of cheetahs. The similar situation led them to sensitivity and diseases.

Conclusion

1. The environmental disaster, connected with the mass murrain of saigas, is caused by a lack of information support of the forecast of cyclones, winds (change) in lower layers of the atmosphere. The obligatory Dopler-radar installation in the list of meteorological devices of the meteorological

station by the urgent definition of the area of the wind (wind shears) in lower layers of the atmosphere is necessary. Otherwise, environmental disasters, because of the dangerous external influence of the environment – areas of the wind (change), will proceed.

2. Only on the basis of the forecast of cyclones (rain), winds (change) in lower layers of the atmosphere of a migratory route of saigas it is necessary to execute bacterination. It will give saigas a chance to endure the adverse period of the year.

3. On our hypothesis, in those herbs which are eaten by saigas there is a mystery of anti-tumoral drugs (treatment of tumors of cancer). The natural instinct, congenital in saigas on the selectivity of officinal herbs, can induce us to believe in many mysteries of processing of oncological illnesses. We have to study the alimentary behavior of saigas in the opening of medical secrets. These factors enlarge the need of conservation of saigas for the region to restore a genetic variety of the Kazakhstani subspecies of saigas *(S.t. tata Rica)* by the method of intraspecific crossing with the Mongolian *(S.t. Mongolia)* subspecies.

4. We are sure that assistance will be from: World Meteorological Organization (WMO), MSOP, YUNEP and World Wide Fund for Nature and PROON. Only the common harmonious efforts of scientists and management of the international institutes will help to keep saigas in the fauna of mammals of Kazakhstan.

The analysis of long-term dynamics of populations of a saiga shows that this type tested effect of "a bottle neck" twice. The first took place in the late 1940s when there were single herds of saigas, a few hundred heads in each. During this period, no more than 5–10 thousand saigas inhabited in the country. In the 1950th thanks to measures for a hunting ban, number of type quickly grew, and trade was organized. The second time sharp decrease in number was noted during the period from 1985 to 2003 when the number of a saigafell approximately from one million heads to 21.3 thousand heads, that was reduced by 97.9%.

Impoverishment of a genetic variety conducts to decrease of adaptive potential of population, i.e. viability of animals (decrease in immunity to some infections, fixing the alleles conducting to genetic diseases).

In our point of view, "feeding" the population of saigas with salmonella bacteriainitially happened in the territory of deserts Moyynkum, Kyzyl Kum and Ustyurt where there are combined natural centers of plague and pasteurellosis. In the period of the highest number of the studied antelopes, they wintered exactly there. Since 60th years of the last century, strains of pasteurellosisallocated from big sandworts according to all Moyynkum, and also in the northwest of Kyzyl Kum and northern part of an Ustyurt plateau.

Pasteurellosis could get to an organism of saigas during wintering. In this time, their genetic

Fig. 1,2,3– Illustrations of mass death of a saiga in Kazakhstan in 2015.

variety was at the high level and therefore the cases of mass diseases of pasteurellosisware not noted. Only from 80s, the outbreaks of a pasteurellosis infection at a saiga as a result of action of effect "a bottle neck" began to arise. Meanwhile the Moyynkum center continues to be active in present time also. Therefore, from 2010 to 2015 only from a big sandwort the antiplague service isolated tens of strains of the causative agent of plague. At serologica research of rodents on pasteurellosis results were positive in Kyzyl Kum (2015). These data confirm activization of the combined centers of plague and a pasteurellosis.

Scientists, specialists in plague of the Southern Kazakhstan assume that extinction of big sandworts in Moyynkum comes from this infection. Also at alimentary infection of rodents with different doses of Pasteurella there was their survival. Only after provocation (bathing in cold water), they began to get sick and die. From them cultures of the causative agent of pasteurellosis from all bodies, and also urine and excrement are allocated. Overcooling, promotes the sharp course of the infectious process, followed by their death. The same happened to saigas. In the spring at a sharp cold snap, accompanied by rains, they overcooled, weakened and developed pasteurellosis that led to a mass case. The starting mechanism is the so-called genetic syndrome. Therefore, if in May 2016 in places of their mass lambing there will be a cold and rainy weather, the death of saigas from pasteurellosis is inevitable. Such a negative forecast. There is a problem: how to avoid new deaths of animals, to keep population and what is necessary to undertake.

The protected natural territories united in one ecological network are necessary for Kazakhstan. Basic elements of the protected territories will be national parks and the reserved territories which have to be connected among themselves by the protected objects of regional and local value. Creation of a global eco platform will represent the network of a full form. Otherwise, the isolated elements of the natural protected fund will undergo to the ecological deterioration because of an anthropogenous factor.

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References
1. Zietkievicz E, Rafalski A and Labuda D (1994) Genome finders-printing by simple sequence repeat (SSR) – anchored polymerase chain reaction amplification. Genome, 20: 176-183
2. Fadeyev VA, AndIvanov AA (1988) The number of saigas in Kazakhstan depending on fodder resources. / Proceedings of the Institute of Zoology of ANKaz. Soviet Socialist Republic t.44. Alma-Ata:37-47
3. Grachev YuA (2009) Structure and reproduction of populations of a saiga in Kazakhstan. Theriofauna of Kazakhstan and adjacent territories. Almaty:181-186
4. Kock R, Grachev Y, Zhakypbayev A, Usenbayev A, Zuther S, Klimanova O, Dieterich T, Sapanov M and Izimbergenova G (2012) A retrospective assessment of saiga antelope Saiga tatarica die-off in Western Kazakhstan 2010-2011. Saiga News 14: 1-4.
5. Jenkins M (2001) 101 key idea: evolution. M.: Fair-press:227
6. Williams I, Kubelnik AR and Lila KI (1990) DNA polimorphisms amplified by arbitrary primers are useful as genetics markers. Nucl. Acids. Res., 18: 496-497
7. Goldsmith FB, Harrison CM. and Morton AJ (1986) Description and analysis of vegetation: 437-524
8. Krebs CJ (1999) Ecological methodology. Addison-Wesley Educational Publishers, Inc., Menlo Park, CA:620
9. Nurushev MZh, Baitanaev OA (2016) To keep biological diversity. Kazakhstan truth (National newspaper). No. 232 (28358):23-24
10. Nurushev MZh, Baitanaev OA, Kerimbai BN (2016a) How to save the saiga in Kazakhstan? Science and World International scientific journal, №1 (29), Vol. II: 96-100.

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