Symposium

Emerging Threats for Human Health

Impact of Socioeconomic and Climate Change on Zoonotic Diseases

August 13, 2018 in Yakutsk

Program and Abstract Book

https://health.uni-hohenheim.de

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Emerging Threats for Human Health

Impact of Socioeconomic and Climate Change on Zoonotic Diseases: An Introduction

Climatic, socio-cultural and economic changes as well as technological development have an immediate impact on the environment and human health in particular. Our steadily growing need of resources increases the pressure on the environment und narrows down untainted habitats for plants and animals. These developments and globalization in general are important drivers of emerging and re-emerging infectious diseases, and promote the spread of neglected tropical diseases. The global rise of drug resistance (e.g. MRSA) superimposes these threads and calls for immediate and comprehensive approaches across borders.

Arctic and subarctic regions are especially vulnerable to climate change, as rising temperatures and thawing of permafrost landscapes transform soil structures, vegetation and habitats. The risk of zoonotic diseases in the Republic of Sakha (Yakutia) has significantly increased, as higher temperatures lead to more favorable living conditions, prolonged vegetation periods and the expansion of vector habitats. Moreover, permafrost degradation may expose historic cattle and other burial grounds thereby reviving the vectors of deadly infections from the past (Revich 2011) and endangering humans, their livestock, pet animals and wildlife.

Zoonoses are not the only source of health threats in today's Sakha. Cultural and socio-economic changes also led to drastic effects on the health and wellbeing of indigenous people. In the course of modernization and urbanization, the traditional lifestyle of horse-breeders and hunters in dwellings and remote settlements steadily shifted towards sedentary urban lifestyles. However, their traditional diet that is rich in fat, meat and dairy products remained the same. This resulted in a troubling increase of chronic conditions, the most prevalent being diseases of the circular and digestive systems (Burtseva et al. 2014, Tatarinova et al. 2015). Rospotrebnadzor, the State Health Agency, lists a category of "gastroenterological diseases of an unknown etiology" each year, giving room to speculate on yet unidentified food-borne diseases and/ or non-physiological, pathogenic changes in the microbiome of the digestive tract.

Next to unravelling the causative agents, their biological mechanisms and epidemiological patterns of the aforementioned conditions, it seems necessary to develop a new behavioral strategy and individual attitude towards health preservation for indigenous people in Sakha. According to a recent study, there is a rather inadequate commitment to a healthy life-style among indigenous Yakuts. Although there is general awareness that health depends on diet, life-style and ecology, only natives of mature age develop an active attitude towards healthy living which seems rather related to progressive deterioration of their well-being and presence of chronic diseases. In younger age, most consider themselves healthy and hence ignore prevention of diseases (Ammosova 2018).

One Health is a collaborative concept and practical approach that addresses imminent and fundamental health threats of humans, animals, and their ecosystem in an integrated manner at a local, regional and global scale. This requires inter and cross-disciplinary partnerships and cooperation among a diverse arena of professionals such as veterinarians, physicians, biologists, chemists, environmental scientists, sociologists, economists and public health professionals.

This Symposium takes up current threats and challenges in Yakutia that shall be addressed jointly by interconnecting scientific expertise, conceptual thoughts and infrastructure. We are looking forward to a fruitful cooperation and interesting meeting.

Dr. Irene Huber & Katerina Potapova
Hohenheim Research Center for Health Sciences

Organizers

Yakut Sate Agricultural Academy

Yakut State Agricultural Academy is an Educational Institution of the Ministry of Agriculture of the Russian Federation for training specialists for the agro-industrial complex. The Academy has three faculties: agrotechnology, veterinary medicine, engineering and the Department for Economic, Legal and Humanitarian Education, a branch in the village of Oktemtsi, Khangalassky ulus. As of today more than 3400 students study at the Academy. The Academy conducts training in more than 45 areas of higher education, as well as in areas of secondary education.Academy has its own Scientific and Clinical Diagnostic Laboratory (opened on 1st September 2017). In 2005, the Academy initiated the Games of Reindeer Herders. Academy holds yearly competitions in horse racing.
For more information, visit: http://ysaa.ru/

Institute of Biological Problems of Cryolithozone SB RAN

The Institute is the leading scientific research institution for the training of scientific personnel for the research and protection of the biological diversity of the North. The institute has interdepartmental laboratories of permafrost forest management, ecological biochemistry, floristics and phytocenology, ecology and stability of northern ecosystems, accounting and cadastre of hunting and commercial animals, preparation of students for scientific work in the Yakut State Agricultural Academy for Soil Science, agrochemistry and plant breeding. The main objectives of the Institute:
• Implementation of fundamental scientific research and applied research in the field of studying the biological diversity of Yakutia and the adjacent territories of the permafrost zone;
• Involvement of northern bioresources in economic circulation.
The main activities of the Institute
• Ecology of organisms and communities: structural and dynamic organization, functioning and stability of cryolithozone ecosystems;
• Biological diversity: optimization of use and protection of the biological resources of the permafrost zone.
For more information, please visit: http://ibpc.ysn.ru/

North-Eastern Federal University in Yakutsk

The Institute of Health was established in 1995 as Scientific Research Institution „Institute of Health“ withing the Academy of Sciences of the Republic of Sakha (Yakutia). In 2011, the Institute joined the North-Eastern Federal University as a separate structural unit. The Institute carries out research in the field of natural and human sciences. The main scientific areas of research are population studies aimed at studying the state of adaptive mechanisms of both indigenous groups and newcomers; development of scientific foundations for the formation of human health in the North, the creation of innovative products and technologies for diagnosis, treatment and prevention of diseases in the population of cold climates; study of the problems of Vilyui encephalomyelitis and other degenerative diseases of the brain.

The Medical Institute (established in 1957) can be called the oldest higher medical school in the North-East of Russia. The Institute is known both in Yakutia and beyond its borders for its training programs and the scientific and pedagogical personnel. Students from Yakutia, Buryatia, Magadan, Irkutsk regions and from foreign countries (Zambia, Peru, Afghanistan, Tajikistan, Kirgizistan) study here in 6 specialties, 2 directions of Bachelor‘s and 4 of Master‘s degree in 22 departments. The Clinic was established in 2002 with the goal to offer medical and preventive help for the students of NEFU as well as to serve as a scientific and educational clinical base for the Medical Institute. It provides patients with outpatient care. The clinic has several scientific and educational laboratories, such as Laboratory of genomic medicine, Laboratory of neurophysiological studies, Laboratory of osteoporosis, Laboratory of pathomorphology, histology and cytology, Microbiological laboratory, Research laboratory of cellular technologies and regenerative medicine.
For more information, visit: www.s-vfu.ru/en/Institutes/SRIH/

University of Hohenheim

Founded in 1818 after devastating famines, the University of Hohenheim is not only engaged in intensive basic research but has traditionally also been committed to developing innovative solutions for some of society‘s pressing problems. To do so, the University of Hohenheim engages in a combination of scientific disciplines that is unique among German universities. Today, the University of Hohenheim is the leading University in agricultural research and food sciences, as well as strong and unparalleled in natural, social, business, economic, and communication sciences. The combination makes it possible to find solutions for many global challenges. This is why the University puts great importance on maintaining an international network with numerous strong partners.
For more information, visit www.uni-hohenheim.de

The Hohenheim Research Center for Health Sciences provides a dynamic platform for researchers, lecturers, young scientists and students dedicated to life sciences and health topics. In accordance with the One Health Concept, we promote high-level research across several disciplines by

- joining expertise, e.g. in biology, immunology, health care and medicine, agriculture and food sciences, economics and social sciences
- building bridges between bench scientists, clinical investigators, health researchers, business and public stakeholders
- strengthening national and international research networks for exchange and productive partnerships
- obtaining funds for integrated research projects focusing on major scientific and societal topics, including e.g. growth, development, demographic change, lifestyle, nutrition, aging as well as their social and economic impact.

For more information about the Research Center, visit www.health.uni-hohenheim.de

Organizers

Yakut Scientific Research Institute of Agriculture

Scientific support of agriculture in the Republic of Sakha (Yakutia)

Report of the Director, Prof. Dr. Ayaal I. Stepanov

The Federal State Budgetary Scientific Institution the "Yakut Scientific Research Institute of Agriculture named after M.G. Safronov" was founded on March 30, 1956. It is one of the largest institutes in the Far East of Russia. The main aim of the Institute is to conduct fundamental and applied scientific research, experimental and design work, introduce scientific achievements and advanced practices aimed at obtaining new knowledge in the agro-industrial complex that contribute to its technical, economic and social development. The Institute, from the day of its creation, pays much attention to the introduction of adaptable varieties of grain crops, perennial grasses, potatoes, fruit and berry crops, conservation and breeding of cattle, horses, reindeer and the development of veterinary preparations.

The staff of the Institute is 144, including 82 researchers, 10 doctors of science, and 38 candidates of science. The Institute includes 4 departments, postgraduate study program, scientific library, 15 scientific subdivisions, whose management is carried out by 6 doctors and 9 candidates of science.

According to the State task, 7 people are studying in the postgraduate program of the Institute. Postgraduate studying is carried out in accordance with the license for 5 scientific specialties.

The advisory body of the Institute is the Scientific Council, which consists of 16 members, including 7 doctors and 9 candidates of science, as well as the board of directors, 4 scientific and methodological councils for economics, plant growing, animal husbandry, and veterinary.

The Institute employs the Council of Young Scientists, postgraduate students and specialists, which includes 45 specialists under the age of 39, including 10 candidates of science. The Small Agricultural Academy, which is entrusted by the Order of the Head of the Republic of Sakha (Yakutia) to organize scientific management of the activities of 80 rural agro-profiled schools in the republic.

The Institute has 203.1 hectares of land on permanent (unlimited) use, As a research and production (experimental) base, there are "Yuchyugeyskoe" and two small innovative enterprises: "Nauka" LLC, and the Scientific Production Center "Hotu-Bact" Ltd..

The main achievements of research and development work in recent years are: the creation and introduction into production of 11 varieties of spring soft wheat, 5 varieties of spring barley, 6 varieties of oats, 2 varieties of winter rye, 14 varieties of perennial grass and leguminous herbs of various type of use, 2 varieties of potatoes, 6 varieties of blackcurrant, 4 varieties of wild strawberry; 2 breeds of horses - megezhekskaya and prilenskaya; 2 types of horses of the Yakut breed (Yansky, Kolymsky); development and production of new biological and veterinary preparations; development and introduction into production of new technologies for cultivation of crops, maintenance, feeding, reproduction and treatment of animals.

For 2017 there were published 10 monographs, 20 methodological guides and recommendations in the field of plant growing, animal husbandry, processing of agricultural products, veterinary biotechnology and environmental protection, as well as in the economy of agriculture, The Institute maintains 46 patents for invention and 15 for selective achievement and 3 certificates of state registration of the database. 20 license agreements were concluded on a reimbursable basis.

Every year at the Institute various seminars, scientific and practical conferences, round tables are held. Scientists of the Institute take part in the work of various Russian and international scientific and practical conferences, meetings, seminars and exhibitions. Every year the agro-industrial exhibition "Golden Autumn" takes part and the development of our institute is awarded with 7 gold and 4 silver medals.

Joint research is conducted with leading scientific institutions. International relations in the field of scientific and technical cooperation with foreign countries are being developed by the Heilongjiang Academy of Agricultural Sciences, the Institute of Natural Resources of Finland on the origin and adaptation of the body of the Yakut cattle, the Kazakh Research Institute of Livestock and Feed Production, the Kazakh National Agrarian University, the National Academy of Sciences of Belarus for Agriculture.

LLC Scientific & production center „Khotu-Bact“

A small innovative enterprise LLC „SCIENTIFIC AND PRODUCTION CENTER KHOTU-BACT“ was established in 2013 at the Yakut Research Institute of Agriculture. LLC SPC „KHOTU-BACT“ is a participant of the Skolkovo Foundation, a resident of the Yakutia Technopark, and is the only enterprise in the North-East of Russia that develops and produces veterinary drugs. The scientific novelty of developments is protected by Russian patents. Production is licensed by the Russian Federal Service for Veterinary and Phytosanitary Supervision (Rosselkhoznadzor).

Program

MONDAY, 13 AUGUST 2018

REGISTRATION, WELCOME AND INTRODUCTION

08:30 **Registration**

09:15 **Welcome Address**
Ivan I. Sleptsov, Rector, Yakut State Agricultural Academy, Yakutsk

09:30 Ludwig E. Hölzle, Head of Delegation, Research Center for Health Sciences, University of Hohenheim, Stuttgart, Germany

09:40 **Zoonotic Infections in Yakutia**
Margarita E. Ignat'eva, Head of Russian Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor), Regional Office in Yakutia

SESSION 1:

Overview over Zoonoses in Yakutia and in Germany

Chair: Konstantin R. Nifontov, Yakut State Agricultural Academy

09:55 **Overview over Zoonoses in Yakutia**
Alexandr M. Okhlopkov, Federal Service for Veterinary and Phytosanitary Surveillance, Regional Office in Yakutia

10:10 **Assessment of the epizootological situation of bovine tuberculosis in Yakutia**
Galina P. Protod'yakonova, Yakut State Agricultural Academy

10:20 **Prevention of infectious diseases of horses - Problems, achievements, perspectives**
Mikhail P. Neustroev, Yakut Scientific Institute of Agriculture, Yakutsk

10:30 **Host-pathogen interaction of persistent bacterial infections**
Ludwig E. Hölzle, University of Hohenheim, Stuttgart, Germany

10:45 **Pharmacological efficiency of 1β recombinant interleukin in cattle treatment and prevention of cryptosporidiosis**
Ayan N. Nyukkanov, Yakut State Agricultural Academy

10:55 **Coffee break**

11:20 **Epizootology of Anthrax in Yakutia**
Mikhail P. Neustroev, Yakut Scientific Institute of Agriculture, Yakutsk

11:30 **Anthrax – Diagnostics, Epidemiology, Environment, Therapy, Vaccines, and Phages**
Wolfgang Beyer, University of Hohenheim, Stuttgart, Germany

11:45 **Echinococcosis and alveococcosis research in Yakutia**
Ludmila M. Kokolova, Yakut Scientific Institute of Agriculture, Yakutsk

11:55 **Research on alveolar and cystic echinococcosis at the University of Hohenheim**
Thomas Romig, University of Hohenheim, Stuttgart, Germany

12:10 **A variety of harmful insects (Diptera) and ticks (Acari: Ixodida), study of their life cycle, and creation of preventive measures for agricultural animals**
Alexandr D. Reshetnikov, Yakut Scientific Institute of Agriculture, Yakutsk

12:20 **Tick related research at the University of Hohenheim**
Marco Drehmann, University of Hohenheim, Stuttgart, Germany

12:35 **Discussion: Knowledge Gaps and Cooperation Opportunities**

12:45 **Lunch**

13:45 Poster Session

SESSION 2:

Emerging Zoonotic Threats to Human Health (in Russia and in Germany)

Chair: Konstantin M. Stepanov, Yakut Research Center of Complex Medical Problems

14:30 **Surveillance and control of zoonotic diseases in Germany – an overview and the case of Hepatitis E**
Dr. Mirko Faber, Robert-Koch-Institute, Berlin, Germany

14:50 **Viral hepatitis E as a new zoonotic threat to human health**
Sergey I. Semenov, Institute of Health, North-Eastern Federal University, Yakutsk

15:10 **Discussion: Knowledge Gaps and Cooperation Opportunities**

15:20 **Coffee break**

SESSION 3:

Evidence Base of Climate Change and its Effects on One Health in Yakutia

Chair: Agafya Z. Platonova, Yakut State Agricultural Academy

15:50 **Influence of global climate change on the natural environment of the center of the continental permafrost zone of the Northern Hemisphere (on the example of Yakutia)**
Roman V. Desyatkin, Institute of Biological Problems of Cryolithozone SB RAS

16:00 **Impact of climate and land use change on soil processes – evidence and perspectives**
Sergey Blagodatskiy, Holger Pagel, University of Hohenheim, Stuttgart, Germany

16:15 **Discussion: Knowledge Gaps and Cooperation Opportunities**

SESSION 4:

Emerging Diseases Threats: Integrating Local Knowledge and Socioeconomic Factors

Chair: N.N.

16:25 **Indigenous Peoples of Yakutia and New Health Risks in Connection with Global Change**
Vyacheslav I. Shadrin, Inst. for Humanities Research and Indigenous Studies of the North SB RAS

16:35 **Attitudes towards health among indigenous peoples under modern conditions**
Elena P. Ammossova, Institute of Health, North-Eastern Federal University, Yakutsk

16:45 **Rural Everyday Life in Yakutia in a Changing Environment**
Liliya I. Vinokurova, Arctic Research Department, Institute for Humanities Research and Indigenous Studies of the North, SB RAS

16:55 **Food products in combination with unique northern raw materials**
Konstantin M. Stepanov, Yakut Research Center of Complex Medical Problems / Yakut State Agricultural Academy, Yakutsk

17:05 **Bridging knowledge systems in nutrition and health research**
Stefanie Lemke, Centre for Agroecology, Water and Resilience, Coventry University, UK / University of Hohenheim, Stuttgart, Germany

17:20 **Discussion: Knowledge Gaps and Cooperation Opportunities**

17:30 **Concluding Remarks / End of the Symposium**

ABSTRACTS

Oral Presentations

Introduction

O1 Zoonoses in Yakutia

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[1] Russian Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor), Regional Office in the Republic of Sakha (Yakutia)

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In the territory of the Republic of Sakha (Yakutia), for a long time there have been natural foci of infectious diseases common to humans and animals such as rabies, anthrax, leptospirosis, tularemia, listeriosis, pseudotuberculosis, yersiniosis, hemorrhagic fever with kidney syndrome and others [1,2,4,5].

Experts of the State Sanitary and Epidemiological Supervision monitor the circulation of zoonotic pathogens in the environment. Zoologists-entomologists annually leave for seasonal field work in different regions of the Republic in order to catch rodents, birds, arthropods, and to collect samples of water and soil. Then the collected material is examined in the laboratory of especially dangerous infections for zoonotic pathogens. Until 1990, cultures of the pathogen of tularemia were isolated in water samples of floodplain lakes and blood-sucking dipterous insects and ectoparasites [1,2]. At present, the causative agents and markers of tularemia and pseudotuberculosis are determined in the materials from rodents, the pathogens of intestinal yersiniosis were detected, the tick-borne virus of tick-borne encephalitis was detected (from 3% to 11%). In 2014, wild bird samples were isolated and the avian influenza A (H5N8) virus was typified [6]. In 2018, a culture of listeria was identified in the fish samples. From the Veterinary Service, information on the disease and the death of animals from anthrax came up to 1993, according to archival materials in 26 districts, 285 permanently adverse points of anthrax were established. Currently, the Veterinary Service regularly informs about the detection of serological markers of leptospirosis in horses and deer, and of rabies in wild and domestic animals.

According to laboratory environmental studies, 19 of the Republic's territories are adverse for tularemia. Here, according to epidemic indications, mass vaccinations against tularemia are conducted. Preventive vaccinations against anthrax, rabies, tick-borne encephalitis are carried out within individuals from "the risk groups".

In the last century in Yakutia there were large outbreaks of tularemia (1959-1960), pseudotuberculosis (1974), outbreak of rabies (1973), during the period 1950-1980, cases of people infected with anthrax were diagnosed [1,2,4,5]. At present, there are occasional cases of yersiniosis. For the first time in 2018, a local case of tick-borne encephalitis was registered.

There is a great interest in paleomicrobiological research. Together with the State Scientific Center of Virology and Biotechnology "Vector", studies of Oymyakonsky mammoth have been carried out, whose age is estimated to be more than 18 thousand years. A living aerobic gram-positive non-spore bacterial culture, classified as Kurthia, was isolated. As a result of the study, it was possible to detect a high concentration of viable thermotolerant aerobic bacteria, and it was shown that it is necessary to continue the genomic analysis for the stability of the characters.

Conclusions:

In the territory of Yakutia, there are natural foci of infections common to humans and animals, and the circulation of pathogens in the environment is determined.

In the past century, there have been cases of mass diseases of people with zoonoses, at present, due to preventive measures, only sporadic cases of certain diseases are recorded.

Modern methods of laboratory diagnostics, including those used in regional and all-Russian reference centers, allow us to identify a wide range of pathogens of natural focal infections, including paleomicroflora, to perform their genomic analysis, and to establish sources, reservoirs and mechanisms for transmission of infections.

The State Sanitary and Epidemiological Surveillance conducted by the expertss of the Rospotrebnadzor in cooperation with the Veterinary Service and leading scientific institutions of the country allows timely detection of trends in the development of the epidemic process of natural focal infections and adequately respond to the emerging epidemiological situation.

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5. Egorov, I.Ya. Infectious diseases in Yakutia: stat. reference book / I.Ya. Egorov, A.G. Fedulova, T.I. Kochetov. - Yakutsk: Sahapoligrazdat, 1994.

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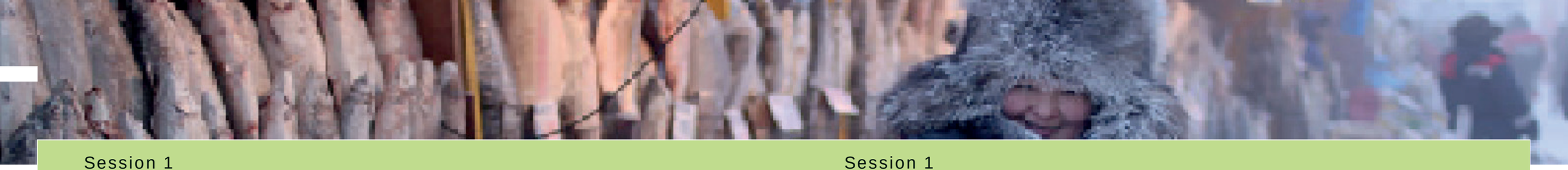

O2 Evaluation of the epizootological situation of tuberculosis in the Republic of Sakha (Yakutia)

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[3] Student at Russian State Agricultural University - Moscow Timiryazev Agricultural Academy
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The Republic of Sakha (Yakutia) had a complicated epizootic situation for cattle tuberculosis for a long period. The purpose of this report is a retrospective study of the epizootic process of bovine tuberculosis in Yakutia.

In the 1950s-1980s in the Republic of Sakha (Yakutia) a high incidence of tuberculosis in agricultural animals was recorded, the criterion for the epidemic significance of animal tuberculosis was the frequency of allocation of bovine mycobacteria from people with tuberculosis.

The results of the conducted studies served as the basis for the development of the "Program of measures for the improvement of livestock farms from tuberculosis of cattle", the introduction of which made it possible to drastically improve the epizootic situation for this infection in the country by 1988.

However, in 1996 and 2001, sporadic cases of tuberculosis in herds of cattle on small farms and private farms were recorded.

In this regard, the Department of Veterinary Medicine of the Republic of Sakha (Yakutia) and the Scientific and Practical Center "Phthisiology" have developed and are carrying out complex measures and scientific research on the prevention and diagnosis of tuberculosis in the outbreaks of tuberculosis infection in livestock farms.

Within the framework of joint activities, the diagnostic value of the detection of mycobacterial tuberculosis DNA by the PCR method in blood samples of cattle from tuberculosis-free farms of the republic, previously unsuccessful, was investigated. At the same time, against the background of stabilization of the epizootic situation of cattle tuberculosis, the problem of nonspecific tuberculin reactions remains. Annually, in 15-18 out of 35 districts of the Republic, animals reacting to PPD-tuberculin for mammals are identified. Long-term studies on the causes of the etiology of nonspecific tuberculin reactions have shown that this infection of animals with non-tuberculosis (atypical) mycobacteria.

The introduction of the developed system of scientifically based measures for the control and prevention of tuberculosis among cattle allowed to provide epizootological well-being of the Republic of Sakha (Yakutia) for this infection.

O3 Prevention of infectious disease of horses: problems, achievements, perspectives

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Infectious and invasive diseases play a significant role in horse keeping. The most common and causing significant economic damage is the horse strangles, salmonella abortion and rhinopneumonia of horses. In recent years, a spread of leptospirosis has been noted. A decrease in the level of immunobiological reactivity of foals and mares in the autumn and winter periods as a result of the influence of stress factors and infection with viral diseases has been established. The spread of viral diseases such as influenza and rhinopneumonia among breeds of horses has been noted. Therefore, the use of immunomodulators in inactivated vaccines is needed.

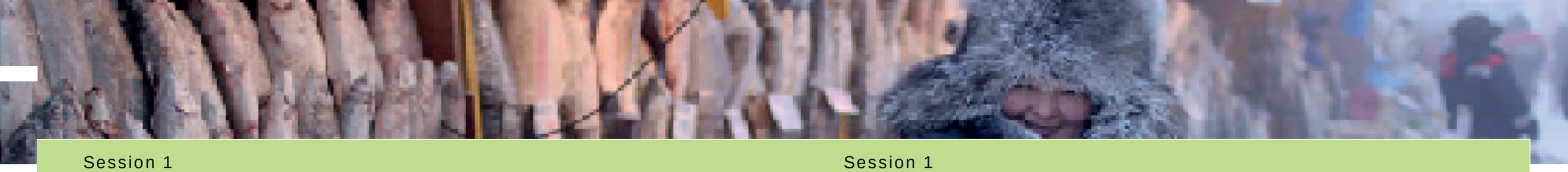
The vaccine against the horse strangles is made of an inactivated strangles Streptococcus strain Str.equi H-34. The vaccine against horse salmonella abortion is made from the strain Sal.abortus equi BN-12. The vaccine contains an immunomodulator. The use of the vaccine ensures the recovery of farms from salmonellosis of horses, and prevents infection of people.

The scientific novelty of the developments is protected by 41 patents for invention.

In the next 5-6 years, it is necessary to:

- test an inactivated vaccine against rhinopneumonia of horses under production conditions,
- test an associated vaccine against rhinopneumonia and salmonella abortion under production conditions,
- test an inactivated vaccine against rhinopneumonia, the horse strangles and salmonellosis under laboratory and production conditions,
- obtain a registration of the vaccine against the horse strangles in Mongolia, Kazachstan and China.

A joint project is proposed for colleagues: We offer a joint research on the role of wild animals and migratory birds in the transmission of zoonoses.



O4 Host-pathogen interaction of persistent bacterial infections

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The Department of Livestock Infectiology and Environmental Hygiene has three main focus in research, i.e. environmental and animal hygiene (animal health), zoonosis and veterinary public health, and infection biology.

Within the first two topics we are dealing with the establishment of diagnostic tools, development of vaccine candidates, epidemiology, disinfection, and novel strategies to prevent and treat infectious diseases. We are interested in animals as reservoirs of pathogens for humans, “emerging and re-emerging diseases”, novel vectors and reservoirs (plants, amoebae), climate changes, and globalization/tourism (novel chains of infection).

In the focus “infection biology” we are investigating persistent bacterial infections caused by the non-cultivable bacterium *Mycoplasma* suis which causes infectious anemia in pigs. This bacterium is very interesting due to the fact that we found autoimmunity, immune modulation, and endothelial damage during the infection. Anemia is caused by scavenging of nutrients, adhesion and invasion of the red blood cells, eryptosis, and autoreactive antibodies. To get insight into the molecular and cellular basis of the pathogenesis of this disease, we use several laboratory techniques such as microscopy (LM, EM, CLSM), serology (ELISA, WB) DNA tools, recombinant expression of proteins, genomics, proteomics, microarray techniques, RNA-Seq, metabolomics, cell cultures, and FACS (fluorescence-activated cell scanning).

The second disease connected with persistent infections is the pseudotuberculosis in sheep and goat caused by *Corynebacterium pseudotuberculosis*. These bacteria can survive and multiply intracellular in macrophages as well as in epithelial cells. For this, they are taken up by the cells via a zipper-like mechanism and can get out of the phagosomes to multiply in the cell cytoplasm.

O5 Pharmacological efficiency of 1β recombinant interleukin in cattle treatment and prevention of cryptosporidiosis

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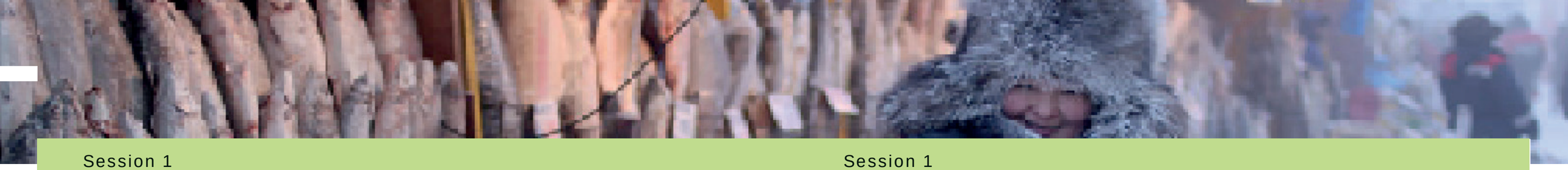
For the first time in veterinary, 1β IL recombinant immunomodulatory has been tested for cryptosporidiosis of cattle under experimental conditions. A fundamentally new method for the prevention and treatment of cryptosporidiosis of cattle using an immunostimulating substance - 1β IL-1β recombinant interleukin), synthesized by the State Scientific Research Institute of Highly Pure Biopharmaceuticals of the Ministry of Health and Industry of the Russian Federation, has been developed. The use of 1β interleukin prior to infection, simultaneously with infection and upon infection leads to a better state of animals and to recovery with a significant increase in the immunological reactivity of the organism. The drug restores the normal content of leukocytes in peripheral blood, and also enhances blast transformation of lymphocytes and their production of IL-2. The changes in the immune system observed upon the affect of the drug cause a significant increase in body defenses of an animal, an effective struggle against invasive agents, and hinder the development of the disease, leading to recovery. IL-1β immunomodulator in calves causes complex positive changes during 1-2 months of observation. The drug effectiveness depended on a dose, frequency, the invasive process period, individual parameters of the organism. With the preventive purpose, the drug is injected to animals, starting from the first day after birth, by 5-10 ng / kg of weight once a day three times at an interval of 48 hours. For the purpose of treatment, the drug is used 10 ng / kg of weight once a day for 3 days. The possibility of correction of the immune status of animals with cryptosporidiosis and prevention has been determined. The drug has an advantage over antibiotics and other chemical and pharmacological agents, since this drug, being able to substitute the natural immunity mediator, stimulates body defenses, without having toxic and allergic effects.



O6 Epizootology of Anthrax in Yakutia

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The first information about Anthrax in Yakutia dates back to 1811. For the period from 1811 to 1993, in the territory of the Republic the disease and mortality of domestic and wild animals with Anthrax was registered in 739 disadvantaged settlements and in 244 permanently disadvantaged settlements. The number of dead domestic and wild animals was 78.017, with cattle – 29.480 (37.7%), horses – 35.995 (46.1%), and deer – 12.537 (16.2%).

The territory of Yakutia is divided into four epizootic zones according to the level of incidence (repeatability and degree of disadvantage):

a) a zone with a high level of incidence and disadvantage which includes 9 administrative territories of Yakutia: Vilyuisky, Verkhnevilyuisky, Yakutsky, Nyurbinsky, Ust-Aldansky, Namsky, Srednekolymsky, Olekminsky, Amginsky (17 to 25 times);

b) a zone with an average level of incidence and disadvantage which includes the following areas: Suntarsky, Khangalassky, Oimyakonsky, Gorny, Churapchinsky, Megino-Kangalassky, Oleneksky, Verkhoyansky, Tattinsky (6 to 15 times);

c) In the zone with a low level of incidence and disadvantage, the following areas are classified: Verkhnekolymsky, Nizhnekolymsky, Neryungrinsky, Ust-Maysky, Lensky, Aldansky, Kobyaisky, Eveno-Bytantaisky, Tomponsky, Zhigansky, Mirninsky, Momsky (1 to 5 times);

d) an area free of anthrax. It includes mainly tundra areas of the polar regions of Yakutia: Anabarsky, Allaikhovsky, Bulunsky, Ust-Yansky, Abyisky districts. In these areas anthrax was never recorded.

Multiple outbreaks of Anthrax in the same areas indicate the stationarity of the infection.

We have developed a cadastre of disadvantaged settlements for Anthrax. The presence of a large number of disadvantaged settlements and the long-term survival of the pathogen in environment causes a threat of epizootic situation. The threat of repeated epizootic situations of Anthrax remains high, which is confirmed by the results of the method of forecasting developed by us.

O7 Anthrax: Diagnostics, Epidemiology, Environment, Therapy, Vaccines, and Phages...

More than two decades of research at the University of Hohenheim, Stuttgart

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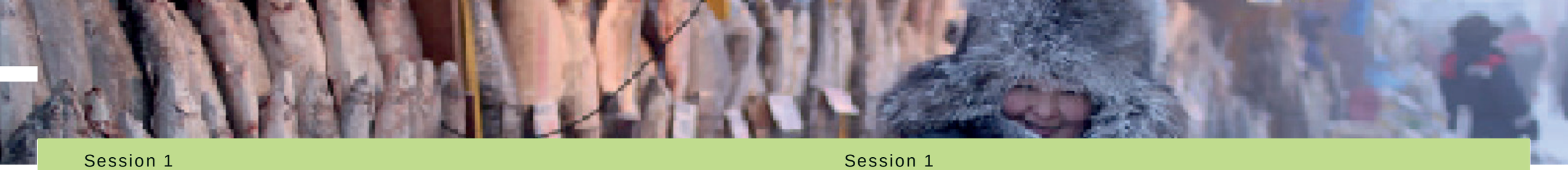
The Anthrax laboratory of the University of Hohenheim has been working as a consultancy laboratory for *B. anthracis* for more than 20 years, mainly in duty of the veterinary service in Germany. It is well established as a cooperation partner for the leading anthrax laboratories in Europe and worldwide. The institute owns a large and still growing culture collection of aerobic endospore forming bacteria of European, Asian, and African origin.

Main topics of our research are

- the development and validation of laboratory methods for the detection of *Bacillus anthracis* from environmental samples, including specimens suspicious to contain spores of intentionally released bacilli,
- the establishment and improvement of methods for forensic and molecular-epidemiological investigations of outbreaks of Anthrax,
- the investigation of the life cycle of members of *Bacillus cereus* sensu lato in environmental habitats and within living vectors,
- the development and pre-clinical testing of non-living vaccines against Anthrax, comprising multiple recombinant proteins with various adjuvants or DNA vaccines,
- the development and pre-clinical testing of novel therapeutics against Anthrax,
- the role of temperate phages in the life cycle of *B. anthracis,*
- the usage of lytic phages in decontamination of *B. anthracis.*

The talk will give a short overview on the topics mentioned above.



O8 Echinococcosis and alveococcosis research in Yakutia

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In 1998 and 2018 in Yakutia there were studied cestodes *Echinococcus granulosus*, *Alveococcus multilocularis*. Tape worms have been studied in domestic and wild ungulates, domesticated and wild carnivores. *Echinococcus granulosus* (larva) was found in domesticated and wild reindeer, roe deer and elk, and also known in humans.
Echinococcosis refers to the invasion of a human or an animal with a larval cystic (metacyclic) stage and a sexually mature stage (tapeworm). Two types of tapeworms belonging to the species Echinococcus are known. Parasitizing in 2 stages: *Echinococcus granulosus* (larva) are localized in the parenchymal organs: mice, lemmings, domesticated and wild reindeer, roe deer, elk and human. The sexually mature stage of *Echinococcus granulosus* is localized in the small intestine of domestic and wild carnivores - dogs, wolves, red foxes.
Tumor of echinococcus is most often found in the lungs, liver, larynx in deer, lungs and liver of roe deer and elk and liver, internal organs of mouse rodents, in the liver, lungs and brain of humans. 627 rodents were exposed to helminthic autopsy: house mice - 107 of them 4 were infected by Echinococcus granulosus (larva), which is 3.74%, bank voles - 300 of them were infested 18, or 6.0%; narrow-headed voles - 2, northern red-backed voles - 61, lemmings – 51. From 61 bank voles - 4; or 6.5%, and from 51 lemmings - 11, or 21.3%. 2,512 deer of domesticated deer were examined. Infection by *Echinococcus granulosus* (larva) was detected in 52 animals, which was 2.07%. 641 wild reindeer were examined, *Echinococcus granulosus* (larva) were detected in 33 animals, which was 5.14%, from 96 elk there were found 54 infected by *Echinococcus granulosus* (larva), which was 56.2 ± 0.93.
Alveococcus multilocularis, the mature stage is often found in white (polar) arctic foxes - the final hosts and lemmings - intermediate hosts, in foxes and dogs, and other mice, is very rare than echinococcosis, in humans and other mammals is almost not recorded. It is known a case of human disease that was registered in 2014 and was characterized by malignant course for more than 10 years, the affected organ was the liver, then with characteristic metastases in other organs - the intestine and peritoneum. The size of nodes of alveococcus larvae reached 15-20 cm in diameter.
Yakutia belongs to endemic regions according to zoonotic helminthiasis - echinococcosis, alveococcosis, which present a great danger to humans, agricultural and wild animals.

O9 Research on alveolar and cystic echinococcosis at the University of Hohenheim

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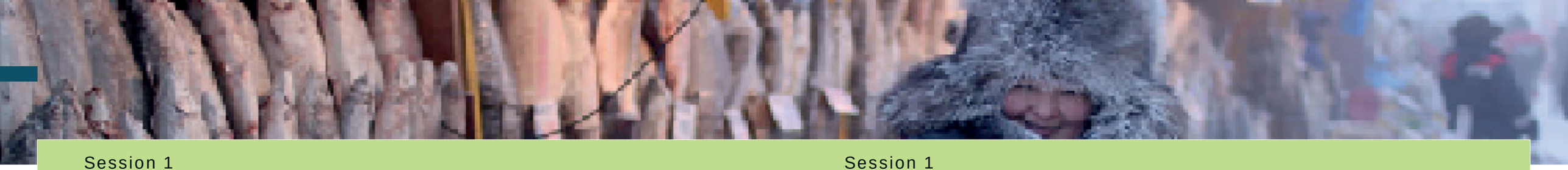
Echinococcosis affects >1 million people at any one time and is recognized by WHO as one of four priority neglected zoonotic diseases, along with rabies, cysticercosis and foodborne trematodes. Two forms of the disease are important, both occuring in Yakutia:
Cystic echinococcosis (CE), a debilitating and potentially fatal disease of humans, is spread worldwide with the highest public health and economic impact in resource-poor countries, and is transmitted in lifecycles involving dogs or wild canids and domestic or wild ungulates. CE is caused by various pathogens of the cestode genus Echinococcus, whose complex taxonomic structure has only recently been established. Accordingly, transmission pathways and pathogenicity for humans and livestock are known to vary widely among the cryptic species of this *Echinococcus granulosus* cluster. Yakutia is a focus of CE within the Russian Federation, with high disease prevalence in domestic livestock (reindeer, sheep) as well as wild animals (e.g. moose, wolves). Molecular identification of few samples revealed the presence of at least two Echinococcus species and several diverse genotypes in animal hosts. The transmission seems to be highly complex, involving both domestic and wild animals. CE in humans is frequently reported, but here are no data on the impact of any of these parasite species on humans for lack of investigations.
Alveolar echinococcosis (AE) is caused by various genotypes of one species, *E. multilocularis*, which is spread in the cold and temperate climates throughout the northern hemisphere. It is a primary wildlife parasite, transmitted in lifecycles between wild canids (mainly foxes) and rodents. Humans are accidentally infected, but the resulting disease is malignant with unsatisfactory treatment options and leads to death without qualified medical intervention. In Yakutia, published prevalence data indicate the presence of hyperendemic foci. Recently, a genotype was found in northern Yakutia that was previously thought to be restricted to America, Considering the vast north-south extension of Yakutia, the presence of different lifecycles (involving different genotypes with divergent pathogenicity in humans) is expected e.g. in arctic tundra and in boreal forest zones (which, however, may or may not be linked through long-distance migration of arctic foxes, red foxes and wolves). There is a report about a specific transmission between domestic dogs and synanthropic rodents in central Yakutia, but no details on this have been published.

In conclusion, *Echinococcus* transmission in Yakutia (and the resulting risk for humans and livestock) is intense, and the contributions of different *Echinococcus* species and genotypes are complex and little understood. Molecular characterization of systematically sampled parasite isolates is expected to help identifying important transmission pathways and enable evidence-based control and prevention campaigns.



O10 A variety of harmful insects (Diptera) and ticks (Acari: Ixodida), study of their life cycle, and creation of preventive measures for agricultural animals

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Global warming of the climate causes a change in the fauna, life cycles and the harmfulness of insects and ticks for farm animals. According to scientific data obtained in our laboratory of arachnoentomology in the fauna of arthropods, the appearance of new, previously unidentified species, is noted. They are vector transfer of especially dangerous zoonotic diseases of farm animals. The economic damage from them is very high. Since 2008, in the Republic of Sakha (Yakutia) after long-term well-being, a new focus of pyreplasmidosis of the reindeer has appeared. The focus of the disease was found in the Gorniy region. In the Tomtor area, 189 deer or 57.9% of the herd stock died; in the area of Tapsylyn - 105 or 77% respectively. The analysis showed that a tick was found in the territory of the Republic of Sakha (Yakutia): Ixodes persulcatus, which is the vector of transmission of many dangerous blood-parasitic diseases. In the Primorsky tundra, previously unidentified species of flies were found (Hybomitra): Hybomitra montana montana and H. nigricornis. For plains pastures - Chrysops divaricatus, Chr. suavis and Hybomitra aequetincta. In the basin of the Kolyma River, there was a previously observed type of midges: Simulium posticatum. With a massive attack of blood-sucking mosquitoes on a herd of domestic reindeer, the average annual damage is 1940.84 thousand rubles. The economic effect for 1 year per one herd of reindeer is 1,875.49 thousand rubles, the economic effect per 1 ruble of costs is 28.7 rubles.

We have developed effective preventive technologies to protect farm animals from harmful arthropods. These technologies are protected by more than ten patents for inventions. The laboratory is staffed by competent staff and cooperates with leading scientific institutions in Russia: All-Russian Scientific Research Institute of Fundamental and Applied Parasitology of Animals and Plants named after K.I. Skryabin, A.N. Severtsov Institute of Ecology and Evolution and All-Russian Scientific Research Institute of Veterinary Entomology and Arachnology.

1. Barashkova A.I. 2017. Bloodsucking dipterals on insects (Insecta, Diptera: Tabanidae, Culicidae, Simuliidae) of the agrocenoses of Yakutia: Abstract of the thesis of Doctor of Biological Sciences. 48 p. http://dlib.rsl.ru/viewer/01006653982#?page=1

2. Reshetnikov A.D., Barashkova A.I. 2017. Technology of protection of reindeer from blood-sucking dipterous insects and imago gadfly in conditions of tundra. 11 p. https://elibrary.ru/item.asp?id=30691359

O11 Tick related research at the University of Hohenheim

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1. Tick diversity and distribution

We are studying the density, diversity and distribution of ticks in Germany. Therefore, we are collecting ticks either from hosts or by flagging and identify the species by morphological characteristics or with molecular methods. This comprises the detection of new tick species in Germany.

2. Tick borne diseases

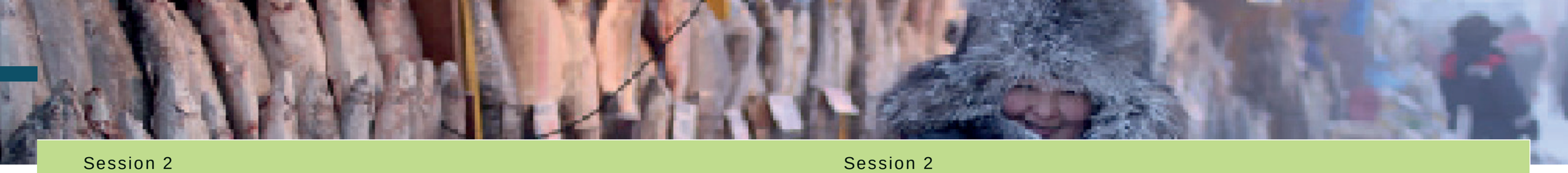
Tick borne diseases are not equally distributed in Germany. Therefore, we collect ticks in different areas in Germany to detect pathogens as TBE-Virus, Borrelia, Rickettsia and others by means of Light-Cycler-PCR. The identification of pathogens in ticks is a prerequisite to understand the distribution of tick borne diseases in Germany.

3. Tick control

We develop and test biological and chemical approaches of tick control in the laboratory, in controlled tick plots and in gardens. We focus on entomopathogenic fungi in an attract and kill. The test of an in Europe commercially available product, the "Ixogon Zeckenrollen" has just been finished.

4. Behavioural studies

By using partially automated techniques we study tick behaviour under special conditions (e.g. in certain seasons or over night). The ticks are kept in a controlled environment in the laboratory or in a tick plot and monitored by cameras. An image recognition program has been developed to measure tick activity.



O12 Surveillance and control of zoonotic diseases in Germany – an overview and the case of Hepatitis E

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Outbreaks of highly pathogenic diseases such as SARS, avian influenza or ebola have shown that zoonotic infections can be a serious threat to public health and keep the world in suspense for several months.

Although less dramatic, zoonoses also play an important role for public health on a daily basis. In Germany, more than half of all infectious diseases that are mandatorily notifiable according to the infection protection act are zoonoses.
They include diseases
- with a high incidence (e.g., salmonellosis, campylobacter),
- with a high case fatality (e.g., HUS/STEC, listeriosis, tularaemia, anthrax),
- that can cause outbreaks (e.g., trichinellosis, brucellosis, hantavirus disease),
- that can be climate sensitive (e.g., TBE, borreliosis, hantavirus disease) or emerging (e.g., hepatitis E).

In this short presentation, we would like to give examples of epidemiological surveillance, research and outbreak investigations with regard to selected zoonotic pathogens that are relevant to public health in Germany.

A focus will be on the epidemiology of Hepatitis E, a foodborne infection, mainly transmitted via consumption of pork and game meat and causing nearly 3000 notified clinical cases in 2017.

O13 Viral hepatitis E as a new zoonotic threat to human health

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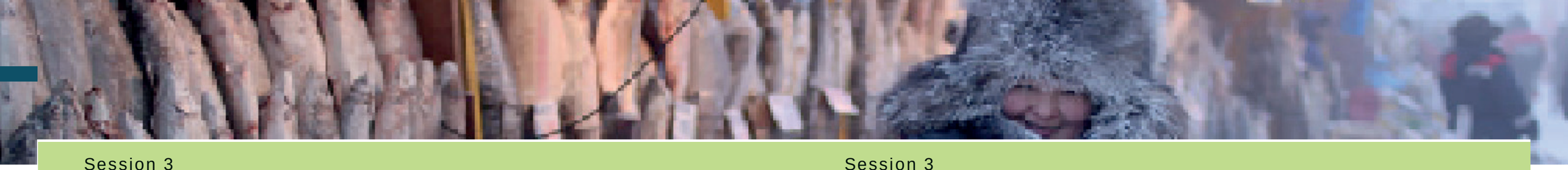
Introduction: Hepatitis E is a new unrose for human health throughout the world. According to research, one-third of the world's population is infected with HEV infection. In many European countries, the detectability of serological markers of HEV in donors varies from 1.3% to 52%. In the risk groups: among farmers, hunters varies from 1.3% to 52%.
Methods: ELISA tests were performed for the presence of a-HEV-IgG in 148 people. 64 people were examined in the pastoral areas, and 12 people in the reindeer breeding area. A group of patients with chronic hepatitis B and C made up 13 people and a group of conditionally healthy individuals - 59 people.
Results: Among the population of pastoral areas, markers of viral hepatitis E (a-HEVIgG) were detected in 21.8% of the surveyed, among reindeer breeding areas - in 16.6%. High circulation of the virus E among conditionally healthy and sick with hepatitis B and C - 21 , 2% and 22.4% respectively. So among 19 patients with chronic hepatitis B anti-HEVIgG revealed in 21.0% (4 of 19). Hepatitis C markers occurred in 31.5% of cases, while the virus (HCV RNA) was found in 21.0% of cases. A similar situation develops in patients with chronic viral hepatitis C. Among 68 patients with chronic hepatitis C, hepatitis E, hepatitis B (HBsAg), hepatitis D markers (in fact, a quadruple infection (HCV + HEV + HBV + HDV) in 25% , 11.7% and 4.4% of cases, respectively Markers of the hepatitis E virus were much more common in 25% of cases than the hepatitis B and C markers.
Conclusion: thus, according to the results of the studies, a high incidence and infection of the population of the republic with all known hepatitis viruses was detected. An increased circulation of the hepatitis E virus in the Arctic zone of Russia, previously considered a tropical infection, was detected. Further study of this problem would allow to determine the degree of infection with hepatitis viruses in the population living in the Arctic regions and to resolve the issue of biosecurity for the population.



O14 Influence of global climate change on the natural environment of the center of the continental permafrost zone of the Northern Hemisphere (on the example of Yakutia)

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Current changes in the climate, primarily increasing air temperatures, have exerted a considerable impact on the state of permafrost landscapes and ecosystems in Eastern Siberia. The 2-3°C rise in mean annual air temperature over the last three decades has resulted in a ground temperature increase of 0.4-1.3°C, which in turn has led to deepening of seasonal thaw and intensification of cryogenic processes. In forest-free and disturbed locations underlain by the ice complex, permafrost has begun to degrade resulting in thermokarst development and landscape reshaping. Permafrost degradation makes the land useless for agriculture and other purposes and poses a potential threat to human life and activities. Increasing air temperatures have triggered changes in the ecology of Eastern Siberia.

Many animals and plants have shifted their ranges and this may be the precursor of northward shifts of the natural zones. Climate warming causes a gradual expansion of many species of animals and plants from south to north, which can be considered as the northward shift of the natural zones. The shift of the natural zones contributes to an invasion of new plant and animal species into the northern areas, including crop pests and pathogens.

In warming climate, cryogenic processes cause local redistribution of the ecosystems, which has not been understood adequately yet. Permafrost ecosystems respond to global warming quite rapidly. This makes the study of their changes somewhat easier, but still requires meticulous attention to observations, research, and analysis of the processes under way.

O15 Impact of climate and land use change on soil processes - evidence and perspectives

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The transformation of heterogeneous and diverse landscapes of Yakutia (Central Siberia) is strongly affected by current and forthcoming climate change, which can be seen in this region as gradual increase of mean annual and maximum summer temperatures (Desyatkin and Desyatkin, 2017). The warming in this region is ten times faster than the global average value (Schuur et al., 2015) and leads to accelerated permafrost thawing as well as increasing forest fire frequency and total lake area (Boike et al., 2016).

Considering these changes in the frame of “One health”, we need to account for several interrelated components: people and animal migration and distribution, availability of soil resources for agriculture and stock raising, and emission of greenhouse gases from land and soil. Greenhouse gas emissions may particularly become critical due to a positive feedback loop: additional CO2 and CH4 emitted in response to climate warming will increase the greenhouse effect and further accelerate the rise of the land surface temperature. The major source of greenhouse gas emissions from soil is the mineralization of soil organic matter (SOM). This process is strongly controlled by temperature and moisture. It is an integral component of “soil health”, i.e. the capacity of soil to function according to its potential and management strategies (Doran, 2002; Wall et al., 2015). Soil health is considered as essential for maintaining human well-being and the conservation of biodiversity.

As collaborative research on soil health in Yakutia, we propose to focus on the impact of land use and climate change on SOM mineralization. This will be based on our previous experience on measuring and modeling of land use impact on SOM turnover (Blagodatskii et al., 2008; Demyan et al., 2016; Larionova et al., 2003), emission of greenhouse gases (Lamers et al., 2007; Van Den Berg et al., 2016; Wizemann et al., 2014), small-scale spatiotemporal dynamics of SOM, pesticides and soil-microbiome interactions (Kramer et al., 2016; Pagel et al., 2016; Preusser et al., 2017), temperature sensitivity of SOM decomposition and impact of global warming (Ali et al., 2018; Blagodatskaya et al., 2016; Crowther et al., 2016), and composition and stability of SOM and organo-mineral associations (Rennert et al., 2018, 2014).

O16 Indigenous Peoples of Yakutia and New Health Risks in Connection with Global Change

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Session 4

O17 Attitudes towards health among indigenous peoples under modern conditions

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Introduction: The Republic of Sakha (Yakutia) is located in the North of Russia. Yakutia has a harsh, sharply continental climate. From time immemorial, all measures of health protection were inextricably linked with the way of life of northern peoples, with traditions and with a peculiar worldview. Over the last century, the traditional way of life in Yakutia has radically changed: the rural type of residence replaced urban one, physical labor replaced mental one, type of nutrition has undergone the fundamental change, and technogenic socialization replaced information isolation. All of the above factors lead to stress, destabilization of health-saving behavior and negatively affect the health of the inhabitants of the North.
Methods: the responses of 292 respondents living in rural Yakutia were analyzed. During study was used the questionnaire "Attitude to health" developed by Berezovskaya R.A. (2001), based on the value-motivational scale. Theoretical and psychological basis is the concept of "Psychology of Relationships."
Results: Study revealed that the health of the majority of participants in the study is a priority vital value. Despite this, the results of the analysis of the responses indicate that most respondents do not understand the responsibility for their health, lack of commitment to a healthy lifestyle and a passive attitude towards their health. Most respondents misunderstand and underestimate the role of health in their lives, and do not realize the importance of health as an instrumental value. Health as an instrumental value yields its primacy to persistence and diligence, takes a lower place compared with terminal value. People of mature age more actively engaged in health, which is associated with deterioration of well-being and the presence of chronic diseases. Youth directs their life towards other activities, most of them think that they are healthy and they do not deal with disease prevention.
Conclusion:
In the new environment, the behavioral skills of the self-preserving behavior of the indigenous peoples of the North, which previously helped to survive in harsh climatic conditions, have become inadequate. Nowadays, it is necessary to form a new strategy of behavior aimed at preserving the health of the population.

O18 Rural Everyday Life in Yakutia in a Changing Environment

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The indigenous peoples of the Republic of Sakha (Yakutia) still live in rural areas, which helped to keep traditional activities and ethnic cultures. In rural space the main occupations of indigenous peoples are cattle breeding, reindeer herding, hunting and fishing. These traditional activities linked and affected by nature and climate environment directly. Therefore all social consequences of environment changes are influencing in space of everyday of life. The indigenous population of the Republic of Sakha (Yakutia) is represented by Sakha-Yakuts, Russian old-timers and small indigenous peoples of the North. The northern minorities of Yakutia are the Evenks, Evens, Yukagirs, Dolgans and Chukchi.

We believe, that the nature environment is a factor in the development of man's spiritual life; it is a fertile ground for attachment to native places. The very idea of a person about himself is formed under the influence of the natural and cultural environment in which he was born and grew up. Here we analyzed the field materials, collected in rural areas of Yakutia during last 10 years. Data base consist of the interviews and life stories of residents of villages in the arctic and central districts of the Republic. Our observations highlighted some interesting aspects of the topic of perception of climate and weather changes by different groups of rural residents. For example, the historical comparative points of ecological and health phenomena in rural everyday life are very valuable.

Session 4

O19 Food products in combination with unique northern raw materials

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In the Far North, there is a unique animal and vegetable raw material for the production of specialized ingredients. It should also be emphasized that the products of processing of forest berries and wild-growing food plants should occupy a proper place in the composition of foodstuffs, ensuring their delivery to the widest masses of the population, increasing the biological value of food without increasing its caloric content, which is especially important for preventing the violation of fat metabolism and cardio -Vascular diseases.

In extreme conditions of the Far North, deer produce the highest amount of biologically active substances. Accordingly, the drugs and products that are derived from these animals are more valuable. A unique combination of substances in the meat of reindeer does not allow fat to accumulate in the human body. In the meat of domestic reindeer contains the greatest number of essential amino acids in comparison with beef, pork and lamb.

As a result of many years of research on the actual nutrition of the population living in the North, medical and biological and technological requirements for the composition, nutritional value and food safety based on local raw materials have been formulated, regulatory and technical documentation for production has been developed, and prototypes have been obtained. The developed technologies take into account the population structure, specificity and material and technical support of the processing enterprises of the Republic of Sakha (Yakutia), which is extremely useful and promotes qualitative change of products for their further improvement, expansion of assortment and preservation of the health of the population of the North.

O20 Bridging knowledge systems in nutrition and health research

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Food systems, and the social relations that shape them, provide an entry point for exploring structural issues such as access to land and other resources needed to grow, collect, or hunt food; the traditions and cultural practices of growing, preparing, and eating food; and the relationships and power dynamics between various actors and institutions involved in the production, processing, and consumption of food. Food plays an important role for wellbeing and health, in Indigenous, non-Indigenous, and urban contexts. There is renewed attention on the role of local food and knowledge systems for achieving more sustainable production and consumption.

Especially for Indigenous Peoples, their food systems, nutrition and health are threatened by environmental degradation and loss of biodiversity, loss of cultural and spiritual heritage, competing demands for land for production of food or fuel, and unsustainable and unhealthy consumption patterns and lifestyles. Public health care systems have often suppressed Indigenous worldviews and practice, resulting in barriers to health care and education.

In order to design appropriate public health policies and programmes, in line with the 'One-Health-Concept', it is critical to understand how people perceive concepts such as 'health', 'health care', 'nutrition' and 'environmental change' and how these are interrelated. It is further important to understand the current practices of producing, processing, storing, preparing and consuming food. Relevant questions in research on public health promotion are for example: how have loss of land and other resources impacted on livelihoods, lifestyles and diets; who is in charge of producing, processing and preparing food; what is the role of local leaders; how is traditional and local knowledge transferred; who are role models for the youth; what are underlying reasons for mistrust toward public health care and how could they be overcome; what are factors that can enhance capacity and resilience of individuals and communities?

Bridging Indigenous and Western research approaches, conducted in partnership of researchers and local actors, can lead to co-designing public health policies and programmes. Examples of good practice from research on food systems, nutrition, public health and environmental impacts illustrate how this has led to initiatives promoting sustainable and healthy nutrition and lifestyles.

ABSTRACTS

POSTER

P1 The results of microbiological studies of representative of mammoth fauna preserved in frozen soils of Yakutia

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Due to the permafrost Yakutia is an amazing place on the planet where scientists can find the remains of fossil animals that have survived thousands of years.
The study of the microbiota of representatives of mammoth fauna is relevant from the point of view of the directions of modern microbiology and biotechnology: psychrophilia, cryoanabiosis, features of ecology and evolution of microorganisms.
Results: The microbiological studies on soft tissues of Mokhsunuokhsky, Yukagirsky, Malolyakhovsky mammoths, Oimyakonsky and Khromsky youg mammoths, Kolyma woolly rhinoceros, young mammoth Yukka, and Yukagir horses and bison, Omoloysky young elk allow isolating 64 strains of microorganisms, including 42 strains of bacteria assigned to the genus Bacillus. According to biochemical and physiological properties, they are attributed to the 9 species: B. megatherium, B. subtilis, B.alvei, B. brevis, B.popillae, B. steurothermophilus, B.circulans, and B. laterosporus. All strains are not pathogenic for the laboratory animals.
We investigate antagonistic activity and antibiotic stability of strains of the bacteria of genus Bacillus isolated from paleomicroflora. All strains of bacteria Bacillus isolated from the mammoth representatives show varying degrees of antagonistic properties in relation to pathogenic and conditionally pathogenic microorganisms: Salmonella, Escherihea, Shigella, Stafylococcus, Streptococcus, Proteus, Micobacterium and microscopic fungi as Aspergillus, Penicillium, and Alternaria.
Antibiotic resistance of bacteria of the genus Bacillus isolated from paleomicroflora has also been established.
The obtained results show that bacteria of the genus Bacillus isolated from the representatives of the mammoth fauna release strong bacteriocins, stopping the growth and development of other microorganisms.
The strongest bacteriocins produce strains of B.subtilis isolated from the soft tissues of the Kolyma woolly rhinoceros and the Oimyakonsky young mammoth.
The study allowed for the first time to certify and deposite strains of bacteria B. subtilis "Kolyma-7/2k" and B. subtilis "Oimyakon-6/1", isolated from the Kolyma woolly rhinoceros and Oimyakon young mammoth in the collection of microorganisms of the Russian Research of Agricultural Microbiology (St.Petersburg, 2010) for further modern biotechnological research.
The methods for restoring northern ecosystems have been developed using the strains of the bacteria Bacillus subtilis "Kolyma-7/2k" and B. subtilis “Oimyakon-6-1”, isolated from paleomicroflora. 2 patents of the Russian Federation for inventions have been obtained.

Poster Session

P2 Microbiota and sanitation of underground glaciers in storage of foodstuffs

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The whole territory of the Republic of Sakha (Yakutia) is occupied by permafrost, in which an enormous supply of cold is accumulated, which directly relates the climate to the sharp continentally and low temperatures. In the Republic, for a long time and until now, storage of food raw materials and food products in glaciers is widespread. The use of natural cold in the processing and storage of food products under the conditions of Yakutia contributes to severe winter, which lasts in some of its regions up to 8-9 months and the presence of permafrost. Inadequate design requirements and improper operation of underground refrigerators lead to premature deterioration of stored food and a decrease in quality.
Carrying out the relevant works on sanitation has difficulties due to the lack of effective means and scientifically-based regimes. The aim of this work is the study of microbiota and the development of effective methods and modes of reorganization of the glaciers in the permafrost for food storage. The total microbial contamination of the glacier surface is from 2,8x102 to 60,0x103 colony forming bacteria in 1 cm2, and air - from 1,4x102 to 23,6x103 colony forming bacteria / cm3. The microbiota of the underground glacier for food storage is mainly represented by soil spore-forming aerobic bacteria of the genus *Bacillus*, as well as toxic and mold fungi of the genera *Aspergillus*, *Mucor* and pathogens of yersiniosis, which can be dangerous and contaminate food. The solutions applied in the form of atomized spray through the containment cylinder at the temperature of the glacier -21,0±0,8 OS. 1% solutions peracetie acid of NCA, at a consumption of 300-400 ml/m2, exposure of 18 hours, reliably disinfect the ice surfaces contaminated with pathogens of intestinal, coccal, spore infections. Electrochemically activated anolite (with an active chlorine content of 0.1 mg/ml) with addition of 0.5% NCA solution, a flow rate of 300 ml/m2 and an exposure of 5 hours, completely disinfects the ice surfaces contaminated with *Sal. abortus equi BN-12, Str. equi H-34, Bac. subtilis TNP-3*.

P3 Sanitation of the udder of cows after milking using *Bacillus subtilis* strains

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Bacteria of the genus *Bacillus subtilis*, isolated from the permafrost soils of Yakutia, have an antibacterial property with respect to pathogenic and potentially pathogenic microorganisms, as well as the ability to stimulate the immunobiological reactivity on the animal organism.

Particular attention should be paid to the treatment of the udder after milking, it is recommended to treat the udder with a special device that provides a protective film and prevents penetration of microorganisms into the teat canal, as the teat canal remains open and a "soft vacuum" is created which draws air and dirt into the teat canal.

When treating the skin of the udder with a hygienic product based on strains of the bacterium *B. subtilis*, with a daily 2-fold application after milking, significantly reduces the microbial contamination of the nipples of the cow udder. At the end of the 30-day trial, the number of mesophilic aerobic and facultative anaerobic microorganisms of nipples of the udder of the test group decreased by 42.6 times compared to the control group. Thus, in the course of the experiment, it was established that the use of probiotic sanitary and hygienic product "Probiodez 3+5" after milking helps to reduce the level of the number of mesophilic aerobic and facultative anaerobic microorganisms, the number of spore forming bacteria, *Staphylococci* and *Escherichia*. It also showed no side effects and no allergic skin reactions of the nipples of the cow udder.

The scientific novelty of development is confirmed by application at No. 2018106423 from 2/20/2018, on obtaining the patent of the Russian Federation for inventions.

The practical significance of the research is that probiotic drugs will be used of sanitation of objects of veterinary supervision.

P4 Development and production of biological protection means of agricultural animals, plants and environmental protection

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At present in the EU due to the environmental safety of food products the use of antibiotics is banned in breeding and agricultural producing. Therefore the development and innovation of safe and effective probiotics as an alternative to antibiotics is proceeding in the world including Russia.

In the recent decades the Yakut Agricultural Research Institute has developed such a range of innovative probiotics preparations on the basis of biologically active and unique local natural strains of bacteria Bacillus subtilis.

Biological properties of preparations based on a strain of bacteria Bacillus subtilis "TNP-3" and Bacillus subtilis "TNP-5" and isolated from the permafrost soils of Yakutia:

– Marked antagonistic action against many pathogens and opportunistic pathogens (streptococci, staphylococci, E.coli, salmonella, brucella, Campylobacter, Mycobacteria Leptospirosis, and viruses) as well as some of toxigenic fungi (Penicillum, Aspergillus, Stachybotrus) and soil microorganisms - pathogens of fungal diseases (Rhizoctonia-solani, Streptomyces, Fusarium oxysporum);
– Stimulation of the beneficial intestinal microflora development;
– Increasing of the immunobiological reactivity of the organism;
– Complex of enzymatic activities: proteolytic, gelatinase, amylase, cellulose, B-gluconase and marked xylanase and fructoziltransferase;
– Non-suppressive to growth and development of beneficial microflora: lactobacillus and bifidus bacteria;
– Resistance to a wide range of antibiotics, so it is possible to use it in combination with antibiotics and the preparation is also recommended after serious illness, antibiotic treatment, with rapidly eliminated dysbacteriosis intestine.

The preparations are effective as a component of inactivated vaccines, mineral and vitamin feed additives, premixes and animal feed, bacterial fertilizers for increasing soil fertility and crop in the prevention and treatment of respiratory, digestive, reproductive, pyo-necrotic wounds mycotoxicosis, microbiocenosis adjusting, immunobiological reactivity of the animal organism and promising for fodder (haylage, silage) are widely used in livestock farms of the republic, successfully tested on the farms of the Novosibirsk and Amur regions, the Republic of Buryatia and Mongolia.

The preparations are not inferior, but superior to many foreign and Russian probiotics in performance and breadth of the spectrum .The scientific novelty of the development is protected by 24 patents of Russian Federation. The production is certified and organized with the laboratory for the development of microbial preparations of the Yakut agricultural research institute.

P5 The effect of climate change on the threat of zoonotic diseases in the Arctic region (by the example of Yakutia)

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Reindeer breeding, horse breeding and livestock production historically always was an integral part of the national economy of Russia providing the need for specific types of raw materials and food which production is caused by severe climatic conditions and also social and economic and national peculiarities of the country.
For increase in production of meat production of horse breeding, livestock production and reindeer breeding it is necessary to use rationally available potential of breeds of the horses, cattle and reindeers divorced in the Sakha (Yakutia) Republic which are well acclimatized to climatic conditions. In this regard a monitoring problem zoonoses and creation of effective system of diagnostics, treatment and prevention of diseases of farm animals of the Arctic with diseases of an infectious and noninfectious etiology for receiving biologically safe and qualitative (functional) livestock products.
For a long time there are natural foci of a number of infectious and parasitic diseases of man and animals on the territory of Yakutia, such as anthrax, rabies, brucellosis, leptospirosis, tularemia, necrobacteriosis, echinocosis, alveococcosis, trichinosis, etc. The possibility of the appearance of new, previously not observed infectious diseases is confirmed by history the spread of such infections in the Republic as brucellosis of reindeer and pseudotuberculosis.
The goals and objectives of the study include monitoring of new forms of diseases of northern animals in connection with global warming and the development of methods for optimizing therapeutic measures and disease prevention, for obtaining biologically safe products of animal origin.
The novelty and effectiveness of research is associated with the development of innovative methods, the scientific methodology of research and commercialization. The work is carried out at the scientific, practical, methodological and experimental levels in an integrated system of knowledge, including: veterinary medicine, zootechnology and economics.

Poster Session

P6 Cestodiasis infection of the fish of the middle course of the Lena river under the conditions of increasing man-caused impact

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The study of populations under the conditions of anthropogenic load is one of the tasks, the solution of which is necessary for understanding the mechanisms of the stability of biological systems. When contaminated from industry, the greatest impact is experienced by water bodies, which due to their characteristics are concentrators of toxicants. Therefore, here in the north-east of Russia as well as all over the world, the issue of qualitative depletion of aquatic ecosystems becomes important. In this respect, the left tributary of the Lena river, the Viliuy river, where intensive mineral development is being conducted, is a convenient model for investigating the impact of man-made load on the ecosystem under current conditions. The advantage of parasitic objects over other biological test objects is that "parasites accumulate all the changes occurring in the reservoir and more fully than other hydrobionts" and therefore, can serve as a more revealing object for assessing the state of the river basin.
For the investigation, the regions with different anthropogenic load were selected: the middle course of the Lena river and its left tributary, the Viliuy.
For the period of 2011-15 there is a slight increase in the prevalence of the pike with *Diphyllobothrium latum* plerocercoids. The prevalence of the pike aged 4, 5, 6 years old is equal to 28.5, 33.3, and 36.3%, the infection intensity is from 1 to 5 specimens, the abundance index is 0.64, 0.55 and 1.09 specimens respectively. The infection of the pike aged 7, 9, 10 years old is 62.5, 60.0, 100%, with the infection intensity 1-8 specimens, the abundance index is 2.0, 3.4 and 4.25 specimens respectively. The total infection of the pike with plerocercoids of diphyllobothriasis is 45.0%, the abundance index is 1.4 specimen.
The total infection of the burbot in the Viliuy river with *Triaenophorus nodulosus* plerocercoids is 36.8%. The prevalence of the burbot aged 4-5-6-7 years old is 16.6, 25.0, 44.4 and 36.3%, respectively, the infection intensity is from 1 to 3 specimens, the abundance index reaches 2.0 specimens.
Along the Viliuy river 49 specimens of the burbot were examined by the method of complete helminthological dissection. According to the research, *Diphyllobothrium latum* plerocercoids has not been found in fish. Out of 49 specimens of the burbot in 36.7% of them the larval stage of *Triaenophorus nodulosus* has been found with the infection intensity 1-3 specimens.
Thus, in the present period, with a high anthropogenic load on water bodies, a gradual decrease in the degree of infestation of fish with the plerocercoids of *Diphyllobothrium latum* is being observed. This leads to a gradual destruction of the foci of diphyllobothriasis and their attenuation which has an important epizootological value. Taking into account the constant discharge of waste waters by various industrial and household enterprises into reservoirs and their slow transition to non-waste technologies, in the coming years the flow of pollutants into the environment is likely to continue. There is a shift of complex specialized systems with a great variety of species to much simpler monotypes. Stable changes in the environment which cause a constant excess of the maximum impact on the reservoir lead to occurrence of new biotopes and a stable change in the existing biocenoses, structural and species rearrangement of aquatic communities. The processes of self-purification go to a fundamentally different level. Therefore, the parasitological situation in the reservoir is an indicator of its sanitary state, since a specific parasitological situation corresponds to a reservoir of a certain degree of contamination. Parasites are able to withstand only a certain level of pollution, the excess of which leads to their disappearance in the fauna that primarily depends on the stability of their hosts.

P7 The helminths and helminthiasis of reindeer in Yakutia

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Reindeer is the main ecology and traditional way of life and the main production activity of the Korean inhabitants of the mountain taiga zone and the most important part of the life of the Republic of Sakha (Yakutia). Further development of reindeer husbandry, increase in productivity and profitability of reindeer husbandry are not possible without reliable organization and effective protection of domestic reindeer from parasitic diseases, helminthiases, which cause significant economic damage in farms engaged in breeding domestic reindeer.

The results of the research showed that in the mountain taiga zone of Yakutia in domestic reindeer, parasitic diseases are common in all reindeer husbandry areas of the zone. According to the results of helminthological intestinal opening of 1143 deer, 34 species were parasitized, including 3 species of trematodes, 6 species of cestodes including 4 species of cestodes parasitizing in the larval stage, 27 species of nematodes, 2 species of the simplest unicellular blood-parasites and 1 species of larvae of lingvats, as well as 4 parasites: 2 species of gadfly larvae, 1 species of imago oribatid mite, 1 species - ixodine mite.

Of these, the most epizootologically significant nematodes are: ostertagiosis-parasitizes Ostertagia species are found in 54.9 ± 2.8% of deer, an average of 61.5 ± 4.12 specimens; Nematodirosis - parasitizes the species Nematodirus skrjabini parasitizing in the small intestine was found in 52.8 ± 3.1%, with (II) 44.4 ± 1.5 ex .; Dictiokuiales - a species Dictyocaulus viviparus parasitizing in bronchi 34.7 ± 1.72% of deer, 13.2 ± 2.1 specimens; trichostrongylosis Trichostrongylus columbriformis, Trichostrongylus axei parasitizing in abomasum and intestines in 27,4 ± 1,2%, with (II) 63 ± 3,2 copies; trematodes: paramphistomatosis - the species Paramphistomum cervi in 26.7 ± 1.37% to 1536 ± 86.1 specimens, cotylophoronosis - the species Cotylophoron skrjabini in 27,7 ± 6,4% up to 308 specimens; cestodoza: moniesiosis - the species Moniezia (Moniezia) rangiferina in 41.5 ± 1.58% with (II) 2-8 ± 1.1 specimens; avitellinosis - species Avitellina arctica Kolmakov 13.3 ± 0.3% with (II) 3-11 ± 2.1 specimens.Larval stages of the family. Taeniidae cysticercosis: Cysticercus parenchimatosa parasitizing in the liver in 56.7% with EI averaging 67.9 ± 2.4 ex.; type Cysticercus tarandi parasitizing in the muscle tissue an average of 12.6 ± 1.6% of deer at an intensity of infestation (II) from 23 to more than 1000 specimens, heart muscle in 31.9 ± 1.5%, with (II) from 9 to 56 ex. .; type Cysticercus taenuicollis in 8,7 ± 0,8%, with (II) - 2,0 ± 0,1 eks; laryngeal echinococcosis - species Echinococcus granulosus larva laryngeal echinococcosis in 5.1 ± 0.13% with (II) of 2-3 echinococcal cysts in the liver or in the lungs. According to the degree of occurrence, associations of 10 types of infestations were identified: kotolidony + moniezii + ostertagia + haemonchus + oesophagostoma +nematodir + trichostrongylus + strongyloid + cysticerci + linguatula larvae were observed in 14.1 ± 0.8% of the reindeer.

Poster Session

P8 Strongilyatoses of Herd Breeding Horses

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Herd horse breeding in Yakutia is a traditional and important branch of animal husbandry. One of the deterrents to increase the productivity of herd horse breeding are diseases caused by helminths, which are widespread in the territory of Yakutia and cause damage due to a decrease in the productivity of animals and the mortality of young animals.

It is known that the use of anthelminthic drugs for the body of animals does not pass without a trace, along with active helminthicidal actions cause functional changes in the body of animals, which is established by studies in the field of veterinary medicine. Now in the whole world there is an interest in the use of natural means of protecting the health of animals and humans.

In this regard, the development of scientifically based, environmentally safe and effective methods of correction from helminth-bacterial etiology and post-dehelminthization dysbacteriosis is an urgent task of veterinary medicine in the Far North.

The results of the research show that 42 species of Strongyloids parasitize the herd breeding horses in the Central and Western zones of Yakutia. The most common Strongyloids are the species Strongylus equinus, Alfortia edentates, Delafondia vulgaris and numerous species of Trichonematidae. When 455 horses were examined for coprologic examination, there were identified Strongylus equinus 44.4%, Alfortia edentates 44.4%, Delafondia 75% and Trichonematidae 100%.

The main Strongilyatoses of horses were 95% in the Namsky District, 93.1% in the Megino-Kangalassky District, 95.5% in the Amginsky District, 100% in the Suntarsky District, and 100% in the Nyurbinsky District.

The results of coprological studies of horses for the detection of eggs and larvae of Strongylus equinus, Alfortia edentates, Delafondia vulgaris and Trichonematidae showed that the extent of invasion (EI) of the major Strongilyatoses of horses was 95% in the Namsky district, 93.1% in the Megino-Kangalassky district, - 95.5%, the Suntarsky district - 100% and the Nyurbinsky district - 100%.

With the combined use of anthelmintics, the Equisect pasta and the probiotic "Sakhabactisubtil", a relatively rapid recovery of the qualitative and quantitative composition of microorganisms occurs, the number of lacto- and bifidobacteria increased significantly, the content of pathogenic and opportunistic microflora decreased.

Thus, the developed scientifically based technology of complex therapy of Strongilyatoses is an effective, promising, ecologically safe method of therapy and prevention of Strongylatoses of herd breeding horses under the conditions of Yakutia.

Poster Session

P9 Influence of keeping conditions and climate on the development of louses - trichodectes pilosus of herd breeding horses in the western zone of Yakutia

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Currently, in the Republic of Sakha (Yakutia), herd horse breeding is widespread almost everywhere and has both a productive and a working direction. One of the serious problems of the development of herd horse breeding is the infection of horses with parasites. Early onset of heat, the arrival of spring in April led to the appearance of ectoparasites previously unidentified in this herd of horses.

Horse biting louses are ectoparasites of mammals belonging to the Mallophaga order. Mallophaga order includes up to 2,500 species, of which about 50 parasites in mammals, and the rest in birds. They cause itching, calculus, hair loss and hyperkeratosis of the skin in animals. Louses are carriers of infectious and invasive pathogens (infectious anemia of horses, dipylidiosis of carnivores, etc.).

The aim of the work is to study the distribution of louses in the herd breeding horses of Yakutia.

We conducted a clinical examination and collection of louses from 10 adult horses and 10 foals of the current year of birth of the herd breeding horses in the peasant farming “Syrdyk Suol” of the Suntarsky district. It was determined by N.N. Plavilschikov.

There was carried out the treatment of the infested horses by the louses. The animals were treated with “Aversect-2” in a dose of 1 ml per 50 kg of animal weight, subcutaneously in the forearm region, once, and also sprayed with “Entomozan-C” - 0.01% aqueous solution, twice with an interval of 10 days. Before the disinfestation, the remains of food and water were previously removed in the presence of animals from the corral. The animals were kept for 1.5 hours after treatment, and then released from the corral. All works with “Entomozan-C” should be carried out using personal prevention measures.

Louses were found in 100% of the various-aged herd breeding horses. At a clinical examination on the skin areas inhabited by louses, the hair is disheveled, of unequal length. In the hair there are a large amount of exfoliated epidermis and a shell of lice, and also bald patches and focal dermatitis are found in the neck, shoulders, groin, and tail root. There is itching in horses. In the study of hair, there were found Trichodectes pilosus, small wingless insects of yellow or light brown color.

In the treatment of horses with the preparations “Aversect-2” and “Entomozan-C”, 20 horses were released from the louses, the efficiency was 100%.

Conclusions

Thus, in the conditions of Western Yakutia, for the first time there were found horse biting louses - Trichodectes pilosus, 100% affected horses in this farm.

In this regard, it is necessary to strictly control the veterinary and sanitary condition of animals and their places of maintenance, as well as the timely isolation of animals affected by louses to avoid the spread of this parasite in Yakutia.

P10 Predatory fungi as natural enemies of nematodes

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Predatory fungi, Hyphomycetes, are found in all parts of the world and in different climatic zones; more than 100 species are known.

It is established that Predatory fungi exist in the soil in the form of chlamydospores. Studies have confirmed the widespread prevalence of carnivorous fungi in nature.

For the first time, we isolated two strains predatory fungi of the genus Arthrobotrys oligospora from the permafrost soils of the Republic of Sakha (Yakutia). To isolate Predatory – nematophagous fungi, the collection of the material was carried out from various soils of the horse pasture, tree trunks, rotting plant residues, food residues, and animal feces. Predatory hyphomycetes living in the permafrost soil of Yakutia can become natural regulators of the number of Strongyloides larvae in horses of herd breeding.

The appearance of the colonies of the fungus Arthrobotrys oligospora has a neutral red color. According to the morphological structure, the isolated fungi are multicellular, consisting of thin-walled, monopodially branching threads located without a definite order, with a regular contour and simple septa.

The isolated pure culture of fungi Arthrobotrys oligospora exhibits a very high attractant and nematophagous effect, forming traps in the form of adhesive loops and plexuses trapping the Strongyloides larvae, digesting their contents.

The nematophagous activity of strains of pure culture of Arthrobotrys oligospora of nematode larvae is estimated by the number of formed hamstring loops and the ability to capture mobile nematode larvae. Based on the results of experimental studies, a high degree of predation of strains of Arthrobotrys oligospora was determined with respect to the Strongyloides of horses and their larvae. The rapid growth of macroconidia and the formation of hawking loops in the presence of Strongyloides larvae were observed in the experiments, the ability and rate of capture of living larvae, killing and digestion of their contents, the rate of increase in the biomass of the fungus, and the formation of more macroconidia, depending on the number of nematode larvae.

It has been developed a technique for obtaining a biologically active preparation using a mycelial mass of strains of Arthrobotrys oligospora on oats and a liquid form for use in experiments against the Strongylatosis infestation of herd breeding horses.

P11 Features of the epizootic situation of bovine tuberculosis in the Republic of Sakha (Yakutia)

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Tuberculosis of humans and animals in Russia remains one of the hard-to-solve problems of medicine and veterinary medicine. Thus, according to the information and analytical center of the Rosselkhoznadzor for 2017, the epizootic situation of bovine tuberculosis in the country has worsened compared to 2016 (the number of diseased animals for 2016 was 535, and for 2017: 1340).

Tuberculosis of cattle in the territory of Yakutia was officially registered in 1922 and for more than 60 years the epizootic situation for this disease remained tense. The disease was recorded mainly in the central and western economic zones. Since 1988, the Republic has recovered from this infection. However, in 1996-1998 and 2001, sporadic outbreaks of the disease were recorded. According to the results of laboratory studies, there were identified tuberculosis of bovine and, in 2001 of human type. Recovery was carried out by the method of complete replacement of the disadvantaged herds with healthy animals. At the same time, with the official welfare of the Republic on tuberculosis, there is a problem of allergic reactions to tuberculin. Thus, the number of reacting animals over the past 10 years ranged from 0.02% to 0.09%, which introduces ambiguity into the epizootic situation. No less important is the epidemiology of tuberculosis, since there were recorded cases of mutual infection of tuberculosis with cattle and their owners during the period of relatively good epizootic situation.

According to the results of bacteriological studies of biomaterial from tuberculosis-responsive cattle, non-tuberculosis mycobacteria were isolated. 11 types of non-tuberculous mycobacteria persisting in cattle in tuberculosis-safe herds in Yakutia were identified. Studies on the identification of cultures of non-tuberculous mycobacteria have shown that 77% of mycobacterial cultures belong to the IV group according to Runyon's classification, while only cases of the isolation of photochromogenic, scotochromogenic and nonphotochromogenic mycobacteria were noted.

As the most fast-growing mycobacteria were identified M.vaccae which is a feature of the region.

Poster Session

P12 Disease Strangles of horses in Yakutia

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One of the most common infectious diseases among horses is the Strangles, which occurs in almost all districts of the Republic. Basically, young animals get sick from 6 to 12 months of age.

The disease is characterized by the defeat of the mucous membranes of the upper respiratory tract, pharynx and the development of abscesses of regional lymph nodes. The causative agent of this disease is *Streptococcus equi*.

The fight against the horse strangles is to identify sick animals, to isolate them, to conduct therapeutic and preventive measures. Scientists of the Yakut Scientific Research Institute of Agriculture in 2000s developed and implemented inactivated vaccine against the horse strangles with immunomodulator. The vaccine was made on the basis of *Streptococcus equi* strain N-34, which was deposited in the collection of the All-Russian State Control Institute of Veterinary Preparations. Wide production trials have shown a high efficiency (up to 95%) of specific vaccine prevention against the horse strangles. Currently, the vaccine is not produced due to the expiry of the registration period in the Russian Federation. In Russia there is no vaccine against the horse strangles.

At the present date, the radical task of veterinary medicine is to develop a vaccine against the horse strangles.

We isolated and identified a new strain of *Streptococcus equi* to develop a new effective vaccine against the horse strangles.

A new strain of *Streptococcus equi* N-5/1 on morphological, tinctorial, cultural and genetic properties was identified and confirmed as the horse strangles *Streptococcus*.

Currently, a new effective inactivated vaccine against the horse strangles with immunomodulator has been developed on the basis of Streptococcus equi N-5/1 strain. The culture liquid (CL) of the bacterial strain *Bacillus subtilis* TNP-3, deposited in the All-Union State Scientific and Control Institute of Veterinary Preparations was used as the immunomodulator. The new vaccine is completely harmless to animals and has a high immunogenic ability.

At this time, a new vaccine against the horse strangles is in the approval stage in the Rosselkhoznadzor registry.

P13 Rhinopneumonia of Horses in Yakutia

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Rhinopneumonia (viral abortion of mares, sexual exanthema, rhinotracheitis of horses) is a viral illness characterized by inflammation of the mucous membranes of the upper respiratory tract, and in mares - by abortions in the second half of the trough. The causative agent is a DNA-containing virus (F.M. Orlov, 1997).

At present, the European part of Russia has studied the epizootology of rhinopneumonia influenza and developed measures for the prevention by vaccines. As you know, the causative agent of rhinopneumonia can cause abortions in mares, as well as rhinitis and pneumonia in young horses (K.P. Yurov, 1999).

For the first time in Yakutia, the circulation of the rhinopneumonia virus was established in 1993 by Neustroev M.P. (V.F. Butkovsky, 2003).

Rapid spread of the disease is facilitated by a large accumulation of horses, the replacement of individuals in the exchange and purchase of horses between areas and other regions, stress and the locating of pregnant mares and foals, and adult horses in one place. The disease also occurs in small farms and herds with grazing housing (M.P. Neustroev, 1994, 2007, K.P. Yurov, 1997)..

According to the research of M.P. Neustroev, the causative agent of rhinopneumonia in the spring and summer periods (April-August) with fluctuations in atmospheric temperature from -16°C to +33°C and relative humidity of 33-43% in the external environment maintains viability and pathogenicity up to 110 days.

In Russia there is used viral vaccine against rhinopneumonia, dry culture SV/69, but this vaccine was not widely used in extreme conditions of Yakutia, as it provides for a two-fold administration. Revaccination occurs in January-February, when the pregnancy of mares reaches 8-9 months, which contradicts the instructions for the use of the vaccine. Also, the bringing of herds during this period causes certain difficulties due to high snow cover and the danger of abortion of a traumatic nature.

The development of new effective vaccines against infectious diseases will contribute to the increase of livestock and horse breeding products of the Republic of Sakha (Yakutia).

Poster Session

P14 Epizootic condition of the brucellosis of northern reindeer in the Republic Sakha (Yakutia)

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The article contains the materials of the dynamics of unfavorable points for brucellosis in reindeer herding in the Republic of Sakha (Yakutia). The data analysis demonstrates how the effectiveness of the diagnostic studies of reindeer on brucellosis has changed over the past 28 years. This can be seen from the results of statistical analysis, where the correlation coefficient between the two ranges of values was -0.02 (r = -0.02). After 2007, the picture changed dramatically, and the direct correlation coefficient already amounted to 0.9 (r = + 0.9). That is, the number of reacting animals with a high degree of reliability depended on the number of animals examined.

The analysis of the epizootic state of the tundra, forest-tundra, mountain-taiga and taiga territorial-climatic zones of the republic in the brucellosis of domestic reindeer was carried out from 1988 to 2016. The percentage of positively reacting to brucellosis of reindeer in the tundra zone is, on average, 2-3 times higher than that of the mountain taiga and forest-tundra zone. Percentage of infected animals in unfavourable areas in 1988-1990 was very high and was 2.0-5.2%. As a result of ongoing anti-brucellosis measures, the number of infected animals in 2008-2010 decreased significantly and is 0.6-1.3%. However, the number of unfavourable areas remains unchanged, correlating with some stabilization of livestock dynamics.

The number of disadvantaged items shows us a tendency to decrease: from 19 districts in 1988 to 8 in 2017. The contamination of reindeer in the tundra zone of the Republic has significantly decreased (by 1.4-3.9 percent) and it is 0.6-1.3 percent. Infection with deer brucellosis in the mountain taiga and forest-tundra zones is 0.1-2.2 per cent, brucellosis in animals in the taiga zone is not established.

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P15 Veterinary and sanitary examination of semipermeable fish (chi and omul) in the basins of the rivers Yana and Kolyma with Diphyllobothriasis

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Relevance: The first and the most important rule of feeding the population of Far North is the ecologically safe products, which are must be conformed by reasonable veterinary-sanitary expertise and by evaluation of slaughter products of domestic, wild commercial animals, feathered wildfowl, and fishes in case of some infectious, parasitic, and non-infectious diseases.
In connection with, special relevance nowadays is problem of getting good-quality and ecologically safe products at all stages of technological recycling and veterinary-sanitary expertise. In all developed countries in case of excess of feeding products the most actual problem on that stage is problem of quality and safety of food.
Modern conditions of market economy provide knowledge and improvement of veterinary-sanitary evaluation of fish products. Study of species, amount, migration routes, and commodity characteristics of the commercial semi-anadromous fish (chir, omul, and other species) in Yakutia are poorly understood. That's why integrated approach is needed. Parasitology, organoleptic, and physico-chemical researches are necessary for an objective assessment of fish safety.
In modern conditions, when competition between imported and domestic production is obvious, it is necessary in accordance with the quality and safety of products, scientific and technical production efficiency of international standards. Before the food industry and trade in international manufactured goods, the population needs biological full and ecologically safe food.
The goal of the workis scientific rationale and development of veterinary-sanitary expertise and evaluation of biological and ecological safety of slaughter products of wild animals, sea mammals, birds, and fishes in Arctic zones of Yakutia.
For achieving goals these tasks are necessary to be done:

- organoleptic researches
- study of physico-chemical indicators
- microbiological researches
- detection of invasive diseases

Scientific novelty of this work is that by the results of researches, this will be the first time in Yakutia of developing guidelines of veterinary-sanitary expertise of semi-anadromous fish (chir, omul, and other species).
Basic provisions for protection: by the end of the work, practical suggestions and recommendations for using some of the semi-anadromous fish as an ecological safe feeding product will be presented.
Scientific justification of industrial fishing in the East Siberian Sea and in the Laptev Sea: study of species, their amount, migration routes and commodity characteristics of commercial sea species of fish.
The results can be used in case of rationale of ecological safety of food raw materials and of feeding products in these regions.

Poster Session

P16 Heavy metals in commercial fish of the Artic rivers of Yakutia

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In recent decades, there is environmental pollution everywhere. Water bodies are contaminated of by various chemical substances, among which, heavy metals are the most interesting, because of their ability to accumulate and high toxicity for living organisms.
Our research goals were evaluation of water contamination, content of heavy metals in the water and main commercial fish that was caught in the lower reaches of Arctic rivers of Yakutia – Lena, Yana, Indigirka and Kolyma. That is because lower reaches and river deltas are fish nursery grounds and possible locations of contaminant accumulation from catch basin. Dynamic of pollution content in the waters of arctic rivers is characterized by seasonal variation. The highest concentration of pollutants is observed during spring-summer seasonal flood. Main water pollutants are phenols, organic substances, and Fe, Mn, Cu, and Zn combinations. Especially, rivers are polluted (including pollution with heavy metals) near major population centers and mining enterprises.
Content of the heavy metals in the muscular tissue of the various types of commercial fish is not high; their concentration is diverse and varies in the range of standard sanitary requirements – Maximum Permissible Concentration for alimentary raw materials and food products. By absolute number of content - Zinc, Copper and Iron are leading, which indicates that these metals are prevailing in the environment and water. On top of it, they have great biological and physiological value in the life of the water organisms, so they are important components and they accumulate in their body. The smallest accumulation of lead, cadmium and mercury in fish can be explained by the small content of these elements in pure form, in water and in the Earth crust.

P17 Application of probiotics in poultry farming

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Currently in Russia there is active development and introduction of safe, effective probiotic preparations at cultivation of agricultural animals and obtaining animal products. Poultry is one of the priority early-ripening livestock industries. Yakutia, along with the support of traditional livestock industries, pays attention to the development of industrial poultry in the Far North, as a supplier of dietary food such as eggs and poultry. Our Institute developed on the basis of strains of bacteria *B. subtilis* TNP-3 and *B. subtilis* TNP-5, probiotic drug "Nord-Bact", isolated from permafrost soils.

The aim of this work is to develop a technology for the use of probiotic "Nord-Bakt" in industrial poultry farming, starting with the processing of incubation eggs, including periods of growing young and producing egg products.

1. In sanitation of hatching eggs the probiotic "Nord-Bact" compared to a chemical disinfectant helps to reduce embryonic mortality 2.7 times; increase the output of chickens by 1 %; the formation of normal intestinal microbiota from the first days of life of chickens.

Method of use: the truck with the eggs before placing in the incubation Cabinet once local anesthesia is sprayed on the probiotic "Nord-Bact" content 1x109 B. subtilis CFU/ml at the rate of 0.1 to 1 egg.

2. The use of the probiotic "Nord-Bact" on young birds: corrects intestinal microbiocenosis from the first days of life to the adult period; takes an active part in metabolism, affects the vitamin and mineral complex of the body, improves the quality of meat in biochemical composition;

- preservation of the number of young birds up to 99.65%;
- increase in live weight by 10.3 % of the planned

3. The use of the probiotic "Nord-Bact" on laying hens:

- significantly increases the content of vital minerals and vitamins in the yolk, protein, shell;
- reduces the battle eggs by 1.4 % and the contamination of eggs by 4.7 %;
- increases productivity by 4%;
- provides microbiological safety of egg products and organic waste;
- joint use of probiotic "Nord-Bact" with antibiotic not only prevents dysbacteriosis, but also retains the concentration of vitamins, macro-and microelements in the egg, which is reduced by antibiotic therapy;
- after application of a probiotic "Nord-Bact" of organic waste of poultry to obtain feed additive

How to use: the probiotic "Nord-Bakt" containing B. subtilis TNP-3 and B. subtilis TNP-5 at the rate of 5x107 CFU/GoI, 1 time a day with water, daily, for 10 days each month.

According to the results of the research 3 patents of the Russian Federation for the invention were obtained:

1. "The rehabilitation method of hatching eggs of chickens" / M. P. Neustroev, N. P. Tarabukina, M. A. Neustroev, M. P. Fedorova, S. I. Parnikova, No. 2009105956121 (007985) 02.07.2010 g
2. "Method of improving the quality of egg products chickens" / M. p., Neustroev, A. M. Stepanov, N. P. Tarabukina, M. P. Fedorova, S. I. Parnikova, D. D. Neustroev No. 2477055 from 10.03.2013 g.
3. "Method of preparation of feed additives from poultry manure with the use of bacterial strains Bacillus subtilis TNP-3-DEP" and "Bacillus subtilis TNP-5-DEP"; Neustroev M. P., Tarabukina N. P. Neustroev D. D., Stepanova M. A., Parnikova S. I.

P18 The use of probiotics based on strains of *Bacillus subtilis* bacteria in the industrial pig production

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The Yakut Scientific Research Institute of Agriculture in recent decades has developed a number of innovative probiotic preparations based on biologically active, natural strains of Bacillus subtilis bacteria isolated from the permafrost soils of Yakutia, such as “Sakhabactisubtil”, “Nord-Bact”, “Hongurinobact” and culture liquid from strains of Bacillus subtilis bacteria “TNP-3” and “TNP-5”. The preparations are used in the prevention and treatment of gastrointestinal diseases of agricultural animals, the strains antagonize the bacteria, viruses, fungi, produce a complex of enzymes, (protease, gelatinase, amylase, cellulase, β-gluconase, xylonase, fructosyltransferase), which enhance the antagonistic properties of preparations and contribute to a more pronounced probiotic effect. In addition, the preparations are active inducers of endogenous interferon, increase immunobiological reactivity and correct the metabolism of the body, improve digestibility and digestibility of feeds, contribute to an increase in live weight.

The use of probiotic preparations for pigs, starting from the period of newborn to slaughter, positively influences the microbial landscape, the safety of pigs rises by 34-53%, the incidence decreases from 4 to 20 times, the average daily gain increases, the quality of meat improves: the protein content increases by 3.9%, carbohydrates - 12%, fat (8.4%), the concentration of vitamins (A, B12, B3, D, B1, B2, E, B, E) and trace elements of iron by 14%, fluorine (11.6%), potassium (4.6%), the cholesterol content is reduced by 14.3%.

As a result of the phased use of probiotic preparations “Hongurinobact”, “Sakhabactisubtil” and the culture liquid of the bacterial strain Bacillus subtilis “TNP-3”, the body's safety, resistance, the growth rate of pigs in various age groups are increased, and the quality of meat is improved.

P19 Issues of preservation of the valuable gene pool of the Yakut breed

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Because of the small number of modern population of Yakut cattle, there arises an urgent question about the conservation of genetic resources and the gene pool of the breed. In recent years, a comprehensive comparative with world breeds genetic study of Russian breeds of cattle, including native Yakut cattle, has been carried out.
Genetic distances according to SNP markers prove that the Yakut breed is the most differentiated from all studied cattle breeds and show a lower level of genetic diversity than a number of other Eurasian breeds of cattle. This observation can be explained by prolonged genetic and geographical isolation. On the other hand, Yakut cattle could also have the effect of a founder and effect of bottle neck due to the small number of the original population. In the cluster distribution, the Buryat cattle, recently exported from Mongolia for reintegration into Russia, proved to be the closest. It is interesting that the Buryat cattle have more common haplotypes with the Yakut cattle and the Wagyu cattle from Japan than with other Turano-Mongolian breeds. This indicates a common pedigree of these breeds. Also, Yakut cattle were found in one cluster of phylogenetic tree with Hanwoo cattle from Korea. The genetic uniqueness and adaptability of the Yakut cattle to harsh conditions makes it a valuable material for use in breeding work.
The work on creation of adapted type of cattle of regional level of importance is carried out. The research on the characteristic of the unique allelofond of the breeding stock of cattle on the basis of the analysis of polymorphism of STR-markers is carried out. Research on the characteristics of the genetic and genealogical structure of the cattle is conducted. Studies are conducted to assess the genetic homogeneity and determine the degree of genetic similarity of the array of cattle. These works are aimed at obtaining new highly effective genotypes of livestock adapted to the harsh climatic conditions of the Republic, to the characteristics of the feed base and milk production technology. Research is primarily applied to the preservation of a valuable gene pool of the Yakut breed.

Poster Session

P20a The Yakut Cattle

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The Yakut cattle are the only native Siberian breed preserved in purity. The breed was created by national selection in the extreme conditions of the Far North. As of January 1, 2018, the number of the Yakut cattle was 1.666 animals, including 678 cows. It is a threatening status. The Yakut cattle is of great value for breeding cattle due to its high adaptability to extreme conditions of keeping and breeding, as well as high butterfat milk, good taste qualities of meat and milk, and the resistance to diseases.
Yakut scientists Z.I. Ivanova, R.G. Popov, I.A. Ammosov in collaboration with Juha Kantanen from the MTT Agrifood in Finland, obtained data on the genetic polymorphism of microsatellite DNA of the Yakut cattle, with following results:
1. The Yakut cattle represent the last cattle of the Siberian Turano-Mongolian breed preserved in purity.
2. Genetic distances on microsatellite DNA markers prove that the Yakut breed comes from domesticated cattle in the Middle East approximately 10,000 years ago.
3. The analysis data of Y-chromosomes indicate the proximity of the Yakut cattle to some European and Middle Eastern cattle.
4. Analysis of mitochondrial DNA sequences (mtDNA) showed that haplogroups T3, T2 are characteristic for Middle Eastern cattle breeds, and haplogroup T4 was still found only in East Asia. Thus, the study of mtDNA proved that the Yakut cattle divide prehistoric paternal pedigrees with domesticated Middle Eastern and European cattle, and maternal ones with Middle Eastern cattle, as well as in haplogroup T, possibly with cattle of East Asia.
5. Analysis of autosomal DNA markers showed that the Yakut cattle are differentiated from other studied breeds and show a lower level of genetic diversity than a number of other Eurasian breeds of cattle. This observation can be explained by long-term geographical and genetic isolation. On the other hand, the founder's effect could also appear in the Yakut cattle due to the small number of the original population.

P20b The problem of conservation of the gene pool of the Yakut cattle

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The biological diversity of species is the key to continuing the prosperous and stable existence and development of mankind on Earth. This fully applies to breeds of farm animals. Breeds of livestock are lost with great speed. In Europe, half the breeds of livestock that existed at the turn of the 19-20th centuries, died out in the 80s of the 20th century. At the present time, as a result of the displacement of highly specialized commercial breeds, the threat of the disappearance of the Yakut breed of cattle was created. Of the remaining 1,500 breeds of livestock on the verge of extinction is 41%. Aboriginal Yakut cattle in the territory of Yakutia were kept in purebred until 1929. In 1928, in the republic, its number was 555193 heads, and in 1961-90, there was a sharp reduction in the number to 986, including cows - up to 355. Yakut cattle is a monument of traditional culture of the northern cattle-breeding Sakha people. Yakut cattle is famous for its high fat content (4.5-6%), high taste qualities of meat and milk, the gene pool of the breed is used for breeding Yakutsk-Simmental and Yakut-Kholmogory types. The use of various DNA markers, methods of genomic and gene selection in the conservation and private genetics of domesticated species provides an opportunity to obtain data on the genetic potential (value, originality) of the rock important for the scientific substantiation of the conservation of aboriginal Yakut cattle.

P21 Species Diversity of Micromycetes in Feed for Cattle

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The study of the species diversity of micromycetes in cattle feed plays an important role in maintaining animal health. From the quality of feed depends the microbiocenosis of cows and hence the productive longevity of animals.

An analysis of the study results of the biodiversity of microscopic fungi showed the presence of 16 genera of micromycetes: Fusarium, Alternaria, Mucor, Penicillium, Aspergillus, Rhizopus, Stachybotrus, Trichoderma, Cladosporium, Acremonium, Geotrichum, Aureobasidium, Hormonema, Arthrographis, Malbranchea, Microascus. At the same time, micromycetes of the genera Aspergillus, Penicillium, Geotrichum and Trichoderma were the most prominent from soil samples. From the hay - Mucor, Penicillium, Aspergillus, from haylage - Rhizopus, Mucor and yeast-like; grain-forage - Fusarium, Rhizopus, Mucor, Aspergillus; from combined feeds - Rhizopus, Mucor, Aspergillus.

53 species of micromycetes belonging to 7 families (Moniliaceae, Mucoraceae, Tuberculariaceae, Pleosporaceae, Dematiaceae, Monascaceae, Saccharomycetaceae) and 10 genera (Fusarium, Mucor, Penicillium, Rhizopus, Aspergillus, Alternaria, Stachybotrus, Absidia, Monascus, Candida) were isolated and identified in feed of plant origin. The dominant position in the hay contamination belongs to Mucor racemosus (65.7%). At the same time, the frequency of detection of allocated toxic species of Aspergillus flavus (31.4%), Penicillium citrinum (28.6%) and A. niger (22.8%) is relatively high and relatively equal. These four species can be considered dominant in the fungi complex of seeded feed. The potential producers of mycotoxins are 67.92% of them, which are producers of aflatoxins and trichothecene toxins. Mycotoxicological analysis of plant feed from the Central Yakutia was used to isolate mylotoxins Aflatoxin B1, T-2 Toxin, Zearalenone and Ochratoxin A (in background amounts).

The Yakut Scientific Research Institute of Agriculture offered effective and safe measures for the prevention of mycotoxicosis by creating conditions that reduce the possibility of developing toxic fungi and the formation of mycotoxins; improvement of the sanitary quality of feed using the probiotic preparation “Sakhabactisubtil” as a preservative (patent for the invention “Method of biological fight against hay molding” No. 2292132, February 27, 2007); decrease in the sensitivity of animals to the action of mycotoxins with the use of the probiotic preparation “Sakhabactisubtil” as an immunostimulating, probiotic, prebiotic, antagonistic agent (patent for the invention “Method for the prevention of mycotoxicosis of animals” No. 2297842, February 15, 2007).

Currently, the work is underway to expand the arsenal of funds for the prevention and treatment of mycotoxicosis in farm animals using natural sorbents.

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P22 Analysis of DNA polymorphism of Yansky type of Yakut breed horses with RAPD-PCR analysis

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In preliminary experiments, a set of 25 decanucleotide primers was tested (designed by Operon Technologies, USA) for RAPD-PCR, of which 17 primers were selected, giving the most informative picture of the distribution of bands (DNA fragments). The studied micropopulations of horses of the Yansky type of the Yakut breed differed in frequency of occurrence of the bands. For example, fragments 550, 500, 600, 750, 550, 450 in length are found only in the horses of the Stolby area and are completely absent from RAPD spectra in the horses of the areas of Adyachcha and Tabalakh. The difference in frequencies is insignificant, but still allows judging the degree of polymorphism in a certain population. So, with the help of primers ORA 10, ORA 11, ORS 02, all DNA fragments in all micropopulations of horses of the Yansky type of Yakut breed were detected.

The results of assessing the informativeness of multilocus markers for studying the polymorphism of distant the Yansky type micropopulations of the Yakut breed of horses showed that 17 primers are the most polymorphic.

According to the results of PCR analyses, data on the molecular masses of microsatellite areas of DNA isolated from the hair bulbs of the Yakut breed horses of the Yansky type were obtained. One amplicon of the spectrum was considered as one locus of DNA. The largest number of amplicons in all samples is located within the range of 1500-300 bp. The most polymorphic sequences are the primers ORA 08, ORA 9, ORA 10, ORA 11, ORA 17, ORA 18, ORV 15, ORV 18, ORV 20, ORS 02 and ORS 03.

Unique alleles for three micropopulations of Yansky type horses of Yakut breed have been revealed. Thus, alleles of 1200-380 bp in length are found only in the micropopulation of horses from the region of Tabalakh, alleles of 1500-350 bp in length are found only in the micropopulation of horses from the area of Adyachcha, alleles of 3000-300 bp in length are found only in the micropopulation of horses from the Stolby area.

P23 Northern reindeer husbandry is the basis of the indigenous Arctic ethnic groups life

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Northern reindeer husbandry is a traditional and economically viable industry of Russian polar region and it is the only industry where in the sector of employment representatives of indigenous Arctic ethnic groups are dominant. Reindeer livestock breeding gives people of North high-caloric, ecologically clean venison, fur and hides. Distinctive features of venison are variety of nutritious fat and proteins in most favorable balanced state, which facilitates easy assimilation by the human body. Reindeers can easily survive the harsh climate of Arctic Regions it is a key feature of reindeers that allows the people of North obtain cheap, low in cholesterol, highly-nutritious meat that is not polluted with chemical additives, antibiotics, stimulants and etc.

Sakha Republic (Yakutia) is the one of the biggest reindeer husbandry regions in Russia. Reindeer husbandry in Yakutia always was traditionally high cultured. Yakutia saved the herding system of reindeers, in which reindeer herders live year-round in search of food continuously throughout the year, along with a herd on the seasonal pastures.

There are 3 breeds of reindeer in Yakutia – Evenk, Evenki and Chukot (harghin), Evenk breed being 60% of total number of reindeers in Yakutia. Breeding of this particular reindeers is traditional, environmentally sound and economically viable activity of indigenous Arctic ethnic groups of Yakutia. Reindeer for them is a trusty transport, source of meat, velvet antlers, hides, blood and other types of production.

Reindeer husbandry as a type of livestock breeding in Yakutia is in difficult situation. The main goal is to make the reindeer husbandry viable. At the same time, one of the promising areas for increasing the efficiency of agricultural production is the creation of a regional cluster that includes divisions of municipal authorities that provide regulatory, legal, investment and financial-budgetary mechanisms regulating the use of reindeer pastures, technology for traditional reindeer husbandry, the way of life of the reindeer communities, management of matching breeds on natural and climatic zones, application of advanced scientifically grounded methods of livestock breeding, maintenance of technologies, pre-fattening before slaughter, waste-free technology of slaughtering reindeer in mechanized slaughterhouses, with further primal cuts of reindeer carcasses according to the scheme and packing in vacuum packaging for further implementation.

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P24 Reindeer husbandry at the Municipal Unitary Enterprise Agribusiness (MUE AB) "Kanchalansky" of the Chukotsky Autonomous Region

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Based on the documents submitted by this farm, on the exhaustive list of documents required in accordance with the order of the Ministry of Agriculture of Russia of November 17, 2011 No. 430 "On approval of the Administrative Regulations of the Ministry of Agriculture of the Russian Federation on the presentation of a state service for identifying the types of organizations that carry out activities in the field of breeding livestock, a survey of the livestock of the Chukot breed reindeer, checking of the pedigree records, organization of grazing, inspection of the infrastructure of the tundra routes of herds". The Commission, established by the Order of the Department of agricultural policy and management of natural resources of Chukotka autonomous region of September 16, 2013 No. 254 "On the establishment of a commission to review the list of documents for determining the types of organizations for livestock breeding and epizootic welfare" considered that the subsidiary of the MUE AB "Kanchalansky" meets the requirements for breeding reproducer. Requirements are approved by the Order of the Ministry of Agriculture of Russia of November 17, 2011 No. 431 "On approval of Rules in the field of livestock breeding "Types of organizations that carry out activities in the field of livestock breeding" and on the recognition of repealed orders of the Ministry of Agriculture of Russia"

P25 Clinical and morphological characteristics of limb (autopodium) arteries of the thoracic extremity of reindeer in postnatal ontogenesis

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Under the conditions of modern Russian economy, reindeer husbandry occurs to be promising branch of agronomic culture. We get from the reindeer not only meat and byproducts, but also fur, hide and endocrine raw material, velvet antlers.

As a main branch of northern livestock breeding, reindeer husbandry has a great value to the life, economy and culture of the Northern people.

To the agricultural development under the conditions of Far North, reindeer husbandry occurs to be promising trend, comprehensive research of the structure and evolution of the reindeers can make a difference in the development of reindeer husbandry. In practice, veterinary specialists often encounter with the limb diseases of infectious and non infectious etiology. For the effective introduction of medical, diagnostic and preventive measures, specialists should know about age regularities of the changes of organ systems and tissues of reindeer.

Distal section of thoracic extremity, which reindeer uses to stand on the ground, provokes certain practical interest of veterinarians. It often gets traumatized, which, in summer period, leads to necrotic stomatitis.

A more comprehensive and in-depth study of distal sections of extremity vessels of reindeer can help to clarify the regularities of morphologic development of limb(autopodium) extremity vessels of various functional values adaptation to habitability conditions, including extreme conditions of Far North.

P26a Comparative dynamics of the domestic Arctic reindeer's haematic picture by climatic and economic zones of breeding zones

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Climate and ecology of Arctic is characterized by extremely expressed continentality and severity. Due to low temperatures during summer months the vegetation of plants lasts only for 60 to 90 days, along with this, freezings stop only at the end of June and the fall starts in the second half of the August. The territory is divided into 1) tundra, 2) forest tundra and 3) the Northern taiga. Due to climate conditions, there is no agricultural land for farming in the North and the animal ration of food is poor. With that knowledge in mind, from the physiological state of animals that live here, it is distinct that they have adaptive potential.

Adaptive features of animals are expressed in the general haematic picture by the seasons of the year. In the present work, data on quantitative and qualitative determination of the indices of blood composition of domestic reindeer by age groups and their comparative dynamics for the seasons of the year are studied. The experiment group is Evenki breed of reindeer bred in the tundra and taiga zones. Research has established that morphological composition of blood of the reindeer bred in the tundra zone is different from reindeer bred in the taiga zone. All the indicators are in the limits of the physiological standard.

P26b Comparative dynamics of the haematic picture when organism of an animal experimentally exposed to cold and heat

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In the report, there are results of experimental research, main goal of which was examination of the changes in cellular composition of the haematic picture of rats, depending on the cold and heat exposure time, as well as results of analysis of literature data about thermal influence on well-being of an animal and human, structure of immune system, and properties and behavior of natural adaptogens. Obtained results testify, that thermal influence on an organism affect the activity of cells, which provide reaction of specific and non-specific immune response, in particular, from the side of the erythrocytes, thrombocytes and leukocytes.

P27 Northern Domestic Reindeer Herding of the Republic of Sakha (Yakutia)

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The northern domestic reindeer herding of the Republic of Sakha (Yakutia) is concentrated in 21 uluses (regions) from 35 uluses and forms the basis of the way of life, economy, culture, employment of the indigenous small in number peoples of the North and creates the socio-economic appearance of northern settlements. Reindeer herding also serves as a locomotive for the development of hunting, fishing, arts and crafts, gathering of wild plants and the consolidating beginning of the northern peoples. According to the specifics of the industry, reindeer herding in the process of the annual production cycle covers huge territories and performs an important state function to ensure employment of the population of the North and the development of huge empty areas of the country. Out of 196 million hectares of reindeer pastures found in Yakutia, and on the remaining 130 million hectares the stocks of feed are so small that grazing of large herds is impossible. Out of 66 million hectares, only 37 million hectares have been transferred to the use of reindeer husbandry, which include the natural pastures of the tundra, forest-tundra and northern taiga zones. As of January 1, 2017, in all categories of farms in the Republic of Sakha (Yakutia) there are 156 814 heads of northern domestic deer, Evenk and Chukchi (hargin) breeds, 110 reindeer herding enterprises employ 1,792 reindeer herders and chum laborers. To date, the following pedigree registers have been registered with the State Tribal Register of the Ministry of Agriculture of the Russian Federation: - Khatystyr Aldansky ulus, a pedigree reproducer for breeding the Evenk deer breed, Olenek Municipal Unitary Enterprise of the Oleneksky ulus, a pedigree reproducer for breeding Evenk deer, MUP Primorsky and Municipal Unitary Enterprise "Borogonskoe" of the Bulunsky ulus - breeding reproducers for breeding the Evensk breed of deer.

Poster Session

P28 Experience and perspectives preservation of agro-biodiversity under permafrost

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Since 1979 more than 10 thousand seeds of crop from the collection of Vavilov Institute of Plant Industry were stored in an underground laboratory of Melnikov Permafrost Institute of the Suberian Branch of the RAS at a depth of about 11-12 meters at the temperature -2,5-2,70C. Sowing qualities of seeds were tested after storage for 17-23 years. Research has established that all samples kept high sowing qualities. The comparative assesment of growth and development's rhythm, morphological and physiological parameters between samples from seeds after long storage and their new analoges showed a lack of morphobiological anomalies and mutational changes.
Collection of seeds of important crop varieties of Research Institutions of Siberia and the Far East was initiated to laying for long storage under permafrost since November 2009 in Yakut Scientific Research Institute of Agriculture. Seeds of 92 varieties were collested from 8 Research Institutions of Siberian Branch of the RAS. In 2010 laying of seeds was carried out in underground glacier of Ust-Aldansky District of the Republic of Sakha Yakutia. In December 2012 near Yakutsk the Underground Storage was built through Siberian Branch of the RAS and the Government of the Republic of Sakha Yakutia. The Underground Storaage could fit 100 thousand samples of seeds. All samples of crops were laid at the beginning of 2013. Researches of sowing qualities and the study of biomorphological parameters in the field were tested every 5 years to establish extend safe storage.

P29 Physiological features of pure bred coarse-wooled sheep and its cross-breed

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The method of hybridization is one of the ways to improve the adaptive qualities of domestic animals to certain conditions used by humans for a long time. Thus, in the application of hybridization, the breeds of merino sheep and arharomerinos were excreted. A number of researchers note the probability of transferring features of behavior and habits by inheritance from parents to descendants. From this it follows that wild species, when crossing with domestic sheep, can transfer to descendants not only useful, but also unwanted signs, such as late ripeness, low technological qualities of wool and behavioral reactions - savagery, timidity and aggressiveness, which is highly undesirable in further work with hybrids.
The problem of acclimatization and adaptation of sheep is historically associated with methods and methods of animal husbandry in specific climatic and weather conditions. At the same time, acclimatization, being a special case of adaptation to a complex of external natural and climatic factors, is an integral unit in the general biological problem of the evolution of animals, which determines its relevance at all times.
E. Ya. Borisenko noted that acclimatization is the means to live, reproduce and develop correctly in a new geographical area, under new climatic conditions and preserve economic and useful qualities for the sake of which animals are bred.
We conducted a hematological study of the blood of coarse-wooled sheep, cross-breed of Buubei coarse-wooled sheep and a big-horn on the ability to acclimatize in the conditions of central Yakutia; blood sampling was collected at the end of the spring period. The result of the conducted analyzes shows that coarse-wooled sheep has a negative ability to acclimatize in the conditions of the utmost North (central Yakutia), the first and the second generation cross breed fit to the standart physiological indices, thus developed cross breed are suitable for the farms of the Republic of Sakha.

Poster Session

P30 Regional indicators of the quality of life of the population of the Republic of Sakha (Yakutia)

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The aim of the study was to study the quality of life of the population of the Far North.
The work was carried out within the framework of the state task of the Ministry of Education of the Russian Federation No.AAAA-17-117021310139-5 "Clinical and genetic aspects of diseases characteristic of the indigenous inhabitants of Yakutia in modern conditions"
Data collection was conducted in various regions of Yakutia by questioning respondents. A total of 1042 residents were surveyed in the region, of which 53% were women, and 47% were men. As a tool for data collection, the SF-36 questionnaire was used, which contains eight health scales (concepts). The indicators of the quality of life were standardized according to the USA general population in accordance with the recommendations of the developers.
The results of the study showed that the average values of the quality of life scales of the population in the study region are below 50% of the "ideal" 100% value. The quality of life of the population of Yakutia is lower than in Russia both in physical and mental health. The daily activities of respondents were limited not only by physical problems on the part of health, but also by their emotional state, in particular in the Arctic regions.

P31 Viral hepatites B, C and D and their outcomes in Republic of Sakha (Yakutia)

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The Republic of Sakha (Yakutia) (RS(Y)) is one of the most disadvantaged territories of the Russian Federation for the prevalence of hemocontact viral hepatitis B, C and D, as well as their adverse outcomes - cirrhosis and primary liver cancer. This unfavorable epidemiological situation is associated with climatic and geographic features (the Far North conditions), with prevalence of immunodeficiency, which frequency is increasing under the influence of an unfavorable ecological situation, which is notable characteristic of the RS(Y). According to official statistics, in 2017 there were 328 cases of chronic hepatitis B (CHV), (34.2 per 100,000 cases) and 501 cases of chronic hepatitis C (CHC) (52.1 per 100,000), in the structure of chronic viral hepatitis, the proportion of CHB and CHC in 2017 was 39.5% and 60.5%, respectively. Currently, according to the register "Chronic viral hepatitis in the Republic of Sakha (Yakutia)", 15 145 people are registered, 6417 of them with chronic hepatitis B, with chronic hepatitis C - 6781, with chronic hepatitis D - 1101, with mixt - 641, with unverified etiology - 4, 385 of them with cirrhosis of the liver (LC), 27 people with primary liver cancer (PLC). High prevalence of hemocontact viral hepatitis is observed in the Suntar, Ust-Aldansky, Neryungrinsky, Myrninsky, Khangalas districts of the republic and Yakutsk.

With Buryatia, Tyva and Tyumen region, Yakutia is among the regions of Russia with the highest incidence rates in patients with viral hepatitis. For the period from 2000 to 2015 the incidence rates of liver cancer exceed in 4-5 times in Yakutia in comparison with the Russian Federation. High incidence of CVH and their outcome in the central, polar and western Yakutia region could be explained by insufficient level of qualified medical and preventive care in these regions. Significant coefficients of rank correlation ($p < 0.05$) between incidence of CVH B, C and D with outcomes in cirrhosis (rsp = + 0.94) and liver cancer (rsp = + 0.83), and between chronic hepatitis D with cirrhosis (rsp = + 0.94) and liver cancer (rsp = + 0.89) has been obtained. However, there was no statistically significant association for CHC and CHB separately.

The main cause of the liver cirrhosis was HDV infection - 51.72%, which is could be explained by more severe course and rapid transition into liver cirrhosis. In the structure of the causes of HCC, the greatest percentage has chronic viral hepatitis C - 41.38% which is characterized by a latent course and detection in the late stages of the disease (37.9%). The mortality rate after cirrhosis and liver cancer in 2016 was 4.5 cases per 100 thousand of us. For the period from 2009 to 2016 this indicator has grew (2009 - 2.3 per 100 thousand people - 2016 - 4.5 per 100 thousand of us.).

The study of the long-term incidence of viral hepatitis B, C and D in the RS(Y) to let us clarify the frequency of various nosological forms of the disease (chronic hepatitis, cirrhosis and liver cancer). Regions of Yakutia, the most affected viruses of hepatitis B, C and D with a progressive course of the disease had been identified. To create a preventive system and stages of treatment for patients with chronic viral hepatitis, including in the cirrhotic stage and with the primary cancer a specialized hepatological center formation is recommended.

P32 The impact of lifestyle transformation on the health of the indigenous population of Yakutia

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Introduction: Lifestyle transformation has a significant impact on human health. In this situation the northern populations are vulnerable groups. For mitigation of effects of lifestyle transformation on the health, monitoring of situation is necessary assess the current health status and potential future negative health outcomes.

Methods: To characterize the health status and nutrition were used statistical date of Federal State Statistics Service of the Republic of Sakha (Yakutia). Basal metabolic rate, seasonal variation of thyroid function present used results of study among indigenous adult population from Central Yakutia (Berdigestjah, 62°N., 126°E.). Participants: healthy adults-volunteers (>19 years old). Time of study: two field seasons– August/September 2009, January 2011. Methods: BMR – indirect calorimetry; Anthropometry; Health measures; Hormonal measures; Physical activity; Questionnaire on socio-demographics & lifestyle. Prevalence of metabolic disorders present used results of study among indigenous adult population from Central (Berdigestjah, 62°N., 126°E.) and nothern (Zhigansk, 66ºN, 123ºE) Yakutia. Participants: indigenous adults (≥20 years old). Time of study: 2009, 2010 May-July. Methods: Anthropometry; Health measures; Hormonal measures; Lipid, Glucose measures; Physical activity; Questionnaire

Results: Traditional Yakut food contains large amounts of fats and proteins. It is a component of adaptation to cold stress. In the end of the XIX century traditional nutrition per one member of middle income family consisted of 80% of the products of animal origin. Modern diet of Yakut people includes 11-13% of protein, 27-34% fat and 53-62% of carbohydrates. Result of study among the Yakut has documented elevated basal metabolic rates and declines in thyroid hormone levels (fT3 and fT4) during the winter. It is response to extreme cold stress. Socioeconomic transition a change almost every aspect of life of circumpolar population (increase of psycho-emotional stresses, physical activity, nutrition, traditional subsistence activities and others). It accompanied by failure of established mechanisms of evolutionary adaptation to extreme factors and lead to the development of pathological conditions. About stress adaptation reserves of the organism under the influence of complex environmental factors and suggest low life expectancy, high rates of morbidity and mortality among the population of northern regions.

Conclusion: in sum, the study has shown that the indigenous Yakut of northeastern Siberia marked elevated basal metabolic rates, seasonal changes in thyroid function, high prevalence of metabolic disorders, increase of morbidity and mortality. These populations carry the double burden of the adverse effects of both natural and socio-economic factors affecting health. In terms of lifestyle transformation and future of climate change, these groups are among the most vulnerable. Climate warming is expected to change in the spectrum of diseases, increase the proportion of infectious diseases, the numbers of cardiovascular events, of stress-factors, the changing of nutrition. Therefore it is necessary to forecast possible trends in health and consider possible measures to maintain the health and life of population.

P33 The biological value of fats of freshwater fish

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The results of research on the biological value of fillet fat and freshwater fish of the rivers of Yakutia (*Stenodus leucichthys, Coregonus nasus, Coregonus autumnalis, Coregonus muksun, Coregonus sardinella, Coregonus peled, Coregonus pidschian)*. It is established that fats of these fishes differ in high content unsaturated (mono - and polyunsaturated) fatty acids which ratio to saturated fatty acids makes in fillet from 1.0: 0.22 to 1.0: 0.32, in a belly part from 1.0: 0.24 to 1.0: 0.28 that speaks about high biological performance of fats of freshwater fishes of Yakutia.
For the study, the fish of the autumn catch were quick-frozen at a temperature of no higher than -30 ° C in a modular plant for freezing products (MUZ-07-10), followed by storage in glaciers and freezers with a temperature not higher than -15 ° C. The obtained samples from all parts of the fish were combined into homogeneous batches and resulted in an average sample of each species. Determination of the biochemical composition of fish and fish products was determined by infrared spectroscopy using the SpectraStar model 2200 infrared analyzer from Unity Scientific USA, calibrated on the basis of conventional standard chemical methods in the laboratory of processing of agricultural products and biochemical analyzes of Yakut scientific research institute of Agriculture.
Freshwater fish of the rivers of Yakutia are distinguished by good biological efficiency due to low content of saturated fatty acids and high content of monounsaturated and polyunsaturated fatty acids.
In winter, a large amount of easily digestible monounsaturated and polyunsaturated fatty acids and fat-soluble vitamins accumulate in the belly of freshwater fish, which is a good source of energy during emergency wintering conditions for fish.
The indigenous people of the northern regions of Yakutia eat fresh fish, including stroganina from fresh-frozen fish, which provides the body with easily digestible fatty acids and the main groups of fat-soluble vitamins (A, E, D) and serves as prevention of diseases of the cardiovascular system and beriberi.

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P34 Veterinary and sanitary assessment of koumiss, the national drink of the Sakha people

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The first and the most important rule of feeding the population of Far North is the ecologically safe products, which are must be confirmed by reasonable veterinary-sanitary expertise and by evaluation of slaughter products of domestic, wild commercial animals, feathered wildfowl, and fishes in case of some infectious, parasitic, and non-infectious diseases.
In connection with, special relevance nowadays is problem of getting good-quality and ecologically safe products at all stages of technological recycling and veterinary-sanitary expertise. In all developed countries in case of excess of feeding products the most actual problem on that stage is problem of quality and safety of food.
Modern conditions of market economy provide knowledge and improvement of veterinary-sanitary evaluation of fish products. Study of species, amount, migration routes, and commodity characteristics of the commercial semi-anadromous fish (chir, omul, and other species) in Yakutia are poorly understood. That's why integrated approach is needed. Parasitology, organoleptic, and physico-chemical researches are necessary for an objective assessment of fish safety.
In modern conditions, when competition between imported and domestic production is obvious, it is necessary in accordance with the quality and safety of products, scientific and technical production efficiency of international standards. Before the food industry and trade in international manufactured goods, the population needs biological full and ecologically safe food.
The goal of the workis scientific rationale and development of veterinary-sanitary expertise and evaluation of biological and ecological safety of slaughter products of wild animals, sea mammals, birds, and fishes in Arctic zones of Yakutia. For achieving the goals, these tasks are necessary:

- organoleptic research
- study of physico-chemical indicators
- microbiological research
- detection of invasive diseases.

Scientific newness of this work is that by the results of researches, this will be the first time in Yakutia of developing guidelines of veterinary-sanitary expertise of semi-anadromous fishes (chir, omul, and other species).
Basic provisions for protection: by the end of the work will be presented practical suggestions and developed recommendations for using some of the semi-anadromous fish as a feeding products with considering ecological safety.

Scientific justification of industrial fishing in East Siberian Sea and in Laptev Sea: study of species and amount, migration routes and commodity characteristics of commercial sea species of fish.
The results might be used in case of rationale of ecological safety of food raw materials and of feeding products in these regions.

P35 Probiotic properties of the microbial consortium

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The article presents the results of a study of the probiotic properties of a microbial consortium. Microbial consortium obtained by autoselecting the microflora of a kefir fungus and thermophilic lactobacilli. It is shown that the microbial consortium possesses high fermenting activity and forms qualitative indicators characteristic for hurunges and koumiss.
Studies of the antagonistic activity of the microbial consortium make known its ability to inhibit the development of E. coli I53 and S.sonnei 2848.

P36 Cultural representatives Fabaceae Lindl. in conditions of the Central part of Yakutia

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Proteins serve as the basic constructional material for the animal, including the human body. It is known that the leguminous Fabaceae Lindl have the largest content of vegetable protein and the agricultural priority of most countries in the world is aimed at expanding of these crops.
Yakutia is one of the northernmost agricultural regions of Russia. The climate of Yakutia is characterized by a cold long winter, such severe winters do not exist in other habitable places of the northern hemisphere, and a short hot arid summer. For these conditions, the following varieties of leguminous were made by the Yakut Research Institute of Agriculture:
Vicia sativa L. - variety Lenskaya 15. It is regionalized in the 11th region of Russia in 2015. The variety is early maturing, the duration of the period from sowing to economic ripeness of seeds is 89 days. The yield capacity of green mass is 19-23 t / ha, of the seeds is 1.8-1.9 t / ha. The resistance to lodging is average.
Pisum sativum L. - variety Saryal. This variety was transferred to the State Variety Test in 2016. It is characterized by early maturity - a vegetation period is 77 days. It has a high resistance to lodging, a short stalk - 50 cm, and a stable seed yield of up to 3.0 t / ha.
And also the following bean cultures Cicer arietinum L., Vicia faba L. and Glycine max (L.) Merr are of the utmost interest for the conditions of Yakutia.

P37 Culture of honeysuckle in Central Yakutia

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The therapeutic and preventive value of berries, early ripening, high winter hardiness of honeysuckle plants, as well as the successes in breeding work achieved by leading scientific institutions of Siberia and the Urals, contributed to an increase in interest in this culture.
Honeysuckle has the early maturation of the berries, fruiting stable, high winter hardiness. It does not suffer from spring return cold due to the stability of flowers and ovaries to lower air temperature to -7°C. Honeysuckle comes late in fruiting-5-6 years after planting, but this deficiency is compensated by its longevity of fruiting up to 25-30 years [2, 3].
The culture of honeysuckle in the conditions of Central Yakutia is suitable for expanding the range of berry crops and creating a raw material base for the food and pharmaceutical industry.

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P38 Distant hybridization of strawberries in conditions of the central part of Yakutia

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Until 2000 strawberry was not cultivated in the Republic of Sakha (Yakutia) due to the absence of winter hardy varieties. Adaption to weather conditions is an important feature of cultivars.
Scientific research on the introduction and selection of strawberries in order to assess its most important economic and valuable features in the creation of high-adaptive varieties for Yakutia in The Yakut research Institute named after M. G. Safronov has been conducted since the mid-90s.
The aim of the research is to study the genetic potential of the initial forms of strawberries, in order to identify high levels of genotypes that have adaptive characteristics to local conditions.
The investigations were conducted in the berry farm of the Pokrovsk selection station, which is located 70 km east of the city of Yakutsk. Winter hardiness of various wild strawberry species were studied under conditions of the Central part of Yakutia: *F. vesca* L., *F. viridis* Duch., *F. mandshurica* Staudt, *F. orientalis* Los., *F. moschata* Duch., *F.* × *ananassa* Duch. Research discovered the most ecological adaptability to local conditions was noted in the aboriginal species *Fragaria orientalis* Los. eastern strawberry. In the nature of Yakutia it is the only wild species.
F. *orientalis* is distinguished by its high winter hardiness, immunity, productivity, unpretentiousness, excellent taste and aroma properties. Particular attention in the selection of parent pairs was paid to winter-hardy native species Fragaria orientalis Los. As another parent pair, winter-hardy varieties of garden strawberry F.× ananassa and forest strawberry F. *vesca* ssp were used. *vesca f. semperflorens* Duch. Interspecies crosses were carried out at different-chromosomal level, both in artificial and free pollination.
The genotypes determined winter hardiness, large berries and other economic valuable characters of initial strawberry species were obtained. The investigations were conducted in the berry farm of the Pokrovsk selection station, which is located 70 km east of the city of Yakutsk.

Poster Session

P39 The results of the breeding study of black currant in Central Yakutia

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The results of studies on selection and study of black currants in the conditions of Central Yakutia.
Breeding work on leading the culture of black currants began in 1962 in Central Yakutia. Collector's nursery founded in 1958, was expanded in 1986, 2001 and 2004. Varieties were brought from Michurinsk, Altai, the Far East, Siberia and Buryatia. More than 130 varieties and forms studied currently.
The main direction of breeding of black currants is to create winter-hardy and frost-resistant varieties that can withstand t -58-60˚C, yielding, vysokovitaminnym, easypayday, resistant to stressful conditions of sharply continental climate.
The local forms of R. nigrum L. spp. sibiricum E. Wolf., R. pauciflorum Turcz., R. dikuscha Fisch., R. procumbens Pall., R. fragrans Pall. studies in early in source material used, as the most adapted to local conditions. Vysokovitaminnye, resistant to Bud mite variety Hara Kytalyk dedicated in the result of individual selection of form R. pauciflorum Turcz. method analytical breeding; The high-yielding, early variety Yakutskaia obtained the method of distant hybridization R. dikuscha Fisch. and R. procumbens Pall.
4 local varieties of black currant Erkeeni, Myrychana, Lucia, and Pamyati Kandila created in a further method of intervarietal hybridization
Adapted, which are highlighted Yakutian varieties and forms of black currants used to obtain a new source material as the parent forms winter-hardy and in Altai, the Siberian varieties.
At 17-25 combinations crossing annually, a total of more than 10 thousand hybrid seedlings. Hybrid material selected individually outdoors on a natural background for 4-5 years. 2950 hybrids known in the nursery for the selection of different years, 24 forms dedicated, a promising 14, elite 4 form, state tests 2 including.
Altai varieties are Rannaia Potapenko, Agrolesovskaia, Kalinovka, Sharovidnaya, Altaiskaya pozdnaia, Podarok Kuzioru (4-6,9 kg per Bush) was allocated the result of variety trials for yield and resistance to powdery mildew, but freeze slightly above the snow cover. These varieties are sources for creation of productive and resistant to powdery mildew new varieties in the conditions of Yakutia.

P40 Selection of perennial grasses in Yakut Research Institute of Agriculture

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Yakutia needs varieties combining high winter hardiness with stable yield and high quality of feed, adapted to arid conditions and salinity of soils, resistant to flooding, to pests and diseases and horses winter pasture under the snow.

9 species of perennial grasses were created and zoned in Yakut Research Institute Of Agriculture. To increase the productivity of haymaking alas lands of the Eastern zone, the varieties of the Lenskaya *Roegneria mutabilis*, the Toybokhoysky *Agropiron repens* and the of Amginsky *Elymus sibiricus* were established. The varieties are characterized by high winter hardiness, resistance to drought, and grassiness persists up to 4-5 years. The yield of green mass is 100-120 centner / ha, the seeds are 1-2 centners/ha. Erkeani *Bromopsis inermis* is spread out for floodplain hayfields, which is characterized by high yield of hay (28.9 c / ha) and seeds (1.9 c / ha), high winter hardiness and drought resistance.

For sowing long-term pastures of year-round use with horses winter pasture under the snow, the varieties of the *Psathyrostachys juncea* Manchaara and Bootur are displayed. They have productive longevity, are resistant to trampling, bleeding, drought and salt-tolerant. The variety of *Festuca rubra* Meryunskaya is recommended for reclamation of disturbed lands, ground lawns, as a component of grass mixtures for sowing pastures.

Among the leguminous herbs, the *Medicago falkata* varieties Yakut yellow and the *Melilotus albus* of Nemyugunsky are zoned. The yield of green mass of *Medicago falkata* is 250-300 centner / ha yellow, white *Melilotus albus* - 160-180 centner / ha. The yield of seeds, depending on the moisture content of the vegetation period in *Medicago falkata* of the Yakut yellow - 0,5-1,0 c/ ha, sweetgrass Nemyugunsky 2.0-4.0 c / ha.

In 2017 a variety of *Bromopsis inermis* Aystal was created, which is distinguished by a high seed yield of 1.9 centners per hectare, lining (44-54 per cent), and high-resistant. It is recommended for sowing hayfields of the Leno-Amginsky interfluve of Central Yakutia.

At present, the task is to bring out new varieties of *Elymus sibiricus*, resistant to extreme conditions in Yakutia, with a stable hay and seed yield, with high fodder qualities resistant to diseases and manufacturability.

Poster Session

P41 Efficiency of local strains of nodule bacteria *Sinorhizobium meliloti i*n the cultivation of alfalfa crescent in the conditions of Central Yakutia

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Aim: study the influence of local strains of nodule bacteria and mineral fertilizers on the fertility of the soil and the biomass of alfalfa crescent.

Objectives:

- to study the effect of local strains of nodule bacteria and mineral fertilizers on the soil fertility, accumulation of biological nitrogen and productivity of alfalfa;
- to assess the effect of local strains of nodule bacteria and mineral fertilizers on the symbiotic apparatus of alfalfa.

Objects of research: alfalfa crescent Yakut yellow, local strains of nodule bacteria Yakutsky №1 and Yakutsky №2 Sinorhizobium meliloti, mineral fertilizers.

Field experience has been laid since 2018 at the scientific stationary of the Yakut Scientific Research Institute of Agriculture in the Khangalassky district. In the experiment, 23 variants - repetition four times, sowing is broad-row with between-rows of 30 cm, the placement of the plots is randomized, the registration area of the plots is 25 m2.

One of the most important problems of modern agriculture is the possibility of fixing atmospheric nitrogen. Biological fixation of nitrogen occurs by microorganisms inhabiting the soil.

Nodule bacteria are the genus of nitrogen-fixing bacteria that form nodules on the roots of leguminous plants. They absorb atmospheric molecular nitrogen and convert it to nitrogen compounds assimilated by plants, which, in turn, provide other plants with nutrients.

A useful quality of alfalfa is its biological peculiarity to grow in symbiosis with nitrogen-fixing nodule soil microorganisms forming on its roots nodules. As a result of their vital activity, nitrogen compounds that are accessible and necessary for the growth of alfalfa and other agricultural plants accumulate. Treatment before sowing seeds with strains of active nodule bacteria allows enriching the root system of plants and thereby promoting active binding of molecular nitrogen.

Bacteria contribute to the optimal use of mineral and organic fertilizers. Breeding in the root zone, bacteria protect them from penetration of microflora, causing plant diseases. Rational use of bacterial preparations makes it possible to significantly increase the productivity of agricultural crops with a lower consumption of nitrogenous fertilizers and an increase in the biological activity of the soil.

In the Yakut Scientific Research Institute of Agriculture, two patents of local strains of nodule bacteria Yakutsky №1 and Yakutsky №2 were obtained from the Yakut yellow alfalfa variety, the author of which is the Candidate of Agricultural Sciences, Associate Professor, Senior Researcher of the Laboratory of Potato Growing and Agroecology Yakovleva Maria Timofeyevna.

Based on these strains, the laboratory of agroecology produces biological preparations for increasing the soil and productivity of agricultural crops.

P42 Biological productivity of oats in Central Yakutia

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In the Republic of Sakha (Yakutia) agriculture is mainly developed in the middle taiga subzone, the border of which passes 64-65° n.l.
The climate of Central Yakutia is sharply continental, arid. According to bioclimatic and soil conditions, L.G. Elovskaya (1978) distinguishes three plain soil provinces within Central Yakutia [1].
Experiments were conducted in the valley of the river Lena, which belongs to the third province, where for the year only 200 mm of precipitation falls with possible maximum moisture consumption for evacotranspiration of 320-360 mm and evaporation of 400-450 mm, the humidification coefficient is below 0.5. Salinity is widespread, which occupies not only the terrace above the floodplain, but also the floodplain of the Lena River. Summers are hot (absolute maximum +38°C), characterized by a long day in a warm period with high solar radiation stress.
Oats is the leading fodder crop in areas of widespread permafrost, where developed agriculture. Object of research - oats “Pokrovsky 9”. The experiment scheme included a variant without irrigation (control), irrigation for the main phases of vegetation is normally 300 m3/ha. It was found that irrigation in the main phases of plant development contributed to an increase in the yield of green mass of oats to 12.2 t/ha. With irrigation, especially in the early phases of plant development, a more accelerated accumulation of carbohydrates and protein compounds is observed. In the variant of irrigation plants, the content of raw fat is markedly increased (11.47-14.54%), raw fiber in the phase of budding-flowering and flowering - milk ripeness (43.35-35.31%). In plants of 1 kg of dry matter there is a decrease in the content of potassium (18.44-18.94) and nitrogen-free extractives (NFE) (41.5-42.8 g) is observed. There is also a tendency to increase the content of phosphorus in plants to 0.26-0.28% and potassium - up to 1.40-1.63% in irrigation, which positively affects the quality of feed. With vegetative irrigation, conducted in critical phases of plant development, the bioproductivity of oats is increased by 30-35%, and the nutritional value of oats is increased by 20-30%.
Thus, in the conditions of the extra-continental climate of Central Yakutia, oats are the most adapted fodder crop. The yield of green mass even in arid years on the bog does not decrease below 8.3 t/ha, while irrigation in the main phases of vegetation provides up to 12.2 t/ha of green mass. With vegetative irrigation carried out in critical phases of plant development, the bioproductivity of oats is increased by 30-35%, and the nutritional value of oats is increased by 20-30%, this allows us to state that the proportion of oats in the structure of cultivated areas of forage crops should not fall below 40%.

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Poster Session

P43 Methods of increasing fertility of frozen soils in Central Yakutia

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The specific conditions of Central Yakutia - short vegetation period, cold and poor soils (in winter soil freezes for eight months, all biological, biochemical processes of vital activity cease), the non-wash nature of soil formation determines the low biological activity and fertility of permafrost soils, which requires new ways to increase the biological activity and fertility of soil in the conditions of cryolithozone. In Central Yakutia almost 40% of arable land is saline to a varying extent. Sulfate chloride predominates, as well as soda salinity.
Resource-saving technology of soil cultivation with the use of multifunctional soil cultivating units and the biologization of farming raises the yield of fodder crops due to better moisture conservation, improves soil structures, prevents its deformation and compaction of subsoil horizons, enriches the permafrost soils with organic matter.
The results of the experiments show that when gypsuming the exchange sodium cations decreased significantly, the content of exchange Ca increased by 14-48%, the content of exchange Mg decreased. The content of absorbed Na from the absorption capacity shows that the degree of alkalinity of meadow chernozem soils has decreased from a slightly alkaline (6.73-8.38%) to non-alkaline (4.99-2.06%). The percentage reduction of Na from the total number of variants is from 37.6 to 71.2. The percentage of displaced Na is from 28.8 to 62.3. After agrotechnical methods and chemical reclamation, the initial index of the degree of salinity (1.69-2.92) changed to a slightly saline (0.42-0.83) determination.
The introduction of gypsum in a dose of 4 tons, 8 tons, 12 tons on saline soils promotes the desalinization of soil in the 0-40 cm layer, the percentage of displaced Na from its total amount is 28.8-65.5. In the application of gypsum in a dose of 8-12 t/ha with the combined application of organic and sideral fertilizers, the analysis of the water extract shows the non-salinity of the soil - 7.54. Soil pH decreased from 8.56 to 7.54 [1].
The methods for increasing the fertility of saline soils contributed to an optimum nutrient supply of plants, a high yield of green mass of the mixture of vetch - 200 - 330 c/ha. The introduction of different doses of gypsum on the background of organic and sideral fertilizers provides an increase in the green mass from 31 to 64 c/ha.
With resource-saving soil cultivation technology, the productive moisture in the permafrost soils is preserved by 20-25% more than in the recommended zonal soil treatment technologies, the soil density decreases from 1.23 g/m³ to 1.18 g/m³ [2].

Patents:

1. Способ повышения плодородия мерзлотных засоленных почв в условиях криолитозоны патент № 2427999, 10 сентября 2011 г.
2. Способ улучшения плодородия мерзлотных почв в условиях криолитозоны, патент № 2603037 от 28 октября 2016 г.

P44 Intermediate cultures under the conditions of Yakutia

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Determining the ecological foundations and opportunities to increase crop productivity by increasing the use of solar radiation in the process of photosynthesis is one of the most important problems of modern farming. The basis for estimating the yield of the crop, the highest possible for a given area, should be efficiency of photosynthetically active radiation.

Increase the efficiency of photosynthetically active radiation of the crop seedlings can be the right choice of crops and varieties, the optimum density of plants, the compaction of crops by intermediate cultures, the use of fertilizers, etc.

Winter rye, as an intermediate culture in the conditions of the permafrost zone, is the only overwintering fodder crop. Cultivated in Yakutia varieties are characterized by high winter hardiness, under a snow cover of 25 cm they can withstand the air temperature up to -58°C ... -60°C.

In the fodder crop rotations with intermediate cultures, the experimental schemes were as follows: oats + peas - rapeseed, winter rye - winter rye, sweet clover – sweet clover, rapeseed - lucerne + regneria; sweet clover - sweet clover, winter rye - winter rye, oats - rapeseed – wild rye.

The vegetative period of winter rye varied from 59 to 73 days during interphase periods from sowing to shoots 5-17 days, from spring renewal of vegetation to tubing 23-29 days, from reaching the tube to sweeping 6-16 days. Thus, winter rye uses for growth 21-34 days of autumn and 38-39 days of spring-summer periods of warm season. For the growth and development of postcut oats and rape crop plants, after harvesting winter rye, there are about 70 days of warm season. The duration of the period from sowing to harvesting in oats was 45-65 days. This was enough to form a yield of green mass to 170 c/ha.

The duration of the vegetation period of the sweet clover after harvesting the winter rye was 28-43 days.

Sweet clover of the second year used 35-38 days of warm period. For the growth of spring rape after harvesting the sweet clover it remains about 70 days of warm period. The duration of the vegetative period of the canola rape after harvesting the sweet clover of the second year is 35-47 days. The period of sowing-ripeness of the early sowing period of rapeseed is 40-56 days.

Thus, the cycle of development of forage crops uses the entire reserve of the warm period of Central Yakutia.

The inclusion of rapeseed as a postcut crop, on average for 4 years, the total yield of green mass was 26.0; dry weight 4.84; feed units 3.50; digestible protein 0.83 t/ha, exchange energy 44.1 GJ/ha. Oats, farmed after the winter rye, are inferior in terms of yield (10.6 t/ha of green mass) for postcut rapeseed. The dry weight yield is 2.65, the feed units are 1.59; digestible protein 0.26 t/ha, exchange energy 22.4 GJ/ha.

Winter rye, regardless of its predecessor, provides the same yield of green mass in both crop rotations. With a low yield of green mass (10.5 t/ha), the yield of dry matter, feed units, digestible protein, exchange energy is quite high.

Poster Session

P45 Productivity of new fodder crops under the conditions of Central Yakutia

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An abundance of poorly clouded sunny days for cultivation periods, a rapid increase in the average daily temperatures in the spring, and high activity of solar radiation, it is possible to cultivate forage crops with relatively short vegetation periods in the conditions of Central Yakutia.

Great importance in the vital activity of vegetation cover has a radiation regime. The intensity of photosynthetically active radiation in Central Yakutia is 1112 MJ/m2 during May-August [1], which allows the cultivation of heat-loving and light-loving crops for silage.

Field experiments were conducted in 2009-2013. Scheme of experience: oats “Pokrovsky 9” (oats are the traditional and the only silage crop in the region, is a standard), oats “Pokrovsky 9” + rapeseed SibNIISH-21, rape SibNIISH 21, sunflower “Kulundinets”, corn RIK-340, sorghum grains “Perspektivnoe-51”, amaranth “Bagryaniy”, sowing millet “Baganskoe-88”.

Years of research varied according to meteorological conditions.

Hydrothermal coefficient for the period of vegetation by years was from 0.50 to 1.56.

The data obtained from new fodder crops showed high yields on average during the years of research: sunflower - 437 c/ha, corn - 486 c/ha, sorghum - 222 c/ha, amaranth - 291 c/ha, rape - 346 c/ha, millet - 230 c/ha. Oats and oat-rapeseed mixture provided respectively 162 and 252 c/ha.

The content of digestible protein in 1 kg of dry matter: corn (179.0 g), amaranth (222.9 g) and sunflower (109.5 g) provide high feed nutrition, the yield of exchange energy of these crops is 9.2-10.1 MJ. The gross energy of corn and amaranth is 19.5-20.0 MJ. The highest yield of fodder units is observed in sunflower (0.84) and amaranth (0.79).

The content of digestible protein in 1 fodder unit: corn is 241.6 g, amaranth - 283.7 g, rapeseed - 184.3 g., sorghum - 127.2 g., sunflower - 104.7 g.

Thus, in the conditions of Central Yakutia, new fodder crops can ensure high yields in intensive farming. Yield of green mass of forage crops is increased by 1.4-3.0 times (222-486 c/ha). Stable high yields are observed in sunflower and rape (276-406 c/ha). High-protein promising forage crops provide a digestible protein content of 1 kg of dry matter to 222.9 g and exchange energy - up to 10.1 MJ. New fodder crops increase the productivity of crops by increasing the use of solar radiation and make up for the deficiency of protein in feed rations.

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P46 Evaluation of collection samples of oats on the complex of economically precise features by the method of multidimensional statistics under conditions of Central Yakutia

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Agroclimatic resources of Central Yakutia make it possible to cultivate a wide variety of oats from different ecologo-geographical and breeding origin. Evaluation of oat samples was carried out for 12 economically valuable features.

According to the results of multidimensional ranging, the following varieties are distinguished in the best group: k-14778 - Omsk region, k-14786 - Altai Territory, k-14697-Germany, Pokrovsky standard - Yakutia, k-13802- Finland, 14555-USA, k -14628 -Australia, k-14718 - Belarus, k -14663 - Poland, k -14429 - France, k -14450 - Estonia, k-14787 - Moscow region, k -14792- Poland. Among the "best" group, the main share was made by samples from Russia (31%), Europe (55%), USA, Australia - (7%). The local zoned standard Pokrovsky is included in the "best" group.

In the group of "medium" samples there were the following varieties: k-14535-Chile, k-14428-Netherland, k-12368-Omsk region, k-14573-USA, k-14416 -Altai Territory, k-14491-Omsk region, к-14387-Netherlands, к-7414-Krasnoyarsk Territory, k-14483-Austria, k-14582-Germany, k-14335-Japan, k-14429-France, k-14574-Krasnodar Territory. The main share in this group was made up of samples from Russia (38.5%), Europe (38.5%), USA, Asia, South America - (7.7%).

In the group of the "worst" objects, there are the following varieties: k-14799-USA, k-14733-USA, k-14607-Canada, k-14553-USA, k-14741-USA, k-14668-Turkey, k-12245-Tomsk region, k -14758-USA, k -14735-USA, k-14561-USA, k-4096-Kazakhstan, k-14761 - USA, k-14798-USA. The main share is made of samples from the USA (69%), Canada, Turkey, Russia, Kazakhstan - (7.7%).

Seven samples were selected by the yield from the best group: k-14778-Omsk tegion, k-14786-Altai Territory, k-14697-Germany, k-13802- Finland, 14555-USA, k -14628 -Australia, k -14792- Poland. The most stable value of this indicator was 1 variety from the USA, the yield of which was more than the Pokrovsky variety by 35%.

By early ripeness from the group of "worst objects" there were marked three varieties: from the USA (k-14733) and (k-14735), Kazakhstan (k-4096). The method of multidimensional ranging facilitates the selection of sowing oats on the main economically valuable features and leads to the creation of a quality source material for the further selection of sowing oats in Yakutia.

Poster Session

P47 Varieties and Perspective Hybrids of Grain Cultures Selection of the Yakut Scientific Research Institute of Agriculture

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As a result of selection work on grain crops, a number of hybrids and varieties have been created in the Yakut Scientific Research Institute of Agriculture. Currently, work is underway to select soft spring wheat, spring barley, oats and winter rye. Selective work is aimed at creating new varieties of grain crops of a new generation with high economic-valuable characteristics, resistant to biotic and abiotic stresses of the cryolithozone. At the moment, for grains of the Yakut Scientific Research Institute of Agriculture breeding, 2 varieties of soft spring wheat and 3 varieties of oats are seeded in the Republic of Sakha (Yakutia). Since 1963, the Finnish Tammi variety has been regionalized in Yakutia, the originator of which is the Yakut Scientific Research Institute of Agriculture.

Brief description of zoned varieties

Soft spring wheat

Prilenskaya 19. Zoned in 1995, a variety of foods, bakery qualities are good. Yield is 1.3-3.4 t/ha, early ripening, weight of 1000 seeds – 28.0-30.0 g.

Tuymaada. Zoned in 2009, variety of foods, bakery qualities from satisfactory to good. Yield is 1.7 – 4.0 t/ha, early ripening, weight of 1000 seeds – 30.0 – 38.0 g.

Oats sowing

Pokrovsky. Zoned in 1982, sort of fodder. Yield is 1.6 - 3.5 t/ha, early ripening, weight of 1000 seeds - 30.0 - 36.0 g.

Pokrovsky 9. Zoned in 1993, variety of fodder, valuable in quality. Yield is 1.6 – 3.7 t/ha, early ripening, weight of 1000 seeds – 27.0 -34.0 g.

Vilensky. Zoned in 2016, sort of fodder. Yield is 2.1 – 3.6 t/ha, medium-ripening, weight of 1000 seeds – 28.0 – 36.0 g.

Spring barley

Tammi. Zoned in 1963, forage variety. Yield is 2.0 – 3.4 t/ha, ultra-early ripening, weight of 1000 seeds – 32.0 – 35.0 g.

Since 2015, the State Seed Inspection has a variety of winter rye Cholbon. The average yield is 3.3 t/ha, the potential yield of green mass is 35-40 t/ha. The variety is medium-ripening, resistant to lodging, winter hardy (99.8%).

A new variety of soft spring wheat Talba transferred to the State Seed Inspection in 2017. The variety is medium-ripening, resistant to lodging, an average yield of 3.0 t/ha.

For spring barley, a new variety of fodder purpose under the number M-56 is being prepared for transfer to the State Seed Inspection in 2018. The variety is medium-ripening, coarse-grained, the average yield is 3.7 t/ha.

P48 Efficiency of biopreparations based on strains of nitrogen-fixing and associative bacteria in the productivity of alfalfa in Central Yakutia

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Long-term experimental data on the effect of strains of nodule and associative bacteria on the yield of alfalfa, which increase the agrochemical parameters of permafrost soils in Central Yakutia, are presented.

In modern conditions, when biologization of agriculture is introduced into agriculture, the application of biological bacterial preparations made on the basis of bacteria that stimulate the growth and development of plants acquires a wide interest and practical significance. They have a multilateral positive effect on plants. Under the influence of nitrogen-fixing bacteria, the following processes occur: amplification of symbiotic and free-living fixation of molecular nitrogen, reaching 30-50 kg of nitrogen per hectare over the vegetation period. The value of alfalfa as a protein culture is determined by high fodder merit, relatively low energy intensity of cultivation, low demand for soil fertility, high nitrogen-fixing capacity. Due to these microorganisms, additional production of physiologically active compounds takes place, including hormone plants, which increase the capacity of the root system. Optimize mineral nutrition and improve the water regime of plants. They participate in the dissolution of hard-to-reach phosphorus compounds that protect the roots from bacterial and fungal infections, suppress stress reactions in plants that increase their resistance to unfavorable external factors.

The purpose of the present studies is to study the effect of inoculation of the seeds of alfalfa with biological preparations based on strains of nitrogen-fixing bacteria on the productivity of alfalfa.

Over the years of research from 1998 to 2012, inoculation of seeds with biopreparation on the basis of strains of nitrogen-fixing bacteria had a positive effect on the yield of green mass of alfalfa sickle-shaped Yakutskaya yellow. The yield of green mass of alfalfa amounted, on average, to the local strain of Yakutskiy No. 1 Sinorhizobium meliloti of 37 t / ha, which is 2 t / ha or 5,7% higher, with production strain 412б-37t / ha, which is 5,7% higher with strain Ps.fl. is 3% higher than in the control variant. In all the studied variants, 1 kg of dry matter contained 0.79-0.95 of the feed unit, 9.9 - 10.8 MJ of metabolic energy, which corresponds to or approaches the standard for hay of the first class. For the fodder value, the best variants were the local strain of Yakutskiy No. 1, in which the digestible protein was collected in 174 g respectively.

Conclusions. As a result of long-term experimental data, we have established that inoculation with strains of nodule bacteria, also with local strain Yakutskiy No. 1, associative nitrogen fixers for 16 years after their application positively affects the yield of green mass of alfalfa. The cultivation of such a high-protein and drought-resistant culture as alfalfa in Central Yakutia will contribute to a significant strengthening of the fodder base, especially in dry years.

P49 Selection evaluation of hybrids of potato of preliminary testing under the conditions of Yakutia

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The article presents studies of the productivity and quality indicators of ten potato hybrids in the conditions of Yakutia. A test was conducted to create highly productive hybrids that are stress-resistant, highly adaptive to environmental factors, resistant to the most common diseases and other economically valuable traits that are of great importance in breeding.

Selected hybrids belong to the group of early ripening (55 to 70 days): 239 (Ladozhsky x Razolinda), 235 (Luck x Bore Volley), 240 (Romance x Victoria), 233 (Slavyanka x Rosalinda), 234-1 (Scarlet sail x Victoria), 232 (Aurora x Bonus), 234 (Scarlet Sail x Victoria).

In the study of the potato breeding material were allocated 9 hybrids that exceed standards Varmas and Yakutyanka yield 0.6-7.6 t / ha.

The description of morphological features of potato hybrids on tubers is carried out. The number and weight of marketable tubers of the hybrids meet the requirements of table varieties. Test specimens of hybrids had товарность87 – 97%, making them commercially valuable.

The samples differed in the content of dry matter (19.5% - 21.3%) and starch (13.7% - 14.9%). In hybrids, nitrate content did not exceed the permissible concentration.

When evaluating hybrids for resistance to the most common diseases in the local conditions revealed that the hybrids have resistance to virus diseases, macrosporiosis, Rhizoctonia and common scab (7-9 points), the exception is the hybrid 239-2.

According to the results of the conducted researches we recommend to transfer to the nursery of competitive tests the most productive, starchy and resistant to the most widespread diseases in local conditions hybrids of potatoes 239, 239-1, 235, 240, 233, 233-1, 234-1, 232, 234.

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P50 Improving the methodology for calculating the amount of subsidies to support the reindeer herding of the Republic of Sakha (Yakutia)

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In research work is considered a specific type of state support, referred to as «Creation of Working Conditions for Reindeer Brigades» and developed an algorithm for calculating the amount of subsidies:
- selection of the existing type of subsidy, requiring adjustment;
- determination of the size of the farm by the number of deer, pasture areas;
- compilation of the technological map and calculation of the normative cost price of production of reindeer products;
- calculation of the revenue part taking into account all means of state support, except for the corrected type of subvention;
- calculation of the monthly cash flow of the farm and the cash gap (cash deficit) at the end of the year without taking into account the corrected type of state support;
- determination of the volume of a specific type of state support for the production of one type of agricultural produce and its distribution to recipients.

Proposals have been developed to improve the system of subsidizing agriculture, the provision of subventions to local governments of municipal districts and urban districts of the Republic of Sakha (Yakutia).

P51 The Results of Research Activities of Pupils of the Tulaginsky Secondary School named after P.I. Kochnev

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Research activity of pupils is one of the components of the education and upbringing of schoolchildren. In this connection, in the process of education, it is important to identify the interests of pupils, to ensure the realization of the scientific and creative abilities of pupils, to provide an opportunity for self-actualization in research activities. In our school, much attention is paid to the implementation of knowledge, abilities of pupils in a real research project, which have considerable scientific value.
Scientific research conducted by the pupils showed that the use of biopreparations, potassium humate and mineral fertilizer (NPK)60 on the terrain in the vicinity of Tulagino village increased the potato yield by 1-1.5 times (349 c/ha) in relation to the control (219 c/ha). The recoupment of 1 ton of fertilizers, preparations with an increase in yield was 86 kg/t.
Research on the study of nitrogen fixation in frozen meadow chernozem soil showed that the nitrogen fixation process is actively underway in the soil. The content of the aerobic nitrogen-fixing bacterium Azotobacter is abundant. When organic fertilizer is applied, the Azotobacter content in the soil increases significantly and reaches up to 100% of soil clusters on Ashby medium. In the studied soils, a local strain of Azotobacter chroococcum was found.

P52 Influence of feeding with mineral supplements “Ecostimul-2” and zeolite on milk production of cows of Central Yakutia

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Relevance. Increasing of cow milking capacity and decreasing of its prime cost is achieved by ensuring the good nutrition, taking into account the economic conditions of individual regions of the Russian Federation.
So far, a big amount of experimental data about development of good nutrition system for agricultural animals has been collected. Developed detailed feeding standards can significantly increase the livestock efficiency index and effectiveness of fodder use. At the same time problems of the mineral nutrition of animals in reliance on individual regions of Russia are insufficiently studied. Hence, study of the optimization of the mineral nutrition for dairy cows by fortification of their ration using macro- and microelements is important for conducting researches in the conditions of Yakutia.
Study subjects were Kholmogory breed of cows.
Goal of the research is to understand the influence of feeding with mineral supplements “Ecostimul-2” and zeolite on milk production of cows.
Main objectives of the research:
1. Research the possible use of “Ecostimul-2” and zeolite for feeding dairy cows;
2. Research the influence of “Ecostimul-2” and zeolite on milk production of cows;
3. Identify digestibility and use of nutritional substances of ration;
4 Research the hematological readings;
5. Research the clinical readings;
6. Research the reproductive readings;
7. Find the economic viability.
Scientific novelty. The positive effect of “Ecostimul-2” and zeolite on milk production of cows as a food supplement is established (for the first time in the conditions of Yakutia).
The influence of “Ecostimul-2” and zeolite on the metabolism of dairy cows is established.
Practical significance. Experimentally established the possibility and viability of food supplements “Ecostimul-2” and zeolite usage as complex mineral supplements for the dairy cows. Recommendations for their use have been developed.
Based on the researches of the use of “Ecostimul-2” and zeolite in feeding of dairy cows, the following conclusions were drawn: 1. Inclusion of “Ecostimul-2” and zeolite in the ration of dairy cows increased milk productivity by 0.3 kg. 2. Feeding dairy cows “Ecostimul-2” and zeolite increased milk production by 0.9 kg and fat content in milk by 0.12%. Hematological, biochemical and clinical readings were in the normal condition. Use of “Ecostimul-2” and zeolite decreased the prime cost of 1 kg of milk and increased production profitability of milk. Production profitability of milk by experimental groups was 12.2%, 16.6% and 23.6%.

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