UDC 619: 616.155.392: 632.2

Bashchenko M.,
Academician of the National Academy of Sciences of Ukraine, Doctor of Agricultural Sciences, National Academy of Agrarian Sciences of Ukraine
Gorbatenko S., Korneykov A.
Candidates of Veterinary Sciences National Scientific Center "Institute of Experimental and Clinical Veterinary Medicine"

Influence of leukosis infection contamination on re-sistance of cattle and product quality in Ukraine

The purpose. To study Influence of leukosis in-fection contamination on resistance of cattle and product quality in Ukraine.

Methods. Materials of own probes and statistical paperwork of the State veterinary and phytosanltory service of Ukraine concerning spread of leukosls at cattle in Ukraine and materials of world scientific literature in unprofitableness of animal husbandry are analyzed at leukosls of cattle.

Results. Information about modern epizootic state of animal husbandry In Ukraine concerning leukosis of cattle is given. Materials of scientific literature on influence of leukosis infection contamination on resistance of cattle and product quality. received from the infected animals are generalized. Methods of final eradication of the disease are speci-fied.

Conclusions. In modern conditions it is neces-sary to ensure real assessment of epizootic state of animal husbandry in Ukraine on leukosis of cattle, to reinforce monitoring of cattle sanitated from leukosis, to develop and implement regional programs of pref-erential provision of individual farms with able-bodied animals instead of the slaughtered infected ones.

Key words: epizootic, unprofitableness, leukosis of cattle, sanitary measures, resistance, product quality.

Leukemia of cattle (hereinafter referred to as cattle) is one of the most common chronic infectious diseases of animals in most countries of the world. The disease causes significant damage to livestock. Losses caused by the presence of a disease can be considered from a number of positions. First of all, it should be borne in mind that the persistence of the leukemia virus in the herd of animals and the resulting disease of the livestock leads to loss of the gene pool due to the early elimination of valuable pedigree and commercial young animals and adult animals. Another important position is loss-making, it concerns the reduction of the quality of livestock products: meat and milk breaks the protein-fat balance obtained from leukemia animals, it is prohibited to use milk without the prior thermal decontamination [3]. Special requirements relate to the use of milk from clinically patients with leukemia of cows: in accordance with national legislation, milk from them, even under the conditions of heat treatment, it is prohibited to use not only people but also animals due to accumulation of tryptophan metabolites with carcinogenic properties. This milk should be mixed with disinfectant and disposed of [2]. A rather important element of the loss-making behavior for bovine leukemia is the immunosuppressive state of animals present at the stage of infection and clinical course of the disease. It should be noted that the immunosuppressive state prevents obtaining the expected immune response of the animal organism in the case of the use of means for specific prevention of infectious

diseases, therapeutic agents of antibiotic and stimulating directions. At considerable costs, caused by the use of high-value prophylactic and therapeutic agents, their effectiveness is reduced in the organism of infected with the virus of leukemia of animals for several orders [1]. Of great significance is the potential medical and social role of the leukemia virus in cattle - due to the peculiarities of the genetic structure related to the pathogen of T-cell leukemia in humans. The bovine leukemia virus, as well as T-lymphotropic human viruses, belongs to retroviruses, the homology of sequences between the p24 antigen of the bovine leukemia virus and the main protein of p24 T-cell leukemia virus HTLV-1 [6] has been established. Consequently, a pathogen for leukemia in cattle poses a potential threat to the health of people who are in contact with infected livestock and who use virus-infected animal products without prior qualitative disinfection. It should be borne in mind that the pathogenesis and clinical manifestation of the disease of leukemia people and animals have much in common, and if the pathogens of the disease have a similar genetic structure, leukemia of cattle may cause an important medical and social problem.

Materials and methods of research. The materials of own researches and statistical reporting of the State veterinary and phytosanitary service of Ukraine concerning the distribution of bovine leukosis in cattle breeding of Ukraine in recent years have been used. The materials of the world scientific literature concerning losses of livestock breeding for the damage of the population of the bovine leukosis virus are summarized. Research results. If we compare the epizootic state of leukemia in cattle breeding in Ukraine in recent years, we can talk about a stable positive dynamics with regard to the effectiveness of health-improving anti-leukemia measures. It is worth noting that even in the recent past, namely in 1998, 4 469 cases of dysfunctional leukosis cases were registered in Ukraine. As of the beginning of 1998, livestock farms in 2 oblasts, namely Zakarpattya and Ivano-Frankivsk, had successfully completed health-improving anti-leukemia measures. In a number of oblasts, isolated single-handed cases of leukemia of the CPR were recorded - Lviv (1), Volyn (2), Vinnitsa (18). In dozens of disadvantaged areas, Dnipropetrovsk (25), Kherson (48), Sumy and Rivne (by 77), and in most regions there were hundreds (Donetsk - 298, Zhytomyr - 145, Zaporozhye - 309, Kiev - 438, Kirovogradskaya - 318, Lugansk - 217, Mykolaiv - 204, Odessa - 416, Poltava - 369, Ternopil - 214, Kharkiv - 387, Khmelnytsky - 190, Cherkasy - 283, Chernihiv - 253, Crimea - 180). As of the end of 2013, disadvantages with respect to leukemia of cattle were registered only in two points within Vinnitsa (1) and Sumy (1) oblasts. In other words, for 17 years of productive efforts of specialists of scientific-diagnostic institutions, practical veterinary medicine, administrative bodies in animal husbandry of Ukraine, it was provided to reduce the tension of the epizootic situation with regard to leukemia of cattle almost 2230 times. It should be noted that during this time the total number of livestock farms with keeping cattle stock decreased almost three times from the available at that time 11 687 units. Even so, success in overcoming the chronic infectious diseases of the cattle, which is dangerous to cattle breeding in Ukraine, is impressive. Emphasizing the achievements of the practical completion of anti-leukemia health improvement measures in livestock production in Ukraine, it should be noted that this concerns mainly the number of animals of collective farms. In the farms, the epizootic situation with regard to leukemia of cattle still requires additional study and active intervention by the departments of veterinary medicine, administrative and economic subordination. Within the private households, the issue of the final completion of anti-leukemia health measures still remains problematic. According to the regional data of veterinary medicine laboratories and DNDILDVSE, in the private sector, a significant number of animals infected with the leukemia virus are constantly detected, while the extraction of such animals outside the farms (sanitary slaughter) is not carried out in full measure. Information of leading experts of the State Veterinary Service of Ukraine shows that only in the results of 2012 in 6 regions (Sumy, Donetsk, Rivne, Kharkiv, Chernihiv, Kiev), 1569 to 3313 of the leukemia-infected people were detected. In other regions, the situation was somewhat less tense, but registration of detection

of infected with the virus of leukemia was observed in almost every region, and the total number of such individuals in Ukraine annually, including in 2012, amounted to tens of thousands.

It should be noted that, according to DNDILDVSE, in the course of 2013 practically within the limits of each oblast, with the exception of Ivano-Frankivsk and Lviv, it was discovered about 16 thousand individuals infected with the leukemia virus. As a consequence of the unsatisfactory state in the issue of eradication of cattle leukemia in domestic livestock farms and the presence of an active source of infection, during the first five months of 2014, 1502 heads of animals infected with the leukemia virus were detected in 7 collective farms of 2 oblasts - Volyn (1) and Kharkiv (6). Official reporting for further periods in 2014 suggests additional cases of registration of a state of ill-interest in cattle leukemia in farms of other regions. Thus, as of the beginning of October 2014, there were already 8 unsuccessful items in the CPS case for leukemia, namely in Volyn (1), Vinnytsia (1), Sumy (1) and Kharkiv (5) oblasts. During the 8 months of 2014, a total of 1851 infected with the animal's leukemia virus were detected. According to our forecasts, with this approach to assessing the epizootic situation regarding cattle leukemia by the State Veterinary Service of Ukraine and the volume of preventive and sanitary measures planned by DNDILDEVSE and the State Veterinary Service of Ukraine for subsequent years, the epizootic situation with regard to the aforementioned disease will be further complicated. Such forecasts are based on the results of the analysis of the volumes of annual serologic dispensaries of Ukraine's cattle for leukemia in a highly threatening epizootic situation. We believe that the amount of serological researches of the cattle for leukemia, which is planned during the last 3-4 years, and the related provision of regional laboratories of veterinary medicine by diagnostic means is 3 to 4 times lower. If necessary, in most regions it is necessary to provide 3 to 4 serological examinations for leukemia of the existing cattle population during a calendar year, precisely for this purpose the legislative instructions, it is planned to 0,85 examinations per one physical head during the period specified above. This causes in these circumstances the risk of manifestations of relapses of epizootic leukemia in cattle in formerly healed regions and farms. It should be recalled that various mechanisms involved in the mechanism of the spread of the cattle leukemia virus and the impression of susceptible animals. If, as practice shows, the most likely mechanism of transmission of the pathogen is the iatrogenic factor (service for veterinary and technological manipulations with devices of repeated use without proper decontamination), we should not ignore other methods of spread of the pathogen of the disease - mechanical, contact, alimentary, transmissive, etc. This suggests that prolonged retention of cattle-reared cattle-leukemia from collective farms, even individual infected with the leukemia virus of the private sector, must necessarily ensure the recurrence of epizootics as a result of the introduction of the pathogen in one way or another on the farmland of industrial farms. Confirmation of this concept in recent years can be the cases of registration of a limited number of infected with the virus of leukemia in animals within the previously healed farms of Volyn, Donetsk, Zhytomyr, Zakarpattia, Chernigov, Sumy, Kharkiv and other oblasts, which is presented in the reports of veterinary medicine departments in the above-mentioned regions during 2010 - 2014.

These unfortunate cases of epizootic relapse may be due to negligent completion of anti-leukemia remedial measures, or, most likely, the introduction of a pathogen in a previously rehabilitated herd is one of the known factors of the transfer of the leukemia virus from infected animals to farmed farms. The question of the loss-making livestock caused by the disadvantage of cattle for leukemia is to be analyzed within the framework of agro-industrial associations and owners of livestock groups in the leading countries of the world. Thus, in 1996, a US DLD survey of dairy herds found that the increase in the prevalence of leukemia in the cattle in the herd constitutes 95% of the milk loss per year per cow [12]. Animals with high titres of antibodies to the cattle leukemia virus found in milk by the ELISA method have a 40% greater risk of death or forced slaughter than cows without such antibodies [5]. During

the study of dairy herds in Ontario (Canada), it was proved that the rate of excretion of seropositive to the cattle cattle leukemia virus is 27% higher than the exclusion of seronegative animals to the above-mentioned animal pathogen [4]. The economic losses caused by BLV are related to the reduction of milk production, the elimination of meat in the event of lymphomas during slaughter, the reduction of lactation, and the limitation of international trade operations. For example, the annual economic losses of the US dairy industry amounted to $ 285 million. for producers and $ 240 million - for consumers [5]. This refers to the negative impact of BLV infection on the duration of the exploitation of animals, not only in the clinical, but also in the subclinical stage of the disease [12]. Another factor in the reduction of the industrial exploitation of industrial livestock is the immunosuppression, due to the persistence of the leukemia virus in the organism of infected animals. These materials indicate that immunosuppressive effects of BLV infection are associated with a decrease in life expectancy in cattle, increased susceptibility to opportunistic infections, and restriction of reproduction [5]. Since one of the main requirements of consumers of livestock products is its high quality and safety, today many countries have identified the control of leukemia in a priority area of their work. Potential threats to the cattle leukemia virus for human health are widely studied and discussed. Despite the fact that all available epidemiological evidence suggests that there is no risk of human leukemia virus for human health, this problem is still unresolved. A large number of scientific reports testify to the loss of meat products for the examination of carcasses killed by animals infected with the leukemia virus. Malignant lymphosarcoma induced by BLV on slaughterhouses in the USA is found in 13.5% of meat cattle and 26.9% of dairy cattle [9, 19]. In general, annual losses from lymphomas are estimated by the US dairy industry to exceed $ 16 million. [13]. Cost for an individual manufacturer is up to 412 dollars. in the case of lymphosarcoma for a herd with a 50% prevalence of BLV infection [14]. The disadvantages of leukemia in cattle export countries to a large extent negatively affect trade operations. Exports of dairy cattle and livestock products from non-free-living countries can be complicated by the fact that more and more countries will eliminate leukemia and implement programs to eliminate it. In addition, modern European Union legislation imposes serious restrictions on the rules for the transport of embryos and semen from cattle due to leukemia infection [17].

Emphasizing the health-care problem caused by the effect of the cattle-leukemia virus, it should be noted that if previously believed that in the infected livestock without lymphosarcoma the virus induces only benign polyclonal proliferation of B-lymphocytes, then the results of later immunological studies [10, 11, 15 , 18] suggest that sometimes proliferation of lymphocytes may be malignant. In addition, the pathogen of leukemia is capable of reproduction in human cell cultures [7, 15], and it is now known that in the majority of people who have been exposed to the virus, antibodies against it are produced [8, 15]. The genes of the virus have been found in women's mammary glands, although it is unclear whether the frequency of their detection with the malignancy of the latter is connected [7, 8, 15]. It is now known that in North America, where the leukemia virus is quite common in the cat population, the frequency of breast cancer in women is lower than in Western Europe, where the disease was predominantly eliminated [16]. At the conclusion of the fragment of the message reflecting the health-care problem, it is also necessary to compare the incidence of human leukemia in Europe and the United States. It is obvious that the consequences of leukemia of cattle and other retroviral diseases for human and animal health should be reviewed using new genetic tools that are now available to researchers. The above materials make it possible to conclude that, with the aim of eradicating cattle leukemia in livestock production in Ukraine, two levers should be used: on the one hand, to improve diagnostic monitoring and preservation of the livestock's well-being of farms of all subregions for leukemia, and on the other hand to solve the issues of liquidation diseases within private livestock farms. Of particular importance are the development and implementation of regional programs with the participation of

veterinary medicine departments, rayon and oblast administrations, and heads of collective livestock farms regarding the preferential provision of private farms to healthy animals instead of subjected to a sanitary slaughter of an infected leukosis virus. At the same time, it is necessary to strengthen control over the welfare of cattle-leukemia cattle farms of different subordination - specialized complexes, commodity and tribal farms, farmer and private. Everyone, albeit a single case of detection of an animal infected with a leukemia virus, should be evaluated as a possible relapse of epizootics and to carry out a complex of measures in accordance with the current legislation, not limited to the exclusion of the herd of the compromised animal. Under such circumstances, it is necessary to conduct repeated, 10-15 days intervals, serological dispensary of the livestock with possible contacts with the detected infected person, to finally identify the infected with the virus of leukemia in the early stages of the development of the infectious process using modern techniques - immunoassay (IFA)), molecular-genetic methods (PCR), completing a complex of studies with measures of veterinary and sanitary order, which provide for high-quality disinfection of the environment. Under these conditions, the task of eradicating cattle leukemia in livestock production in Ukraine will be implemented in the near future.

Conclusions

In modern conditions, it is necessary to provide a real assessment of the epizootic state of livestock in Ukraine regarding leukemia of cattle, and it is necessary to respond to each detection of even isolated infections of the animal's leukemia virus as an element of epizootic relapse with the provision of preventive and sanitary measures provided for by the current legislation. Within the framework of the current legislation, the department of veterinary medicine, regional laboratories of veterinary medicine should strengthen control over the well-being of the heifers treated with leukemia from farms. At the initiative of veterinary medicine departments and the participation of the administration of district and regional levels, it is necessary to develop and implement regional programs for the preferential provision of farm households to healthy animals instead of the leukemia infected with the virus for health care.

Bibliography

1. Study of elements of immunocuppressive state in young animals of cattle under the influence of associations of viruses / S.K. Gorbatenko [and others] // Sci.-Tech. bullet IBT and DDKIVKD. - Lviv, 2009. - Vip. 10, № 4. - P. 248 - 254.

2. The instruction on prevention and rehabilitation of bovine animals from leukemia: the shade. by order of the State com vet Medicine of Ukraine, 21.12.2007, № 21; Registered in Minh Justice of Ukraine, dated January 11, 2008, No. 12/14703. - K., 2008. - 8 p.

3. Nikiforova V.L. Indices of natural resistance of bovine cattle, infected with leukemia virus / V.L. Nikiforova // Proceedings of VNIIEV them. RAVINE. Kovalenko - M., 1999. - T. 72 - P. 103-108.

4. A serological survey of bovine syncytial virus in Ontario: associations with bovine leukemia and immunodeficiency-like viruses, production records, and management practices / R.M. Jacobs [et al.] // Can J Vet Res. - 1995. - V. 59. - P. 271 - 278.

5. BLV in the USA: Available at: http: //cvm.msu. success / alumni-friends / continuing education / blv-in-the-usa / usablv # bovine.

6. Bovine leukemia virus, an animal model for the study of intrastrain variability / L. Willems [et al.] // J. Virol. - 1993. - V. 67, No. 2. - P. 1086 - 1089.

7. Bovine leukemia virus gene segment detected in human breast tissue / M. Giovanna [et al.] // Open J Med Microbiol. - 2013. - V. 3. - P. 84 - 90.

8. Buehring G.C. Human have antibodies reactive with bovine leukemia virus / G.C. Buehring, S.M. Philpott, K.Y. Choi // AIDS ResHum Retrovirus. - 2003. - V. 19. - P. 1105 - 1113.

9. Cattle condemned postmortem in USDA inspected establishments. Animal Disposition Reporting System, 2002 // USDA-FSIS. Available at: www.fsis. usda.gov/OPHS/adrsdata/2002/02rm2.htm. - Accessed Dec 12, 2013.

10. Deep sequencing reveals abundant noncanonical retroviral microRNAs in B cell leukemia / lymphoma / N. Rosewick [et al.] // Proc Natl Acad Sci USA. - 2013. - V. 110. - P. 2306-2311.

11. Effect of infection with bovine leukosis virus on lymphocyte proliferation and apoptosis in dairy cattle / R.J. Erskine [et al.] // Am J Vet Res. - 2011. - V. 72. - P. 1059 - 1064.

12. Options for the control of bovine leukemia virus in dairy cattle / P.C. Bartlett [et al.] // JAVMA. - 2014. - V. 244, No. 8. - P. 914 - 922.

13. Pelzer K.D. Economics of Bovine Leukemia virus infection / K.D. Pelzer // Vet Clin North Am Food Anim. - 1997. - Proct. 13. P. 129 - 141.

14. Rhodes J.K. Economic Impacts of Bovine Leukemia Virus Infection in Mid-Atlantic Dairy Herds / J.K. Rhodes, K.D. Pelzer, Y.J. Johnson // J Am Vet Med Assoc. - 2003. - V. 223. - P. 346 - 352.

15. Serologic and genomic detection of bovine leukemia virus in human and cattle samples / G. Nikbakht [et al.] // Int J Vet Res. - 2010. - V 4. - P. 253 - 258.

16. The descriptive epidemiology of female breast cancer: an international comparison of screening, incidence, survival and mortality / D.R. Youlden [et al.] // Cancer Epidemiol. - 2012. - V. 36. - P. 237 - 248.

17. USDA-APHIS. USDA-APHIS - Regulations and Assessments. 26 June 2014. Available at: http: // www. aphis.usda.gov/regulations/vs/iregs/animals/animal_ european_union.shtml. - Accessed July 14, 2014.

18. Using a herd profile to determine the age-specific prevalence of bovine leukemia virus in Michigan dairy herds / R.J. Erskine [et al.] // Vet Med Int. Available at: www.hindawi.com/journals/vmi/2012/350374/. Accessed Feb 28, 2014.

19. White T.L. Reasons for a complete carcass condemnation of cattle in the United States and implications for producer education and veterinary intervention / T.L. White, D.A. Moore // J Am Vet Med Assoc. - 2009. - V. 235. - P. 937 - 944.

Received on January 30, 2015.