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THE INFLUENCE OF GENETIC ABNORMALITIES ON THE REPRODUCTIVE ABILITY OF THE BULLS OF THE HOLSTEIN BREED BLACK-WHITE AND RED-WHITE COLOURS

I.S. Kamenskaya, candidate of agricultural Sciences,

"Pereyaslav-Khmelnitsky SI name Skovoroda"

Results of researches of influence of chromosomal aberrations in the formation of the reproductive ability of the bulls of the Holstein breed of black-white and red-white colurs.

Bulls, volume, concentration, total number of sperm, motility of sperm, chromosome aberrations, enzymes , blood.

M.I. Wavillow noted that breeding is evolution, guided by the will of man. Therefore, a systematic analysis of the evolution of the gene pool leading factory herds involving complex genetic methods, which form the experimental basis of genetic selection and monitoring, has theoretical and practical value [4]. Given this, current is constant breeding and genetic monitoring of the gene pool breeding herds in order to establish the best ways of doing breeding work with the breed [1].

Recently, to solve issues of selection and breeding of cattle cytogenetic research method is often used. This method was developed by scientists of the Department of genetic principles of breeding of the Institute of animal breeding and genetics of the UAAS to identify genetic load of chromosomal, chromating and genomic nature. As we know, the consequences of genetic abnormalities are: abortion, stillborn calves, the offspring, which is unfit for procreation, birth freaks and animals with disabilities, etc. Also numerical and structural chromosomal abnormalities may be the cause of low productivity, reproductive function and viability of the animals. Thanks to cytogenetic analysis, we can detect genetic abnormalities and withdraw from the selection process the animals - carriers of constitutive chromosomal abnormalities. It is important for Breeding companies with breeding animals and genetic material, to have information about their genetic characteristics and spermproduction.

The aim of our research was to study the influence of genetic abnormalities on the reproductive ability of the bulls of the Holstein black and red-white colour.

Materials and methods of the research. Cytogenetic analyses were performed on 24 bulls of Holstein breed black-white and red-white colour on the basis of MBC "Main breeding center of Ukraine", Pereyaslav-Khmelnitsky town, Kiev region). Blood was collected from the jugular vein of the animals through a special system disposable blood collection VK - 10-01). The research was carried out according to the method of A.V. Shelov and V.V. Dzitsiuk (2005).

The research of activity enzymes sperm activity were conducted in the Center of radiological medicine, Kiev) according to the following techniques: the activity of transaminases - by the method of S. Reitman and S. Frankel in modification of I.E. Pashino (1974), the activity of succinate dehydrogenase using 2,3,5-triveneto chloride, the activity of lactate dehydrogenase using 2,4-dintervention (the method of Sevel, Tovarek), the activity of alkaline and acid phosphatase by the of method Bodansky. Ejaculates of 14 bulls of the Holstein breed of black-white and red-white colours were investigated.

Materials of zootechnical accounting and research laboratory of technologies for production and cryopreservation of sperm, were used according to GOST 20909. 3-75 - GOST 20909. 6-75 and GOST 27777-88 (ART. CMEA 5961-87).

The research results were processed by the method of variation statistics according to methods of N.A. Plokhinskyi (1969), E.K. Merkur'ieva (1970) and the software package of Microsoft Office Excel 2003.

The results of the research. The results of our research showed that bulls of Holstein breed black-white and red-white colour have certain cytogenetic differences. So, the animals of black-white colour had a significantly lower percentage of frequency of cytogenetic abnormalities than animals of red-white suit.

Accordingly, the frequency of metaphases with asynchronity of splitting of centromeric areas chromatid bulls Holstein breed red-white colour was greater on 5 %, the frequency of metaphases with aberrant cell - 4.9, frequency of metafisix

plates with aneuploidy (2n±1) - 1.7 breaks of , chromosome - 1 and chromatid breaks on 4.6 % (P<0,10)than in the animals of Holstein breed black-white colour. Such genetic disorders as polyploidy, gabloidy, paired and single fragments, ring chromosomes and translocation of animals Holstein breed black-white and red-white colour are not detected.

In order to identify the influence of genetic abnormalities on the reproductive ability of bulls according to the results of studies the bulls were divided into three groups: the first bulls, in which there are no violations of the chromosome apparatus; the second, chromosomal disorders within permissible limits; the third - animals in which level of aberrant cells is increased.

The research results show that bulls-producers of the third group had the best of quantitative and qualitative indicators of spermproduction, except the volume of ejaculate. The volume of ejaculate animals of the second group was bigger than to the producers of the third group on 3,42, but the first - 15,89 %, the difference was incredible. The concentration of sperm from the producers of the first group was less on 19,42, and the second on 11,51 %, compared with the bulls of the third group. Us for the total number of sperm in the ejaculate between animals first and third group, the difference was 26,82 % (1.55 billion), the second and third - 3,98 % (0,23 billion) and the first and second 23,78 % (1,32 billion) as. For mobility of sperm difference between bulls was not significant.

Analysis of variance of indexes of spermproduction of different groups showed that the volume of ejaculate, sperm concentration, total sperm in the ejaculate and motility of sperm in animals of all experimental groups had a high degree of variability in accordance 23,25-27,08, 17,07-32,14, 33,39-39,24 and 11,02-of 18.45 %.

It was determined in the bulls of the Holstein breed of black-white and red-white colour between ejaculate volume and concentration of sperm correlation coefficients were straightforward and depending on the group of animals were within 0,174-0,585 (P<0,10) (table. 3). The relationship between the total number of sperm in the ejaculate and their concentration and ejaculate volume and total

number of sperm in the ejaculate in bulls of all three groups were significant and were within 0,703-0,845 (P<0.05) and 0,718-0,951 (P<0,05-0,001) respectively.

In the course of investigation it was established that violations of the chromosome apparatus of animals does not affect fertility of the bulls. In addition to quantitative and qualitative indicators of spermproduction it should be taken into account the growth of live weight of animals, vitality, resistance, absence of anomalies in the offspring.

It is known that the improvement of the breeds with the aim of improving of the productive and breeding qualities is impossible without a comprehensive study of physiological and biochemical processes that occur in vivo [5, 6].

We have found that the enzymatic activity of the sperm plasma bulls-series of different groups, is different from each other. So, the activity of aspartate aminotransferase (463,5±15,34% act.) and alanine aminotransferase (147,5±10,53% act.) was the highest in the animals of the first group, succinate dehydrogenase (34,9±14,35% act.), lactate dehydrogenase (833,33±23,22% act.) and acid phosphatase (11,76±0,76% act.) – in the animals of group II and acetylcholinesterase (125,27±4,53% act.) and alkaline phosphatase (44,95±2,45% act.) - in the animals of group III, but the difference in these parameters between the bulls of different groups was incredible.

It was established that the among activity of alanine aminotransferase (ALT), aspartate aminotransferase (AST), dehydrogenase (LDH), lactate dehydrogenase (LDH), acetylcholinesterase (ache), alkaline phosphatase (apase) and acid phosphatase of (EC) plasma sperm and indicators of spermoproduction there was a correlation. In the animals of the first group correlation coefficients depending on the indicator were within 0,052-0,922 (P<0,10), animals from the second group within 0,273-0,999 (P<0.001) in the animals of the third group within 0,114-0,986 (P<0.05). Reliable correlation has been established between the activity aspartate aminotransferase (AST), alanine aminotransferase (ALT), dehydrogenase (LDH) and sperm motility (r=0,902 is 0.975, P<0,10-0,05) from the bulls of the first group; between the activity of succinate dehydrogenase (LDH)

and the volume of the ejaculate (r = 0.999, P<0.001) and total number of spermatozoa in the ejaculate (r = 0.999, P<0.001), activity of alanine aminotransferase (ALT) and sperm motility (r = 0,990, P<0,10)acetylcholinesterase (ache) and the activity of alkaline phosphatase (apase) and concentration of sperms (r = 0,994, P<0,10) in animals of the second group; between the activity of acid phosphatase (EC) and the mobility of the sperms (r = 0,953, P<0.05)and the activity of succinate dehydrogenase (LDH) (r = 0,986, P<0.05) and the content of the enzyme acetylcholinesterase (ache) (r = 0,962, P<0.05) and the concentration of sperm in the bulls of the third group.

It is established that the bulls-series of Holstein breed red-white colour had a higher percentage of disorders of chromosomal apparatus than animals of the black-white colour. B.S.Konovalov notes that the increased spontaneous mutagenesis in red-white Holsteins gives the right to express the point of view about the pleiotropic effect of intermediate metabolites of melanin exchange on the purity of the formation of aneuploidy and different types of chromosomal aberrations. This recessive-pigment mutation brown ("red") locus No. 001249 (international classification of DNA-labeling) controls the biosynthesis of pigment of red colour pheomelanin. The formation of the red pigment is the result of joining to intermediate metabolite of the black pigment - eumelanin (dominant mutation Black-black) doxyfile amino acid cysteine. In the result of mutation, "red" previously existing of cluster organization of primary locus of the colour is broken [2]. Due to the fact that the formation of long-lived free radicals in the polymer molecules of eumelanin is modifies in the breeds of "red root" chromosomes are less protected from the mutagenic action of high reactive intracellular mutagens [3]. A.V. Shelov [7] found that such cytogenetic characteristics as the frequency of aneuploid and polyploid metaphases, as well as cells with asynchronous distinction of centromeric areas chromatid showed a high level of breed and species dependence.

Conclusions and prospects for further research. We have found that a quantitative and qualitative indicators of spermproduction in the group of bulls

with a higher level of aberrant cells is higher than in other groups. This indicates that cytogenetic abnormalities do not affect the indicators spermproductio. In this way the violation of chromatides and genomic character is transmitted to future generations. It is established that sperm of bulls in different groups had different enzymatic activity, suchas the activity of AST, ALT, LDH and KF in animals of the third group was the smallest.

For improvement of the methods and criteria of assessing of reproductive potential, growth and development bulls cytogenetic monitoring of their blood must be done.

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