

## Characteristics of a karyotype of cattle of grey Ukrainian breed

L. Starodub,  
candidate of agricultural sciences

Institute of Animal Breeding and Genetics named M.V.Zubets. of the National Academy of Agrarian Sciences of Ukraine

**The purpose.** Cytogenetic analysis of grey Ukrainian cattle and comparison of stability of its karyotype with retrospective data concerning animal breeds of different directions of productivity. **Methods.** Cytogenetic — analysis of metaphase plates of cells of peripheral blood of cattle; microkernel test, statistical. **Results.** The share of cells with aneuploidy at animals of grey Ukrainian breed made 1,2%; average arithmetical amount of aneuploidic cells at animals of breeds of milk direction of productivity — 2,4%, that twice exceeded this index at grey Ukrainian cattle. At animals of breeds of the combined direction aneuploidy made 2%, at animals of breeds of meat direction of productivity — 10,6% with statistically reliable variance ( $P>0,99$ ). Variability on indexes of somatic polyploidy is not detected in cows of grey Ukrainian breed, share of 2-nuclear lymphocytes — 2,2‰, that twice below, and mitotic activity of peripheral blood lymphocytes — 2,8‰, that is authentically below ( $P>0,99$ ) in comparison with the animals specified above. **Conclusions.** The karyotype of probed cows of grey Ukrainian breed was characterized by the heightened stability in comparison with animals of breeds of milk, combined and meat directions of productivity at spontaneous mutagenesis.

**Key words:** *grey Ukrainian breed, aneuploidy, polyploidy, chromosome breaks, microkernel test, 2-kernel lymphocyte, mitotic index.*

Now the problem of maintenance of breeds of aborigines and local of domestic animals is realized by world community as one of important directions on business maintenance of her cultural and natural inheritance. The personal interest is explained the problem of maintenance of breeds of aborigines and local of domestic animals by the unicity of their genetic material, adapted on the draught of centuries to the extreme terms of maintenance, that can be transferable no by combining variations of gene pools of breeds from other regions or classic measures of the plant breeding.

In the cases when gene pool of breed lasted he divorces in certain locality presents by a soba natural treasure, no less valuable knife supplies of coal, oil, gold et cetera [1].

In our country such is a gene pool of the grey Ukrainian breed of cattle. It is a very old originally breed of cattle, as she, as researchers testify, saved the lines of the wild ancestor - European rook. Created by a centuries-old folk selection, in the past widely widespread on considerable part of country. The grey Ukrainian breed played an important role in creation of new breeds and types. As a carrier of rare alleles, that elimination as a result of creation of new breeds, she did not lose the value and to this day. This breed is needed as a potential source of genetic material that can be used in the future. [2]. Among all breeds of cattle genetic potential of the grey Ukrainian breed is studied not enough, that is why an analysis of her to karyotype changeability is actual enough.

The aim of our work was realization of cytogenetic analysis of the grey Ukrainian cattle and comparison of stability of her karyotype with retrospective data in relation to the animals of breeds different after direction of the productivity.

**Materials and methods of researches.** A cytogenetic analysis was carried out in 30 cows of the grey Ukrainian breed of an experience economy of "Markevo" of Institute of stock-raising of steppe districts "Askaniy- Nova"

All animals were in terms that met the standards of feeding and to the veterinary- sanitary requirements

For the comparative estimation of the cytogenetic researches carried out by us, the retrospective analysis of the karyotype monitoring of animals of cattle of breeds was conducted milk ( Holstein of Black - and - White colour a 15 goal., Ukrainian Black -and - White milk a 15 goal.); combined (Simmental a 30 goal.); but meat direction (Polesye meat a 15 goal., Charolais a 10 goal.,Aberdeen-angys a 10 goal., Southern Meat Breed a 10 goal.) of the productivity [3].

Cytogenetic preparations prepared in obedience to traditional methodology [4]. For animals determined the genome mutations related to running the number of chromosomes in karyotype (a percent of metafaznuh plates is with aneuploidy, polyploidy, and also structural violations (chromosomal and chromotudaal breaks).

For every animal analysed 100 metafaznuh plates. On these preparations counted up the amount of dinuclear lymphocytes, uninuclear lymphocytes with micronucleus, mitotical index. Frequency of dinuclear lymphocytes, uninuclear lymphocytes with micronucleus, mitotical index was calculated in millet (an amount is on 1000 cages)

#### Results of researches and their discussion :

The grey Ukrainian breed of cattle is created by a centuries-old folk selection. The process of forming of her passed in the difficult terms of steppe zone. At first she was characterized by triple direction of the productivity :of milk of beef cattle of working. Milking of cows does not conduct presently. The modern array of cows of the grey Ukrainian breed belongs to the breeds of meat direction of the productivity [2].

The results of cytogenetic control of the grey Ukrainian cattle and retrospective analysis of the karyotype monitoring of animals of cattle of breeds of different directions of the productivity are shown in a table 1.

#### 1. Comparative analysis of karyotype of animals of breeds different after direction of the productivity and cows of the grey Ukrainian breed of cattle %, (M±m)

Breed	aneuploidy	polyploidy	Chromosomal breaks	Chromotudaal breaks
Grey Ukrainian breed	1,2±0,27	-	1,5±0,45	-
Direction of the productivity				
of milk	2,4±0,65	–	1,8±0,42	3,1±0,85
of combined	2,0±1,76	0,2±0,12	2,0±0,87	1,6±1,08
of beef cattle	0,5±0,23- 10,6±2,95	2,1±0,40– 6,9±0,97	0,8±0,6 – 6,4±0,91	0,9±0,6 – 6,1±3,52

The got results of cytogenetic analysis of investigational animals of the grey Ukrainian breed and breeds different showed after direction of the productivity, that for them characteristic quantitative and structural violations of chromosomes. Yes, part of cages with aneuploidy for the cows of the grey Ukrainian breed equaled 1,2%, that answered the spontaneous level of this changeability, characteristic for a cattle on the whole (1,5-8,3%) [5, 6]. The percent of aneuploidy cages for the animals of breeds of suckling direction of the productivity presented 2,4%, that in 2 times exceeded the percent of cages on this sign for the cows of the grey Ukrainian breed, but with the statistically unreliable difference of averages, for the animals of breeds of the combined direction - 2,0%, and for the animals of breeds of meat direction of the productivity of 10,6% (in 8,8 times anymore) with a statistically reliable difference (P>0,99).

The concentration of polyploidy cages in blood of animals of breeds of suckling direction of the productivity was absent, for the animals of breeds of the combined direction of the productivity presented 0,2%, and at the breeds of meat direction - 2,1- 6,9%, accordingly. For the cows of the grey Ukrainian breed this changeability is not educed.

After structural violations of chromosomes (chromosomal and Chromotudaal breaks) of animal of breeds of three directions of the productivity did not have substantial divergences. The limits of chromosomal breaks for them presented 0,8-6,4%. The level of breaks of chromosomes at the investigational grey Ukrainian cattle equaled 1,5%, that in 4 times below top limit of the spontaneous chromosomal changeability educed

for the investigational animals of breeds of three directions of the productivity with a statistically reliable difference ( $P>0,999$ ), frequency of chromosomal breaks for them was observed within the limits of 1,6-6,1%, at the investigational grey Ukrainian cattle chromosomal breaks were absent.

For more complete estimation of somatic mutagenesis for investigational animals and grey Ukrainian breed of economy of "Markeev" of Institute of stock-raising of steppe districts "Askaniya-Nova" conducted a micronucleus test (table 2)

## 2. Results of micronucleus test of cattle of the grey Ukrainian breed and animals of breeds of three directions of the productivity ‰, ( $M\pm m$ )

Breed	uninuclear lymphocytes with micronucleus	of dinuclear lymphocytes	mitotical index
Grey Ukrainian breed	1,1±0,32	2,2±0,34	2,8±0,30
Direction of the productivity			
of milk cattle	1,07±0,53	4,6±1,77	7,6±2,76
of combined cattle	0,4±0,4	5,6±1,97	11,1±1,94
of beef cattle	1,03±0,16	4,1±0,69	8,2±2,4

As a result of analysis of micronucleus test in the groups of animals of breeds of anything it is straightened the productivity, that the least amount of lymphocytes with micronucleus was observed for the animals of breeds of the combined direction of the productivity (0,4‰). At the cattle of meat breeds the level of frequency lymphocytes with micronucleus (1,0‰) is near to the index (1,1‰) characteristic for the animals of breeds of suckling direction of the productivity with the unreliable difference of averages. For the cows of the grey Ukrainian breed frequency of лимфоцитів with a мікроядром presented 1,1‰. For all these animals frequency of lymphocytes with micronucleus did not exceed the parameters of norm of cytogenetic indexes of cattle (lim 1,00-3,67‰) at spontaneous mutagenesis [7,8, 3, 9]. For the animals of breeds of the combined direction of the productivity a tendency is marked to the increase of frequency of dinuclear lymphocytes (5,6‰) and rates of division of cages (11,1‰) comparatively with the animals of breeds of suckling (4,6; 7,6‰) and meat direction of the productivity (4,1; 8,2‰) accordingly. Part of dinuclear lymphocytes (2,2‰) for the cows of the grey Ukrainian breed in 2 times more subzero, comparatively with the above-described animals. There is a scientific hypothesis, that dinuclear cages can arise up as indemnification of action of genotoxins agents for support of genotoxins balance in the populations of animals [10]. Mitotical activity of lymphocytes of peripheral blood (2,8‰) the cows of the grey Ukrainian breed had for certain below ( $P>0,99$ ), than at the investigational groups of animals. Changes in a mitotical index testify to the cytogenetics effect [11]

Thus, karyotype of investigational cows of the grey Ukrainian breed is characterized by greater stability comparatively with the animals of breeds of suckling, combined and meat directions of the productivity at spontaneous mutagenesis.

### Conclusions

For the investigational cows of the grey Ukrainian breed absence of polyploidy set of chromosomes is evidenced in the cages of peripheral blood and reduction of cages with aneuploidy in 2 times comparatively with the animals of breeds of suckling and combined direction of the productivity and in 8,8 times less than comparatively with the animals of breeds of meat direction of the productivity.

The level of breaks of chromosomes at the investigational grey Ukrainian cattle equaled 1,5%, that in 4 times below top limit of the spontaneous chromosomal changeability evidenced for the investigational animals of breeds of three directions of the productivity with a statistically reliable difference ( $P>0,999$ ).

For the cows of the grey Ukrainian breed part of dinuclear lymphocytes (2,2‰), in 2 times more subzero comparatively with the above-described animals, and mitotical activity of lymphocytes of peripheral blood (2,8‰) for certain below ( $P>0,99$ ), than at the investigational groups of other marked breeds.

Karyotype of investigational cows of the grey Ukrainian breed is characterized by greater stability comparatively with the animals of breeds of suckling, combined and meat directions of the productivity at spontaneous mutagenesis that is the certificate of presence of the unique genetically-determined mechanism of and adaptive firmness to the unfavorable factors of environment.

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