

UDC 636.2.083.312.3

© 2015

V.D. Humennyi, doctor of agricultural sciences

Public institution is Institute of agriculture of steppe zone of NAAS

O.I. Kostenko, L.O. Tymchenko, candidates of agricultural sciences

National academy of agrarian sciences of Ukraine

Organizational and genetic-and-population aspects of conservation of autochthonous local breeds in Ukraine

Aim. To learn conceptual bases and world and home experience of maintenance of gene pool of agricultural animals. **Methods.** An analysis, synthesis, classification, population statistics, is terminological, source study and archival studies analysis. **Results.** The value of gene pool of indigenous local breeds of agricultural animals is exposed, plant-breeding theoretical and practical aspects of his maintenance and the attempt of ground of necessity of integration of local breeds is done in the modern system of agrarian production in accordance with the requirements of FAO. Shown biological features of the grey Ukrainian breed and possibility to apply plant-breeding methods from maintenance of her genetic originality. Theoretical bases over and practical measures are brought on the management of gene pool animals populations. **Conclusions.** For the decision of problem of maintenance of gene pool of indigenous local breeds in Ukraine further development of scientific researches is needed from a ground and determination of criteria of estimation of economic-biological features of gene pool breeds, development and working off organizational and technological charts from maintenance of in situ and ex situ, rational use and improvement of present gene pool of these breeds.

Key words: indigenous breed, gene pool, reproductive ability, biological variety.

An aim of researches is a study of conceptual bases, world and home experience of maintenance of gene pool of agricultural animals, in particular, indigenous home grey Ukrainian breed of cattle - national acquisition of Ukraine.

Material and methods of researches. Modern scientific methods (analysis, synthesis, classification) and special are in-process used - population statistics, terminological, source- but to the архівознавчого analysis, and also materials of zootechnic and tribal account of tribal plant from breeding of cattle of the grey Ukrainian breed of the State enterprise the "Experienced economy of "Poluvanivka" of Institute of agriculture of steppe zone of NAAS".

Results of researches. In the stock-raising of any country genetic resources are one of the most expensive and strategically major riches. The necessity of further maintenance of breeds of aborigines is predefined by that they have an unique complex economic useful signs, that can be used in plant-breeding-tribal work both for creation of new and for the improvement of present breeds and pedigree groups [3, 7, 9, 12].

The conference of UNO on an environment and development (Rio de Janeiro, 1992) defined providing of the permanent use of genetic resources as загальнопланетарну problem. Corresponding international Convention about the guard of biological variety, by the signed 167-ма states from присутніх 179-ти, it is ratified by Ukraine (There is a law of Ukraine № 257-94-BP from 29.11.1994).

The further stage of development of this direction was the first International technical conference on questions the genetic resources of animals, organized FAO (Interlaken, Switzerland, on September, 3-7 2007). The first Global plan of actions is from an assistance to canning and rational management of animals global genetic resources for the production of food and conduct of agriculture, accepted by delegations 109 countries from 169, that participated, and Інтерлакенська Declaration about the genetic resources of animals confirmed general and individual responsibility for maintenance, stable use and perfection of genetic resources of animals [4]. On the necessity of management of animals a genetic variety it was once again marked the commission of FAO on genetic resources in the field of food and agriculture (Rome, 2010).

Presently under control the global bank of FAO from genetic resources are 7616 breeds of different types of agricultural animals, what 20% as such is classified from, that are in the zone of risk of disappearance. All for 6 last the disappeared 62 breeds of domestic animals.

Intensification of the systems of production has a tendency to narrowing of variety of breeds. In the developed countries widely a few high-performance breeds use in all, countries that develop do similarly. In most high-performance breeds of agricultural animals the level of genetic variety substantially grows short through the use of the limited amount of pedigrees. Consider that the factors of influence on an environment in the world will remain permanent, and the changes of climate will cause new problems with adaptation of breeds [4].

Narrowing of genetic variety of productive population of animals - inplane subjective motivation of their breeding. If in natural populations the vector of selection is sent to maximal adjusted of animals to the terms of environment, then for breeding of cultural breeds selectionists are orientated on the state of affairs of market, that does not take into account processes that take place in natural populations often. A decline of adaptation possibilities of cultural breeds of animals is atonement for the orientation of plant-breeding selection of animals mainly on the sign of the productivity.

Comparatively easy access to the plant-breeding achievements of other countries, that gives an opportunity to conduct intensive transformation of present breeds and separate populations of animals, already brought to the home cattle breeding the fallouts related to the separate defects of the high-performance specialized breeds, in particular by illnesses and syndromes, caused genetic defects. Yes, point mutation of gene of BLAD - Bovine Leukocyte Adhesion Deficiency (адгезія of leucocytes of cattle) results in a volume, that for her transmitters the expressed propensity to the respiratory diseases, діареї, and homozygotes after this gene perish in the first months of life. By the transmitters of such mutation already at 1995 there were 15% of tribal быраїв and 6% cows of the USA, in Germany - to 30, in Ukraine - 3,2%.

To the objective factors of narrowing of biovariety in a stock-raising the higher index of conversion of feed belongs on 15-20% for the animals of breeds of aborigines by comparison to specialized commercial, that predetermines the increase of unit cost and does breeding of these breeds economically unprofitable, threatening the same to their existence.

Taking into account objective insolvency of breeds of aborigines to compete with the best home and foreign breeds on basic productive indexes the investors of economies, where retain gene pool animals, actively try fully from them to get rid.

It is not an exception in this process and Ukraine, where an orientation on commercial breeds for intensification of production of stock-raising goods resulted in expulsiing of local breeds. Already 16 home breeds disappeared and pedigree groups (14,3% of world list) of 5 types of agricultural animals, namely: 4 breeds of horse - germano-bessarabian , nogai, rifle and tarpan; 3 pedigree groups of pigs - Dnepr, rabbit, Podolsk and Ukrainian local population of European short-haired of pig; 3 breeds of cattle - black-rye Podolsk, hutsul and Ukrainian blonde-dorsal; 3 breeds of sheep - chyntyk, mazayevsky merino and reshetylivska; 2 breeds of goats - askaniisk mohair and Crimean. In the live-stock breeding only 118 (19,8%) pedigree populations - out of zone of risk of the substantial diminishing of population.

It testifies to the necessity of usual attention to the problem of maintenance of local breeds. Ukraine, signing international Convention about a biological variety, importance of problem admitted and assumed an obligation actively to participate in maintenance of present on her territory genetic resources. Taking into account it there are blocks of questions - theoretical, related to the methods of maintenance, and organizational measures from providing of possibility of existence of local breeds and populations in the real economic terms of market.

In a theoretical aspect general conceptual approaches are to the problem of genetic variety at specific level substantially differ from intraspecific. In relation to specific changeability a most value is presented by genes that determine the original lines of breeds, and for the agricultural use of animals of most attention deserves and genetic changeability that provides the variety of genes, directly or the productive signs mediated related to forming. After genetic features it is possible to distinguish 2 quality even organizations of population : genetically stable population systems and more basic them structural constituents are more changeable (unstable) population units [9].

Such subpopulation organization is the very powerful factor of support of genotype stability of the isolated population. A question about the optimal structure of population remains important and actual both in connection with maintenance of breeds of domestic animals and for opening of them genetic potential through the system of crossing. C. Chetverikov underlined that at the terms of Division of general quantity of this kind on the row of the isolated colonies frequency of origin of new gene variations will not suffer within the limits of all kind. Moreover, authenticity of exposure of such gene variations will be considerably higher, if an amount of individuals a colony will have less [13].

M. Dubinin and D. Romashov experimentally it was confirmed in the theory of genetic-automatic processes [7]. And C. Wright Fischer also came to the analogical conclusions [16, 18]. Further development this direction got in researches of Kolmogorov, Haldane and other [8, 17]. O. Serebrovsky a scientific term gene "pool" is first entered and broken question in relation to organization of the specialized economies for maintenance of gene pool of agricultural animals [11]. The theoretical and methodical base of population genetics is thus created, one of basic tasks of that there are a study of genetic stability and changes in populations.

The Ukrainian scientists are work out conceptual principles the economies of gene pool of animals, oriented to modern presentations in relation to the gene pool of animals as element of biodiversity and potential role in the decision of tasks of agricultural production (M. In. Indent and other, 1997; V.P. Burkat and other, 2006). However modern external of domestic animals environments become vce harder. From one side, the natural constituent of environment changes through anthropogenic influence, from other, - the state of affairs of market requires the biological unitization of populations that conduct.

From the point of view of modern theory any population is examined as a difficult system with a certain Subordinate structure. The hierarchicalness of structural elements of population provides the adequate change of gene pool from a generation in a generation in reply to the changes of environment. In cultural populations (in local especially) find out the deficit of structural elements, caused by one-sided aspiration of selection. Breeding after lines that use in practice in a stock-raising as a method of Structuring of breeds very often is formal and does not provide necessary differentiation of intrapopulation (pedigree) elements.

Maintenance of genetic resources of stock-raising takes place in gene pool, collection herds and gene pool banks, of pure breed breeding of animals with the use of the special plant-breeding charts, negative consequences of the limited quantity of tribal animals, accumulation sent to diminishing and of long duration storage of genetic material (sperm, oocytes, embryos, standards of DNA) comes in that true. By the institute of breeding and genetics of animals of HAAH in 2006 first in Ukraine the expeditionary inspection of the state of pedigree gene pool of basic types of agricultural animals is conducted and certainly for every kind spectrum all the ренофондових objects foreseen for of long duration storage.

The system of the plant-breeding-genetic monitoring is worked out, the basic elements of complex research of specific of genetic resources of animals are certain in early age. Technological principles of functioning of bank of DNA of agricultural animals as pre-condition of introduction of methods of genome selection are certain in the context of conception of maintenance of gene pool of breeds and biovariety of natural resources.

In the fundamental documents of Ukraine about a stock-raising, laws: "About tribal business in a stock-raising" and "About the national program of selection in the stock-raising" of row of breeds that conduct in Ukraine, given status "local". The grey Ukrainian breed of cattle belongs to them.

Monitoring of population-genetic parameters of the grey Ukrainian breed testifies that she keeps the unique complex of valuable original biological signs : high genetic Consolidation, endurance and adjusted to the terms of maintenance, firmness to stresses and infectious diseases, protracted period of the productive use, high fecundity in combination with easy motion of отелень. Characteristic pedigree signs is a strong dense constitution of animals, harmonious build, grey colour, durability of skeleton and hoof horn, high maintenance of fat and squirrel in milk.

Animals are comparatively large (a height in the withers of cows-breeders presents a 153 cm, full-age cows - 133 cm), have to good of embarrassment and characteristic type of build. Living mass of adult быраїв-pedigrees is 1100 kg, cows - 531 kg, duration them the economic use - over 10 lactations.

This breed is kept in the most in Ukraine herd of tribal plant of the State enterprise the "Experienced economy of " Polivanivka " of Institute of agriculture of steppe zone of HAAH". The exit of calves on 100

cows in the herd of tribal plant of the grey Ukrainian breed in 2007 presented 92%, 2008 - 90, 2009 - 85, 2010 and 2011 - 95, 2012-2014 - 96%.

Reproduced ability of heifers and cows of the grey Ukrainian breed Index

During 85 of supervisions living mass of animals at birth and in different periods of ontogenesis remained stable. Living mass of bulls is 30-34 kg, Calf

- 23-31 kg Coefficient of small-scale at first-born cows and full-age animals
- 0,052-0,061 and there are 45 last the at such level.

Duration of service period presents $85,9 \pm 2,76$ day (lim 72-105 days, CV - 21,5%). Insemination of repair heifers takes place for the achievement of living mass 360-380 kg, thus not age, but living mass and common development of animals, has a decision value.

Presently before cattle-breeders a new task appeared quality - not only to provide the characteristic level of the productivity of breeds of aborigines, populations and subpopulations but also save their viability in many generations. Deciding him is possible only leaning on approach of the systems, in basis of that there must be a theoretical case a population frame as by a large macrosystem that is in functional unity with an environment and objectively attracted in the economic relations of society.

Main strategic plant-breeding work assignment with the local breeds of agricultural animals in Ukraine is forming of inborn genealogical structure from a few divergence after a gene pool subpopulations. Depending on the size of local breed these differentiated morphons can be formed in different economies, if such are, or by means of the hard linear breeding, if a population so had, that she is grown in one or two economies (for example, grey Ukrainian cattle).

There is a question: how to use for an impregnation animals in such herds of the best pedigrees of home and foreign selection. An answer consists in that for maintenance of local breeds it is impossible to use the gene pool of other breeds. It is needed to realize that introduction of genes of other breeds destroys a genealogical structure that was folded in a breed the method of the use of pedigrees of highly cultured breeds. After such crossing it is needed to conduct plant-breeding work with a few generations, to pick up thread specificity to the genome of local breed.

For the decision of task of genetic differentiation of breeds and their structures it is necessary to work out corresponding objective tests after genetic markers. It follows to work out the genetic passports of breeds and lines. A self exposure by means of the genetic passport system of unique genotypes, including of them to the plant-breeding system of selection and selection was given possibility the last years to stop the losses of some rockspecific aneniv and to stabilize the gene pool of the reserved herd of the grey Ukrainian breed after the controlled by genetic systems.

For the ground of commercial attractiveness of local low-yielding breeds it is needed to investigate quality of products of these animals. It is desirable not simply to show, in particular, that the unique feature of the grey Ukrainian breed are firmness to tuberculosis, leucosis and high taste internalss of milk and meat, but also to pay attention to that firmness of signs is provided by a presence in the gene pool of concrete alleles of large complex of genes of histocompatibility, the concentration of that has such level that provides 100% - by firmness to the marked diseases of animals of these genotypes.

The albuminous products of stock-raising are valued for her biological full value, especially on maintenance irreplaceable amino acid. The valuable component of milk of cows is protein and him basic part is a casein. Frequency the animals-transmitters of genotype of BB of gene of casein happen with that presents about 2/3 herds and does milk of this breed very attractive for cheesecake and dietary feed.

Thus, it is needed in every way to propagandize unique properties of local breeds, them genetic and biochemical features and possibility of receipt from them ecologically clean and healthy products of feed that will assist the commercial attractiveness of these breeds. For the sake of it it is necessary to extend fundamental researches with application of modern methods of biophysics, biochemistry, marker genetics, and also applied - from development of technologies of production of the goods, got from the animals of local breeds, realization of marketing researches from a search and creation of market possibilities.

Conclusions

The problem of maintenance of gene pool of indigenous local breeds in Ukraine requires the further decision of wide spectrum of theoretical and practical questions. It is important, except description of genetic resources, to determine them community sense, to carry out the permanent monitoring and management by them. Necessary further development of scientific researches from a ground and determination of criteria of estimation of economic-biological features of gene pool breeds, development and working off organizational and technological charts from maintenance of in situ and ex situ, rational use and improvement of present gene pool of "cultural" біорізноманітності, and also genetic resources local, aborigines and breeds of agricultural animals that disappear.

Bibliography

1. *Алтухов Ю.П.* Генетические процессы в популяциях/Ю.П. Алтухов. — М.: ИКЦ «Академкнига», 2003. — 431 с.
2. *Алтухов Ю.П.* Популяционные системы и их структурные элементы. Генетическая стабильность и изменчивость/Ю.П.Алтухов, Ю.Г. Рычков//Журн. общ. биологии. — 1970. — Вып. 31, № 5. — С. 507–526.
3. *Венжик С.* Сохранение генетических фондов/С. Венжик//Актуальные вопросы прикладной генетики в животноводстве. — М.: Колос, 1982. — С. 59–70.
4. *Глобальный план действий в области генетических ресурсов животных и Интерлакинская декларация о генетических ресурсах животных.* Комиссия по генетическим ресурсам в сфере продовольствия и сельского хозяйства//Продовольственная и сельскохозяйственная организация Объединенных Наций (ФАО). — Рим, 2008.
5. *Гузев І.В.* Методика збереження генофонду локальних порід у закритих популяціях/І.В. Гузев, О.П. Чиркова//Методики наукових досліджень із селекції, генетики та біотехнології в тваринництві: наук. зб. — К.: Аграр. наука, 2005. — С. 14–21.
6. *Доповідь про стан генетичних ресурсів тваринництва України/М.В. Зубець, В.П. Буркат, Д.О. Мельничук та ін.* — К., 2003. — 72 с.
7. *Дубинин Н.П.* Генетическое строение вида и его эволюция. I. Генетико-автоматические процессы и проблема экогенотипов/Н.П. Дубинин, Д.Д. Ромашов//Биол. журн. — 1932. — Т. 1. — Вып. 5–6. — С. 52–95.
8. *Колмогоров А.* Уклонение от формул Харди при частичной изоляции/А. Колмогоров//ДПАН. — 1935. — Т. 3 (8), № 3 (63). — С. 129–132.
9. *Мельник Ю.Ф.* Селекционный процесс и состояние генетических ресурсов животноводства в Украине/Ю.Ф. Мельник, В.П. Буркат, И.В. Гузев. — К.: Аграр. наука, 2002. — 68 с. (оцінка стану генофонду тварин).
10. *Определение носителей генетических дефектов среди быков — производителей/А. Яковлев, В. Терлицкий, О. Митрофанов, Н. Дементьева//Молочное и мясное скотоводство.* — 2004. — № 6 — С. 31–32.
11. *Серебровский А.С.* Селекция животных и растений/А.С. Серебровский. — М.: Колос, 1969. — С. 31–119.
12. *ФАО.* Учебный пакет. Поддержка развития доклада страны при подготовке первого доклада по состоянию мировых генетических ресурсов животных. — 2001. — 218 с.
13. *Четвериков С.С.* О некоторых моментах эволюционного процесса с точки зрения современной генетики/С.С. Четвериков//Журн. эксперим. биологии. — 1926. — Т. 2. — Вып. 1. — С. 3–54.
14. *Шмальгаузен И.И.* Факторы эволюции. Теория стабилизирующего отбора/И.И. Шмальгаузен. — М.: Наука, 1969. — С. 451.

15. *Эйснер Ф.Ф.* Использование и совершенствование серого украинского скота/Ф.Ф. Эйснер//Каталог животных серой украинской породы крупного рогатого скота. — К.: Урожай, 1986. — С. 3–5.
16. *Fisher R.F.* The genetic theory of natural selection/R.F. Fisher//Oxford Clar. Press 1930. — 2 nd ed. — N.Y. — Dover, 1958. — 368 p.
17. *Holdane J.B.S.* The effect of variations of fitness/J.B.S. Holdane//Amer. Nat. — 1937. — V. 71. — P. 337–339.
18. *Wright S.* Evolution in Mendelian populations/S. Wright//Genetiks. — 1931. — V. 16. — P. 97–159. Acted 9.04.2015.