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POPULATION-GENETIC MONITORING IN THE CATTLE BIODIVERSITY CONSERVATION SYSTEM *IN SITU*

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Introduction

The globalization of biological diversity narrowing of the animal world has necessitated a shift to genetic resource management that combines traditional and modern knowledge and technology, with an increasing emphasis on product quality, longevity and animal health, and the rational use of natural resources. One of the elements of a systems approach is to obtain objective information on controlled populations and create a database to analyze their structure, plan breeding and research, study genetic processes and maintain optimal variability at the species and individual levels.

The full implementation of measures to preserve the gene pool of livestock in Ukraine can be ensured through the functioning of the national strategy for regulating the development of herds through systematic information, selection and genetic monitoring. The prognostic measure is a comprehensive assessment of the degree of risk of normal development of any breed population, taking into account a range of factors that directly or indirectly affect the viability of animals.

Results

Establishment of current status (categories) of risk of each controlled breed population of cattle of Ukraine. According to calculations FAO recommendations, the following are in critical condition: Carpathian Brown and Blonde D'aquitaine cattle breeds, the number of breeding females in these herds does not exceed 100 heads and a very small number of males. Since 2013, the breeding stock of the Carpathian Brown breed has been concentrated only in households. In danger are: Ukrainian Gray, Ukrainian Beef, Southern Beef, Ukrainian Whiteheaded and Lebedyn breeds. Because the breeding population of purebred females and the total size of these populations range from 100 to 1,000, the sperm production of males in most of these breeds kept in breeding enterprises is generally less than 20 sires and the percentage of purebred females is less than 80%.

Material & Methods

Quantitative and qualitative composition of breeds (populations) of cattle was analyzed according to the State Register of Breeding Entities in Animal Husbandry as of 01.01.2021 and catalogs of bulls for reproduction of breeding stock in 2021. The current risk status (category) was established according to the methodology of the FAO Committee on Animal Genetic Resources (number of purebred males and females involved in reproduction) and the European Association of Animal Production – Animal Genetic Data Bank (EAAP-AGDB) (estimated value of the expected increase in ΣΔF inbreeding in the breed over 50 years of reproduction).

Population parameters of the state, trends and risk status of cattle breeds as of January 1, 2021

Breed	Number of herds	In total, heads	including		Females +/- until 2011.	Trend *	Ne*	Ne_s*	ΔF*	$ΔF_{-50}$*	Risk status	
			males	female							FAO	EAAP-AGDB
Ukrainian Whiteheaded	1	663	10	300	110	↑	38,7	27,1	1,9	18,1	Endangered	Minimally endangered
Lebedyn	3	1399	14	677	-548	↓	54,9	38,4	1,3	12,8	Endangered	Potentially endangered
Red Steppe	6	3443	9	1360	-3167	↓	35,8	25,0	2,0	19,6	Not at risk	Minimally endangered
Simmental	14	9015	72	4355	-1801	↓	283,3	198,3	0,3	2,5	Not at risk	Not endangered
Ukrainian Brown Dairy	2	251	1	135	-344	↓	4,0	2,8	18,0	176,3	Endangered	Critically endangered
Ukrainian Red Dairy	14	9934	19	4300	-6133	↓	75,7	53,0	0,9	9,3	Not at risk	Potentially endangered
Ukrainian Grey	2	1048	29	346	-103	↓	107,0	74,9	0,7	6,7	Endangered	Potentially endangered
Ukrainian Beef	2	630	34	240	-775	↓	119,1	83,4	0,6	6,0	Endangered	Potentially endangered

Notes: trend * (for 10 years) - ↑ growth, ↓ decrease in uterine population; Ne * - effective population size, heads; Nes * - effective population size in the presence of selection pressure, heads; ΔF * - level of inbreeding per generation,%; ΔF-50 * - level of inbreeding for 50 years of reproduction,%.

Conclusions

According to the results of the analysis among a significant number of breeds in Ukraine, we have assessed the most vulnerable breeds of cattle that are in danger of losing the gene pool.