



UNIVERSITY OF AGRONOMIC SCIENCES
AND VETERINARY MEDICINE OF BUCHAREST
FACULTY OF ANIMAL PRODUCTIONS
ENGINEERING AND MANAGEMENT



SCIENTIFIC PAPERS

SERIES D. ANIMAL SCIENCE

VOLUME LXV, No. 2



2022
BUCHAREST

SCIENTIFIC PAPERS
SERIES D. ANIMAL SCIENCE
VOLUME LXV, No. 2, 2022

UNIVERSITY OF AGRONOMIC SCIENCES
AND VETERINARY MEDICINE OF BUCHAREST
FACULTY OF ANIMAL PRODUCTIONS
ENGINEERING AND MANAGEMENT

SCIENTIFIC PAPERS

SERIES D

ANIMAL SCIENCE

VOLUME LXV, No. 2

2022
BUCHAREST

SCIENTIFIC COMMITTEE

- Stelian ACATINCĂI - Banat University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timișoara, Romania
- Lovita ADRIANI - Padjadjaran University, Indonesia
- Daniela BĂNARU - Mediterranean Institute of Oceanography, Aix-Marseille University, France
- Vasco A.P. CADAVEZ - Polytechnic Institute of Bragança - Agricultural School (Departamento de Ciência Animal & Centro de Investigação de Montanha (CIMO), Escola Superior Agrária, Instituto Politécnico de Bragança), Portugal
- Muzaffer DENLI - Dicle University, Diyarbakir, Turkey
- Cătălin DRAGOMIR - National Research-Development Institute for Animal Biology and Nutrition - Balotești, Romania
- Nicolae EREMIA - State Agrarian University of Moldova, Chișinău, Republic of Moldova
- Umer FAROOQ - Islamia University of Bahawalpur, Pakistan
- Horia GROSU - National Research-Development Institute for Animal Biology and Nutrition - Balotești, Romania
- Khalid Hamid HASSAN - University of Diyala, Iraq
- Armagan HAYIRLI - Ataturk University, Erzurum, Turkey
- Mostafa A.R. IBRAHIM - University of Kafrelsheikh, Egypt
- Ondrej KADLECÍK - Slovak Agricultural University Nitra, Slovakia
- Yusuf KONCA - Erciyes University, Kayseri, Turkey
- Giuseppe MAIORANO - University of Molise, Italy
- Monica Paula MARIN - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
- Raluca MATEESCU - University of Florida, USA
- Edit MIKÓ - University of Szeged, Hungary
- Vioara MIREȘAN - University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania
- Carmen Georgeta NICOLAE - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
- Dušica OSTOJIĆ ANDRIĆ - Institute for Animal Husbandry, Belgrade-Zemun, Republic of Serbia
- Ioan Mircea POP - University of Life Sciences "Ion Ionescu de la Brad" of Iasi, Romania
- Agatha POPESCU - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
- Paul Rodian TĂPĂLOAGĂ - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
- Ilie VAN - Academy of Agricultural and Forestry Sciences "Gheorghe Ionescu-Șișești", Bucharest, Romania
- Livia VIDU - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
- Suntom WITTAYAKUN - Rajamangala University of Technology Lanna, Thailand

EDITORIAL BOARD

General Editor: Prof. Ph.D. Gheorghe Emil MĂRGINEAN

Executive Editor: Prof. Ph.D. Monica Paula MARIN

PUBLISHERS:

University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania – Faculty of Animal Science Engineering and Management

Address: 59 Mărăști Blvd, District 1, 011464, Bucharest, Romania

Phone: + 40 213 182 564, Fax: +40 213 182 888, www.zootehnie.ro

CERES Publishing House

Address: 29 Oastei Street, District I, Bucharest, Romania

Phone: + 40 317 90 23, E-mail: edituraceres@yahoo.com, Webpage: www.editura-ceres.ro

Copyright 2022

To be cited: Scientific Papers. Series D. Animal Science, Volume LXV, No. 2, 2022

The publishers are not responsible for the opinions published in the Volume.

They represent the authors' point of view.

ISSN 2285-5750; ISSN CD-ROM 2285-5769; ISSN Online 2393-2260; ISSN-L 2285-5750

International Database Indexing: Web of Science Core Collection (Emerging Sources Citation Index), Index Copernicus, CABI, DOAJ, Ulrich's Periodicals Directory (ProQuest), PBN, Cite Factor (Academic Scientific Journals), Scipio, OCLC (WorldCat), Research Bible, Google Scholar.

SUMMARY

I. SESSION GENETICS AND BREEDING

1. EVALUATION OF THE PRODUCTIVE AND REPRODUCTIVE QUALITIES OF BLACK MOTTLE COWS WITH THE USE OF FORAGE SORBENTS - **Nikolai SICHKAR, Viktor LYASHENKO, Inna KAESHOVA, Alla GUBINA, Maria NECHAEVA** 13
2. BASIC PRINCIPLES OF SELECTION OF BULLS-PRODUCERS - **Tatiana SHISHKINA, Alexander DARIN, Nikolai KERDYASHOV, Natalia NIKISHOVA** 19
3. QUANTITATIVE AND SIMULTANEOUS GAS CHROMATOGRAPHIC DETERMINATION OF VARIOUS FORMS OF LONG-CHAIN FATTY ACIDS IN BIOLOGICAL MATERIAL – **Yosyp RIVIS, Daniel ZABORSKI, Bogdan GUTYJ, Olga HOPANENKO, Oleksandr DIACHENKO, Olga STADNYTSKA, Oleg KLUM, Ivan SARANCHUK, Vasyl BRATYUK, Vasyl FEDAK** 24
4. HISTORY GENETIC ANALYSIS OF POLWARTH SHEEP BREED - **Cristina Ștefania NEGRE, Gabriel Petru VICOVAN, Răducu RADU, Ana ENCIU, Adriana VICOVAN, Camelia Zoia ZAMFIR, Ion Corneliu NEAȚU, Alina NICOLESCU, Maria STANCIU** 30
5. PEROXIDE PROCESSES AND BIOSYNTHESIS OF CHOLESTEROL DERIVATIVES IN RABBIT TISSUES AT ACUTE L-ARGININE-INDUCED PANCREATITIS AND ITS CORRECTION – **Yosyp RIVIS, Olga HOPANENKO, Oleg STASIV, Olga STADNYTSKA, Bogdan GUTYJ, Oleksandr DIACHENKO, Ivan SARANCHUK, Oleg KLUM, Vasyl FEDAK, Vasyl BRATYUK** 34
6. BIOLOGICAL ASSESSMENT OF THE CONSTITUTION OF THE POLISSIAN BEEF CATTLE IN THE CONDITIONS OF THE PRECARPATHIAN REGION - **Olga STADNYTSKA, Bogdan GUTYJ, Viktor KHALAK, Vasyl FEDAK, Igor DUDCHAK, Miroslava ZMIIA, Ivan SHUVAR, Volodymyr BALKOVSKYI, Antin SHUVAR, Hanna KORPITA, Nataliia CHYZHANSKA, Larysa KUZMENKO, Viacheslav VAKULIK** 46
7. GENETIC PARAMETERS ESTIMATES FOR GROWTH TRAITS OF GOATS FROM THE ARGAN GROVE OF AGADIR IN MOROCCO - **Saïd EL MADIDI, Houda EL KHEYYAT** 53
8. FATTENING AND MEAT QUALITIES OF YOUNG PIGS OF DIFFERENT INTRABREED DIFFERENTIATIONS BY ORIGIN AND BREEDING VALUE - **Viktor KHALAK, Anna HORCHANOK, Lyudmila LYTVYSCHENKO, Oksana KUZMENKO, Natalia KORBYCH, Alexander BORDUN, Vladimir LISKOVICH, Ruslana UMANETS** 58
9. ADAPTATION LEVEL, MANAGEMENT VALUE AND PRODUCTIVITY OF LARGE WHITE SOWS OF HUNGARIAN ORIGIN IN THE STEPPE ZONE OF UKRAINE - **Viktor KHALAK, Anna HORCHANOK, Oksana KUZMENKO, Lyudmila LYTVYSCHENKO, Natalia PRISJAZHNJUK, Olena VEDMEDENKO, Alexander BORDUN, Dmytro UMANETS** 65

II. SESSION NUTRITION

1. THE BENEFICIAL EFFECT OF *BACILLUS* SPP. AS PROBIOTICS IN POULTRY NUTRITION - A REVIEW - **Mihaela DUMITRU, Georgeta CIURESCU** 75
2. CURRENT ASPECTS REGARDING THE USE OF ZEOLITES IN THE PROPHYLACTIC-THERAPEUTIC MANAGEMENT OF GASTROINTESTINAL DISORDERS IN POULTRY, SWINE, RUMINANTS AND DOGS (REVIEW) - **Daria-Maria-Ecaterina FENEȘAN, Octavia Maria TAMAS-KRUMPE, Diana TODORAN, Doru NECULA, Laurenț OGNĖAN** 92

ADAPTATION LEVEL, MANAGEMENT VALUE AND PRODUCTIVITY OF LARGE WHITE SOWS OF HUNGARIAN ORIGIN IN THE STEPPE ZONE OF UKRAINE

Viktor KHALAK¹, Anna HORCHANOK², Oksana KUZMENKO³,
Lyudmila LYTVYSCHENKO², Natalia PRISJAZHNJUK³,
Olena VEDMEDENKO⁴, Alexander BORDUN⁵, Dmytro UMANETS⁶

¹State Institution - Institute of Grain Crops, National Academy of Sciences of Ukraine,
14, Vernadskyi St., Dnipro, Ukraine

²Dnipro State Agrarian and Economic University, 25, Sergey Yefremov St., Dnipro, Ukraine

³Bila Tserkva National Agrarian University, 8/1, Soborna Sq., Bila Tserkva, Ukraine

⁴Kherson State agrarian and economic University, 23, Street St., Kherson, Ukraine

⁵Institute of Agriculture of Northern East of National Academy of Agrarian Sciences of Ukraine,
Sumy, Ukraine

⁶National University of Life and Environmental Sciences of Ukraine, 15,
Heroyiv Oborony st., Kyiv, Ukraine

Corresponding author email: anna.horchanok@dsau.dp.ua

Abstract

The paper presents the results of a study of long-term adaptation, management value and productivity of Large White sows of Hungarian origin in the conditions of steppe zone of Ukraine. It was found that Large White sows of Hungarian origin are characterized by high rates of long-term adaptation, management value and reproductive qualities. Thus, their age of life is 44.1 ± 1.97 months ($Cv = 35.27\%$); the duration of breeding use is 32.8 ± 1.95 months ($Cv = 46.91\%$); the index "level of adaptation" varies in the range from 5.48 to 27.20 points. Taking into account the intra-breed differentiation according to the index "level of adaptation", a significant difference between the groups of sows of class $M+$ and $M-$ was found according to the following indicators: "farrowing received", "live piglets in total, heads", "multifetation, heads", "nest weight during the weaning at the age of 28 days, kg". The indicator "livability of piglets before weaning at the age of 28-32 days, %" in the experimental groups of sows ranges from 90.1 to 94.4%. Sows from the category "high management value" exceeded peers from the category "low management value" in terms of "farrowing received", "live piglets in total, heads", "multifetation, heads", "nest weight during the weaning at the age of 28-32 days, kg" by 46.67% on average. The indicator "livability of piglets before weaning at the age of 28-32 days, %" in different management value groups of sows ranges from 91.3 to 100.0%. The maximum increase in additional products was obtained from sows which index "level of adaptation" ranges from 5.48 to 8.20 points (+4.99%), as well as from animals of the category "high management value" (+3.41 %), respectively. These indicators are proposed to be used as criteria for selection of highly productive animals in the controlled population.

Key words: adaptation, breed, correlation, economic efficiency, management value, reproductive qualities, sow, variability.

INTRODUCTION

An objective assessment of the level of pig adaptation to environmental conditions, management value and productivity indicators is the relevant issue in working with the population of animals of a particular breed (Shulga et al., 2011; Topikha & Konovalov, 2009; Khalak et al., 2021; Khalak, 2009, 2020; Khokhlov et al., 2011; Kislińska et al., 2012). Thus, according to Dudka (2020), it was established that sows of the Ukrainian Spotted

Steppe breed in the process of ontogenesis adapt better to breeding conditions and to the environment. This is manifested in an increase in age of life and breeding use of sows from the main herd and a reduction in the adaptation index. The age of life of sows of the Ukrainian White Steppe breed is 35.7 months, the duration of breeding use is 21.9 months, the adaptation index is 37.7 points. The author notes that the high level of adaptability of genotypes from the studied breeds to breeding conditions is confirmed by the results of

assessment of their management value, which is 22.3-35.3 heads per one sow for all viable piglets, and it meets the requirements of the "average" level at scale for assessing the management value of sows.

Important population indicators are flexibility and stability of pigs, which depend on the genotype (Dudka, 2020). The author identified four highly flexible ($bi = 3.020-4.601$) lines with a positive genotypic effect (0.11-0.44 heads) in the Ukrainian Spotted Steppe breed and two ($bi = 1.545-1.683$ and $0.12-0.21$ heads) in the Ukrainian White Steppe breed. It is proved that lines with a combination of high flexibility and low stability should be used in further breeding work to increase the genetic potential of animals, and low flexibility and high stability to consolidate the breeding traits of breeds.

It is established that in the process of adaptation in the herd replacements of Large White breed of Hungarian origin in the Black Sea region there is a decrease in growth, development and productivity for three consecutive generations. The most significant decrease in the above mentioned indicators is specific to the second generation of descendants of imported animals (Kislinska, 2012). The process of adaptation has negatively affected the level of reproductive qualities of the sows being tested. The lowest rates were obtained in the first generation of animals compared to the generation of acclimatizers. But with each following generation, an increase in these indicators was found, the maximum manifestation of which was found in the third generation of animals.

The works of other native and foreign scientists are confirmation of the relevance of the chosen research area (Khalak, 2020; Vashchenko et al., 2015; Kovalenko, 2011; Berezovskyi, 2014; Vashchenko, 2011; Tolokontsev, 2010; Kislinskaia et al., 2012).

The aim of the work is to investigate the indicators of long-term adaptation, management value and productivity of sows of Large White breed of Hungarian origin in the steppe zone of Ukraine, and based on the obtained data, to determine the criteria for selection of highly productive animals according to the index "level of adaptation" and calculate the economic efficiency of research results.

MATERIALS AND METHODS

The experimental part of the work was carried out on farms in Dnipropetrovsk region and in the laboratory of the State Institution "Institute of Grain Crops of NAAS of Ukraine". The work was performed according to the research program of NAAS of Ukraine № 31 "Genetic improvement of farm animals, their reproduction and conservation of biodiversity (Genetics, conservation and reproduction of biological resources in animal husbandry)", task "To determine the adaptive features and nature of inheritance of polygenic-hereditary traits of pigs of different genotypes and to develop an integrated system for creating a highly productive population".

Large White sows of Hungarian origin are the object of the study.

Evaluation of sows on the indicators of long-term adaptation, management value of reproductive qualities was carried out taking into account the following quantitative characteristics: "age of life of sows, months"; "duration of breeding use of sows, months"; "farrowing received"; "piglets in total, heads"; "live piglets in total, heads"; "multifetation, heads"; "nest weight during the weaning at the age of 28 days, kg"; "livability of piglets before weaning, %". Comprehensive assessment of sows on the indicators of reproductive qualities was carried out according to the index of M.D. Berezovskyi (quoted Vashchenko, 2019):

$$I = B + (2 \times W) + (35 \times G) \quad (1)$$

where: I - M.D. Berezovskyi index, points; B - the number of piglets at birth, heads; W - the number of piglets at the time of weaning, heads; G - average daily gain of live weight of piglets before weaning, kg.

The index "level of adaptation" was calculated according to the following method:

$$ILA = \frac{AL^2}{\text{farrowings} \times \text{DBU (months)}} \quad (2)$$

where: ILA - index "level of adaptation", points; AL - age of life of sows (from birth to the last weaning of piglets), months; DBU - duration of breeding use (from the beginning of the first gestation to the last weaning of piglets), months (Smirnov, 2003).

The management value of sows was determined by the Koriazhnov scale (1983) (Table 1).

Table 1. The scale of management value of sows

The level of management value	Management value per farrowing sow		Management value per inseminated sow	
	E ₁ (piglets in total)	E ₁ (including viable)	E ₂ (piglets in total)	E ₂ (including viable)
Low	Up to 25	Up to 20	Up to 25	Up to 15
Medium	26-40	21-30	21-44	16-34
High	more 50	more 40	more 45	more 35

The cost of additional products was calculated by the following formula:

$$\hat{A} = P \times \frac{A \times M}{100} \times L \times N, \quad (3)$$

where: A - cost of additional products, UAH; P - purchase price per unit of output, according to existing current prices in Ukraine; A - average productivity of animals; M - the average raise of the main product (%), which is expressed as a percentage per 1 head when applying a new and improved breeding achievement compared to the productivity of animals of basic use; L - constant coefficient of reduction of the result, which is associated with additional costs for profitable products (0.75); N - the number of livestock of new or improved breeding

achievement, heads ("Methods of determining the economic...", 1983).

Biometric processing of the obtained material was performed according to the methods of Kovalenko et al. (2010), using the software module "Data Analysis" in Microsoft Excel

RESULTS AND DISCUSSIONS

The research results show that Large White sows of Hungarian origin in the steppe zone of Ukraine are characterized by high rates of long-term adaptation (Table 2). Thus, their age of life is 50.1, the duration of breeding use is 41.9 months. The "adaptation level" index is 10.56 points.

Table 2. Indicators of long-term adaptation of Large White sows from controlled population, n = 153

Indexes, units of measurement	Biometric indicators		
	$\bar{X} \pm S\bar{x}$	$G \pm S_G$	$Cv \pm S_{Cv}, \%$
Age of life, months	50.1±1.45	18.03±1.030	35.98±2.057
Duration of breeding use, months	41.9±1.39	17.28±0.987	41.24±2.357
Index "level of adaptation", points	10.56±0.279	3.46±0.197	32.76±1.873

Taking into account the intra-breed differentiation according to the index "level of adaptation" (deviation from the average value of the index is $0.67 \times \sigma$), it was found that sows from group III according to the indicators of "farrowing" exceeded peers from group I by 5.8 farrowings (td = 16.57; P<0.001); "live

piglets in total, heads" by 70.9 heads (td = 16.26; P<0.001); "multifetation, heads" by 1.0 head (td = 4.16; P (0.001)); "nest weight at the time of weaning at the age of 28-32 days, kg" by 5.2 kg (td = 2.98; P<0.01); Berezovskyi index by 3.9 points (td = 2.60; P<0.01) (Table 3).

Table 3. Reproductive qualities of Large White sows of Hungarian origin of different intra-breed differentiation according to the index "level of adaptation"

Indexes, units of measurement	Biometric indicators	Gradation of the index "level of adaptation", points		
		12.97-27.20	8.30-12.80	5.48-8.20
		distribution class		
		M ⁺	M ⁰	M ⁻
		group		
		I	II	III
Farrowing received	<i>n</i>	31	77	45
	$\bar{X} \pm S\bar{x}$	4.0±0.20	6.3±0.28	9.8±0.29
	$G \pm S_G$	1.12±0.142	2.46±0.198	1.94±0.204
	$Cv \pm S_{Cv}, \%$	28.00±3.557	39.04±3.148	19.79±2.087

Live piglets in total, heads	$\bar{X} \pm S\bar{x}$	42.6±2.37	71.0±3.35	113.5±3.67
	$G \pm S_G$	13.24±1.682	29.41±2.371	24.56±2.590
	$Cv \pm S_{Cv}, \%$	31.10±3.951	41.43±3.341	21.64±2.282
Multifetation, heads	$\bar{X} \pm S\bar{x}$	10.6±0.19	11.2±0.11	11.6±0.16
	$G \pm S_G$	1.10±0.139	0.98±0.079	1.09±0.114
	$Cv \pm S_{Cv}, \%$	10.37±1.317	8.75±0.705	9.39±0.990
Average live weight of piglets at birth, kg	$\bar{X} \pm S\bar{x}$	1.39±0.025	1.37±0.111	1.31±0.014
	$G \pm S_G$	0.14±0.017	0.98±0.079	0.08±0.008
	$Cv \pm S_{Cv}, \%$	10.08±1.280	9.47±0.763	6.45±0.680
Nest weight during the weaning at the age of 28 days, kg	$\bar{X} \pm S\bar{x}$	74.7±1.44	75.9±0.91	79.9±0.98
	$G \pm S_G$	8.07±1.025	8.02±0.646	6.61±0.697
	$Cv \pm S_{Cv}, \%$	10.80±1.372	10.56±0.851	8.27±0.092
Berezovskyi index, points	$\bar{X} \pm S\bar{x}$	37.98±0.595	38.31±0.253	39.93±1.40
	$G \pm S_G$	3.31±0.420	2.22±0.179	9.43±0.994
	$Cv \pm S_{Cv}, \%$	8.73±1.109	5.80±0.467	23.62±2.491
Livability of piglets at the age of 28-32 days, %	$\bar{X} \pm S\bar{x}$	94.4±1.89	91.2±0.65	90.1±0.86

The coefficient of variability of traits that characterize the level of long-term adaptation and reproductive qualities of sows from experimental groups ranges from 6.45 (class of distribution of sows according to the index "level of adaptation" is M-, indicator is "live weight of piglets at birth, kg") to 41.43% (class

of distribution of sows according to the index "level of adaptation" is M0, indicator is "live piglets in total, heads").

The research results of long-term adaptation and reproductive qualities of sows of different management value are shown in Table 4.

Table 4. Reproductive qualities of sows of large white breed of Hungarian origin of different management value

Indexes, units of measurement	Biometric indicators	management value		
		high	medium	low
		group		
		I	II	III
Farrowing received	<i>n</i>	126	25	2
	$\bar{X} \pm S\bar{x}$	7.8±0.25	3.4±0.09	2.0
	$G \pm S_G$	2.87±0.180	0.50±0.068	-
	$Cv \pm S_{Cv}, \%$	36.79±2.318	14.70±2.00	-
Live piglets in total, heads	$\bar{X} \pm S\bar{x}$	87.3±2.91	33.5±0.98	18.0
	$G \pm S_G$	32.70±2.060	5.12±0.697	-
	$Cv \pm S_{Cv}, \%$	37.45±2.359	15.28±2.081	-
Multifetation, heads	$\bar{X} \pm S\bar{x}$	11.2±0.08	9.8±0.15	9.0
	$G \pm S_G$	1.00±0.063	0.80±0.108	-
	$Cv \pm S_{Cv}, \%$	8.92±0.562	8.16±1.111	-
Average live weight of piglets at birth, kg	$\bar{X} \pm S\bar{x}$	1.32±0.08	1.41±0.18	1.45
	$G \pm S_G$	0.09±0.005	0.09±0.001	-
	$Cv \pm S_{Cv}, \%$	6.81±0.429	6.96±0.948	-
Nest weight during the weaning at the age of 28 days, kg	$\bar{X} \pm S\bar{x}$	78.7±1.01	74.9±1.32	68.2
	$G \pm S_G$	11.40±0.718	6.85±0.933	-
	$Cv \pm S_{Cv}, \%$	14.48±0.912	9.14±1.245	-

Berezovskyi index, points	$\bar{X} \pm S\bar{x}$	39.04±0.538	37.19±0.334	34.14
	$G \pm S_G$	6.03±0.379	1.74±0.237	-
	$Cv \pm S_{Cv}, \%$	15.44±0.972	4.67±0.636	-
Livability of piglets at the age of 28-32 days, %	$\bar{X} \pm S\bar{x}$	91.3±0.64	94.2±1.11	100.0

Studies have shown that the number of sows from the category "high management value" in the controlled population is 82.3%, from the category of "low management value" is 1.31%. The difference between the animals from these groups in terms of "farrowing" is equal to 5.8 farrowings, in "live piglets total, heads" is 69.3 heads, in "multiplicity, heads" is 2.2 heads, in "nest weight at the time of weaning at the age of 28-32 days" is 10.5 kg, in Berezovskyi index is 4.90 points.

It was established that sows from the category "high management value" exceeded peers from the category "medium management value" in terms of "farrowing" by 4.4 farrowings (td = 16.60, P<0.001); "live piglets in total, heads" by 53.8 heads (td = 17.52, P<0.001); "multiplicity, heads" by 1.4 heads (td = 8.23, P<0,001); "nest weight at the time of weaning

at the age of 28-32 days" by 3.8 kg (td = 2.28, P<0.05), Berezovskyi index by 1.85 points (td = 2.93, P<0.01)

The maximum rates of survival of piglets before weaning at the age of 28-32 days were found in group of sows where the index "level of adaptation" ranges from 12.97 to 27.20 points (94.4%), and in the category of animals of "low management value" it is 100.0%.

The results of the calculation of the pairwise correlation coefficient between the index "level of adaptation" and indicators of reproductive qualities of sows are shown in Table 5.

It was established that the coefficient of pair correlation between the traits that characterize the level of adaptation of sows and indicators of their reproductive qualities ranges from -0.670 (tr = 15.03) to +0.257 (tr = 3.40).

Table 5. Pairwise correlation coefficients between the index "level of adaptation", age of life and breeding use and sows' reproductive performance

Indicator (attribute)		Biometric indicators	
<i>x</i>	<i>y</i>	<i>r</i> ± <i>Sr</i>	<i>tr</i>
Index "level of adaptation", points	1	-0.420±0.0667***	6.30
	2	-0.588±0.0529***	11.11
	3	-0.670±0.0446***	15.03
	4	-0.667±0.0449***	14.85
	5	-0.222±0.0769**	2.89
	6	+0.257±0.0755***	3.40
	7	+0.043±0.0808	0.53
	8	+0.142±0.0793	1.79

Note: 1 – age of life, months; 2 – duration of breeding use of sows, months; 3 – farrowing received; 4 – live piglets in total, heads; 5 – multifetation, heads; 6 – live weight of piglets at birth, kg; 7 – nest weight during the weaning at the age of 28-32 days, kg; 8 – livability of piglets at the age of 28-32 days, %; *** - P<0.001

Significant correlation coefficients were established by the following pairs of features: index "level of adaptation" × age of life (r = -0.420, tr = 6.30), index "level of adaptation" × duration of breeding use (r = -0.588, tr = 11.11), index "level of adaptation" × farrowing received (r = -0.670, tr = 15.03), index "level of adaptation" × live piglets in total (r = 0.667, tr = 14.85), index "level of adaptation" × multifetation (r = -0.222, tr = 2.89), index

"level of adaptation" × live weight of piglets at birth (r = +0.257, tr = 3.40).

The calculation of the economic efficiency of the research results shows that the maximum increase in additional products was obtained from sows which index "level of adaptation" ranges from 5.48 to 8.20 points (+4.99%), as well as from animals of "high management value" - (+3.41%), respectively (Table 6).

Table 6. Economic efficiency of research results

Group	n	nest weight during the weaning at the age of 28-32 days, kg	Increase in additional products, %	The cost of additional products UAH/heads/farrowing * US dollar/head/farrowing
<i>intra-breed differentiation according to the index "level of adaptation"</i>				
Total sample	153	76.1±0.86	-	-
I	31	74.7±1.44	-1.83	-49.61 / -1.50
II	77	75.9±0.91	-0.26	-7.04 / - 0.21
III	45	79.9±0.98	+4.99	+135.28 / +4.11
<i>intra-breed differentiation by management value</i>				
III	2	68.2	-10.38	-281.40 / -8.55
II	25	74.9±1.32	-1.57	-42.56 / -1.29
I	126	78.7±1.01	+3.41	+92.44 / +2.81

Note: * - the price of selling young pigs to processing enterprises of the region at the time of the experimental part of the study was 47.5 UAH/kg, or \$ 1.44

The cost of additional products received from one sow of these groups is +135.28 and +92.44 hryvnias or +4.11 and +2.81 US dollars.

CONCLUSIONS

1. It is established that Large White sows of Hungarian origin are characterized by high rates of long-term adaptation, management value and reproductive qualities. Thus, their age of life is 44.1 ± 1.97 months ($Cv=35.27\%$), the duration of breeding use is 32.8 ± 1.95 months ($Cv=46.91\%$), the index "level of adaptation" varies in the range from 5.48 to 27.20 points. According to the indicators of reproductive qualities ("multifetation, heads"; "weight of the nest at the time of weaning, kg"), 82.28% of sows belong to class I and elite class, 14.51% to class II, 3.21% to non-class animals.

2. Taking into account intra-breed differentiation according to the index "level of adaptation", a significant difference between groups of sows of class M + and M- was found in the following indicators: "farrowing received", "live piglets total, heads", "multifetation, heads" and "nest weight at the time of weaning at the age of 28-32 days, kg". The indicator "livability of piglets before weaning at the age of 28-32 days, %" in the experimental groups of sows ranges from 90.1 to 94.4%.

3. Sows from the category "high management value" exceeded peers from the category "low management value" in terms of "farrowing received", "live piglets in total, heads", "multifetation, heads", "nest weight at the time of weaning aged 28-32 days, kg" by 46.67% on

average. The indicator "livability of piglets before weaning at the age of 28-32 days, %" in groups of sows of different management value ranges from 91.3 to 100.0%.

4. Coefficient of pair correlation between traits that characterize the level of adaptation of sows and indicators of their reproductive qualities ranges from -0.670 ($tr = 15.03$) to +0.257 ($tr = 3.40$).

5. The maximum increase in additional products was obtained from sows which index "level of adaptation" ranges from 5.48 to 8.20 points (+4.99%), as well as from animals of the category "high management value" (+3.41%), respectively. These indicators are proposed to be used as criteria for selection of highly productive animals in the controlled population.

REFERENCES

- Berezovskyi, M.D. (2014). Problematic issues of improving breeding pig breeding in Ukraine and their solution. *Pig breeding: interdepartmental. topic. Science. coll. Inst. Of Pig Breeding and APV NAAS*, 64, 37–48 (In Ukrainian).
- Dudka, O.I. (2020). Adaptation building and exploitation value of sows of gene pool herds. *Scientific Bulletin "Askania-Nova"*, 13, 245–256 (In Ukrainian).
- Dudka, O.I., & Karvatska, I.M. (2020). Ecological and genetic parameters of pigs of gene pool herds. *Scientific Bulletin "Askania-Nova"*, 13, 257–267 (In Ukrainian).
- Khalak, V., Stadnytska O., Gutyj, B., Kirovych, N., Reshetnichenko, A., Susol, R., Vashchenko, P., Rak, T., Stryzhak, T., & Bratyuk, V. (2021). An Operational Value of Universal Direction Productivity Sows and their Reproductive Qualities {textasciicute} Discretion Level. *Journal of Mountain Agriculture on the Balkans*, 24 (6), 91–103.

- Khalak, V.I. (2020). New methods of integrated assessment of sows on indicators of reproductive qualities. *Cereals*, 4 (2), 396–403 (In Ukrainian).
- Khalak, V.I. (2020). The management value of large white sows and the economic efficiency of their use. *Actual directions of innovative development of animal husbandry and modern food technologies: materials of the Intern. scientific-practical. conf. (Persianovsky settlement, Donskoy State Agrarian University on November 27, 2020)*, 24–29 (In Russian).
- Khalak, V.I., Hutyi, B.V., & Korkh, I.V. (2021). The level of discreteness of low-hereditary traits and their correlation in sows of different distribution classes according to some evaluation indices. *Scientific and technical bulletin of the Institute of Animal Husbandry NAAS*, 125, 216–226 (In Ukrainian).
- Khokhlov, A.M., Baranovski, D.I., & Herasimov, V.I. (2011). Some features of the adaptation of the organism of pigs during hybridization. *Taurian Scientific Bulletin*, 76 (2), 91–96 (In Russian).
- Kislinskia, A.I., Kalinichenko, H.I., Shakun, A.P., & Tyshko, N.I. (2012). Evaluation of the natural resistance of the organism of pigs of the Large White breed of Hungarian selection during the period of adaptation. *Modern trends and technological innovations in pig breeding: materials of the XIX International. scientific-practical. conf.*, 78–83 (In Russian).
- Kovalenko, T.S. (2011). *Improving the assessment of productive and breeding qualities of pigs by selection indices: author's ref. dis. ... Cand. agr-l. Sciences: 06.02.01.*, Poltava. 17 p. (In Ukrainian).
- Kovalenko, V.P., Khalak, V.I., Nezhlukchenko, T.I., & Papkina, N.S. (2010). *Biometric analysis of variability of traits of farm animals and poultry. A textbook on farm animal genetics*. Kherson: Oldi. 160 p. (In Ukrainian).
- Kyslynska, A.I. (2012). Comparative characteristics of indicators of natural resistance of blood of pigs of different genotypes. *Collection of scientific works of Podolsk State Agrarian Technical University; for ed. M.I. Bakhmat*, 20, 103–105 (In Ukrainian).
- Methodology for determining the economic efficiency of the use in agriculture of the results of scientific research, new technology, inventions and rationalization proposals (1983). Moscow: VAIPI. 149 p. (In Russian).
- Shuga, Y.I., Topchii, L.I., & Popov, V.M. (2011). *Adaptive ability of Ukrainian steppe white breed pigs. Taurian Scientific Bulletin*, 76 (2), 67–71 (In Ukrainian).
- Smirnov, V.S. (2003). Evaluation of adaptation of sows to intensive reproduction. *Zootechnics*, 7, 22–25 (In Russian).
- Tolokontsev, A. (2010). Reproductive and adaptive qualities of pigs. *Livestock in Russia*, 4, 33 (In Russian).
- Topikha, V.S., & Konovalov, I.V. (2009). *Adaptation features of pigs of different breeds in the conditions of JSC Pedigree farm "Stepnoy" of Zaporozhye region. Agrarian Science of the Black Sea Coast*, 4 (51), 203–207 (In Ukrainian).
- Tretiakova, O.L., Bondarenko, V.S., & Sirota, I.V. (2017). Duration of productive use of sows and analysis of reasons for culling. *Scientific journal Kub GAU*, 134 (10), 41–50 (In Russian).
- Vashchenko, P.A. (2011). Breeding value of pigs. *Pig breeding: interdepartmental. topic. Science. coll. Inst. Of Pig Breeding and APV NAAS*, 59, 28–32 (In Ukrainian).
- Vashchenko, P.A. (2019). *Prediction of breeding value of pigs on the basis of linear models of selection indices and DNA markers: author's ref. dis. ... Dr. s.-g. Science: 06.02.01*. Mykolaiv. 43 p. (In Ukrainian).
- Vashchenko, P.A., Berezovskyi, M.D., & Nebylytsia, M.S. (2015). *Determination of breeding value of pigs using linear models: Guidelines*. Poltava: Institute of Pig Breeding and Agroindustrial Production NAAS. 12 p. (In Ukrainian).



ISSN 2285 – 5750
ISSN-L 2285 – 5750