IJABR

International Journal of Advanced Biotechnology and Research (IJABR)
ISSN 0976-2612, Online ISSN 2278–599X,
Vol-10, Issue-2, 2019, pp267-277
http://www.bipublication.com

Research Article

Influence of Replacement Gilts Breed on the Association between Cortisol and Morphological Blood Parameters and Economically Beneficial Features

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[Received: 04/02/2019; Accepted: 25/04/2019; Published: 01/05/2019]

ABSTRACT.
The present study was aimed at evaluation of replacement gilts breed on morphological blood parameters and association between cortisol level and blood parameters and economic beneficial features. The study was conducted on the basis of "Agrofirma AriAnt, Llc" site. Test groups were formed by the results of gilts assessment at the age of 160-170 days at 100.00±10.00 kg weight gain. 1st group included gilts of Duroc breed (n=30), 2nd group – Yorkshire breed (90) and 3rd – Landrace breed (n=15). Clinical, biochemical and statistical methods were used

during the study. It was determined that replacement gilts breed and, as a result, their genotype, influences on erythrocytes count and hemoglobin level. In Durocs the levels were higher than in their analogue breeds, Yorkshires and Landraces, by 12.29; 2.39 and 17.59; 16.19% ($p \le 0.05$), respectively. Erythrocyte count defines mean corpuscular volume and red cells distribution width: the higher the erythrocyte count is, the smaller their volume and range of size distribution. Landraces blood has the lowest erythrocyte count (6.99±0.21 10^{12}/L), but their cells, in comparison with Durocs and Yorkshires, have larger volume (64.40±1.10 fl.) and higher mean red cell distribution width value (27.62±0.60%). Gilts genotype determines the platelet count. Durocs have higher platelet count than Yorkshires and Landraces by 14.57% and 35.87% ($p \le 0.05$). Cortisol concentration in replacement gilts is characterized by higher variability of values in statistical sampling, defining the main individual differences between the breeds by this parameter. Maximal concentration of cortisol is observed in Yorkshires blood (457.12±23.49 nmol/L), exceeding the concentration in Durocs and Landraces blood by 26.97% ($p \le 0.05$) and 86.93% ($p \le 0.05$), respectively. There is significant correlation between cortisol level and erythrocyte count in Durocs ($r=-0.37 \pm 0.16$; $p \le 0.05$), Yorkshires ($r=0.40 \pm 0.09$; $p \le 0.05$) and Landraces ($r=-0.35 \pm 0.22$; $p \le 0.05$). It directly and indirectly regulates the formation of economically beneficial features, defining 16.67%; 27.78% and 14.28% of significant correlation coefficients from the total in Durocs, Yorkshires and Landraces, respectively.

Key words: erythrocytes, erythrocyte indexes, cortisol, correlation, economically beneficial features

INTRODUCTION

Stimulation of animal breeding in the leading companies in this sphere, that contribute to the maintenance and growth of economic efficiency of pig breeding under the imposed sanctions, will preserve the genetic resources and improve them due to breeding of “best” animals.

Blood plays an important role in determination of genetic value of animals, in particular, pigs. This is explained by the fact that blood is one of the most important biological medium that hosts and integrates cells and tissues vital processes [30, 36]. Blood composition is characterized by the relative consistency, but still its parameters vary within the normal range, reflecting the variability of organism metabolic status [21, 26], which is defined in reproductive animals, primarily, by the way of genetic production potential realization.

Blood maintains its composition and fulfils its biological functions due to direct and reverses associations between physiological functions of the organism and endocrine glands, which regulate and coordinate all vital processes. Thus, the systematization of the associations between morphofunctional, biochemical and economically beneficial features in pigs, based on their breed, age and other related features, will allow the authors to characterize the realization of genetic potential in upscale livestock industry [20].

It is determined that one of the main defects in pigs is their stress-susceptibility. Under stress impact of different exogenous factors on animals, acute health level decrease is observed, which results in vital functional systems disorders [9, 11, 22]. One of the main stress markers in animals is cortisol [39, 40, 41]. The level of its secretion and, as a result, concentration in blood reflect the reactivity of hypothalamo-pituitary-adrenal system [8, 15, 17, 31, 39] and the development of compensatory and adaptive processes [15, 16, 29]. However, cortisol level in blood also characterizes productive status in pigs, specially, during their reproductive function development [25, 38], as well as the rate of their skeletal muscle growth, which is explained by the functioning of metabolic axis of 17-hydroxyprohesteron [14]. The above mentioned effects of the glucocorticoid in their organism result from the information, encoded in RYR1 gene [23].

Hypothalamo-pituitary-adrenal system hormones, including cortisol, take part in hemopoiesis processes regulation in hemapoietic organs [33, 37], which is influences on the morphological blood composition, level of oxygen supply and, as a result, metabolic status of the organism that determines its growth and development in accordance with the genetic merit. However, the issues of correlation between the hormones and blood parameters and economically beneficial features in pigs of different breeds are understudied, which explains the rationale for the present work.

The purpose of the study is to evaluate the breed influence on the morphological blood composition in replacement gilts and the associations between cortisol level and blood parameters and economically beneficial features.

MATERIALS AND METHODS.

The experimental works were conducted in 2017 on the basis of "Agrofirma AriAnt, Llc" site. The objects of the study were Duroc, Yorkshire and Landrace replacement gilts, which were distributed into the three groups by the results of the assessment done at the age of 160-170 days at 100.00±10.00 kg weight gain. The 1st group included Duroc gilts (n=30), the 2nd group included Yorkshire gilts (n=90) and the 3rd included Landrace gilts (n=15).

Gilts feeding and management was similar and performed according to the technology applied on the farm site. During the study the authors evaluated the following gilts parameters: live weight (kg) – at weaving on the 28th day from birth and at last weighing at the age of 160-170 days; absolute (kg) and relative (%) weight gain for the periods from birth to weaving on the 28th day, from weaving to assessment age and from birth to assessment age; early maturation (days); fat depth (mm); number of dugs (pcs); body measurements; indexes of body built (%); exterior assessment (points).

The material of the study was blood taken from the cranial *vena cava*. To test its morphological parameters, the blood was sampled by standardized vacuum receptacles that contained ethylenediaminotetraacetic acid (EDTA) for anticoagulation [19].

Morphological blood tests were performed in "Invitro, Llc" (Chelyabinsk). Identification of parameters was done by hematologic analyzer "SYSMEX XE2100" (Japan). Qualitative identification of cortisol concentration was done by blood serum using reagents for enzyme immunoassay (IFA) "CORTISOL – IFA – BEST" (Novosibirsk, Russia). The method is based on the solid phase competitive ELISA test with monoclonal antibodies. The strips were incubated in thermostat shaker «ELMI Sky Line Shaker ST-3» (ELMI Ltd., Latvia) with further measurement of optical density by the microplate readers – «MINDRAY MR-96A Elisa Microplate Reader» (MINDRAY Ltd., KHP).

Statistical analysis of the data included calculation of its mean value and error, estimation of variation coefficient and correlation coefficients by means of definition of mean product of normal deviations on each parameter. The analysis was performed in "analytical package" application to Microsoft Excel. Correlation matrixes were formed based on the calculations done (the calculation result of correlation of one type for each pair from the variety of P variables, estimated by the quantitative scale in one sample).

RESULTS AND DISCUSSION.

Great attention in modern pig breeding is paid to identification of blood parameters that can be used as markers of economically beneficial features in breeding of highly productive pigs [5]. In the present study the authors identified the parameters that allowed the researches to evaluate blood respiratory function in replacement gilts of different breeds, because the animal genotype, primarily, defines morphological and functional peculiarities of erythrocytes [28], that determine the intensity of oxidation-reduction processes by means of transportation of breathing gases.

The lowest erythrocyte count was observed in Landraces blood (6.99±0.21 10^{12}/L). The count values varied within the range of 4.63-7.37 10^{12}/L, determining the 10.50% variation coefficient. In Yorkshire and Duroc replacement gilts this parameters was higher than in Landrace gilts by 4.72% and 17.59% ($p \leq 0.05$), respectively ($p \leq 0.05$). The increase of erythrocyte count in peripheral blood is associated with the values variability reduction and parameter uniformity increase in the studied sample. Cv in Yorkshire group was 7.38%, in Durocs – 6.01% (Table 1). Hence, the pig breed influenced on the erythrocyte count in blood and its oxygen transportation properties.

The results of the present study agree with other research data [5]. Other authors in their studies also mentioned significant interbreed differences in erythrocyte count in Landraces and Large

Whites. Pig genotype influence on erythrocyte count in blood is confirmed in the study [13]. According to the research data [3], erythrocyte count influences on the intensity of muscle tissue growth, which is associated with the metabolism rate and animals genotype, which defines the productivity orientation.

Table 1 – Replacement gilts blood parameters

Parameter	Breed								
	Group I, Durocs (n=30)			Group II, Yorkshire (n=91)			Group III, Landrace (n=15)		
	X±Sx	Cv, %	min-max	X±Sx	Cv, %	min-max	X±Sx	Cv, %	min-max
Erythrocytes, 10^{12}/L	8.22±0.10*[1]	6.01	7.51-9.34	7.32±0.05	7.38	6.20-8.73	6.99±0.21*[1]	10.50	4.63-7.37
Hb, g/L	124.00±6.93*[1]	30.61	123-151	121.10±2.33*[3]	18.27	96-140	106.72±7.50*[1]	26.50	83-133
Ht, %	51.00±0.71*[1]	7.19	46.70-57.70	47.23±0.39	7.98	37.90-53.90	45.40±1.01*[1]	8.70	36.50-50.30
MCV, fl.	62.10±0.81	7.12	53.90-69.50	64.20±0.50	7.47	55.30-74.60	64.40±1.10	6.62	61.70-78.80
RDW,%	25.90±0.41	8.70	22.40-30.8	24.80±0.41	14.50	19.10-30.60	27.62±0.60	8.10	24.40-29.80
MCH, pg	16.50±0.21	5.86	15.30-18.60	16.90±0.11	6.27	14.70-29.60	16.70±0.16	3.73	15.80-17.90
MCHC, g/dL	26.60±0.25	5.27	24.30-30.80	26.40±0.13	4.99	23.00-28.50	25.90±30.30	4.40	22.70-27.20
Platelets, th-ous/µl	333.16±13.57*[1];*[2]	22.31	203-478	290.8±11.02*[2];*[3]	35.96	54-486	245.20±22.15*[1];*[3]	35.00	144-351
ESR, mm/h	5.03±0.91	87.84	1-15	5.16±0.45	83.19	2-24	5.94±1.00	52.53	1-13
Cortisol, nmol/L	360.00±24.00*[1]; *[2]	54.00	188-473	457.12±23.49*[2]; *[3]	59.12	180-890	244.53±32.39*[1]; *[3]	51.30	140-595

Note: *[1] - p≤0.05 between Durocs and Landraces, *[2] - p≤0.05 between Durocs and Yorkshires, *[3] - p≤0.05 between Yorkshires and Landraces; Hb – hemoglobin; Ht – hematocrit; MCV – mean corpuscular volume; RDW – red cell distribution width; MCH – mean cell hemoglobin; MCHC - mean corpuscular hemoglobin concentration; ESR – erythrocyte sedimentation rate.

It is known that red blood cells pool is defined by the relation of their synthesis rate to their degrade rate [1]. The dependence of erythrocyte count on the pig breed indicates on the genotype influence on functional activity of central and peripheral erythron segments.

Erythrocyte count in blood of replacement gilts in test groups defined the corpuscular volume. Thus, the erythrocyte count in Durocs was higher than in Yorkshires and Landraces, but it was associated with their corpuscular volume reduction to 62.10±0.81 fl (Cv = 7.12%). At the same time, differences in MCV values in gilts from groups II and III were minimal, because the erythrocyte count differences were insignificant.

It should be noted that erythrocyte count and their volume influenced on the mean red cell distribution width. In Landraces, deformed erythrocyte count was 27.62±0.60% (Table 1), while the parameter variability was the lowest, i.e. the cells did not differ much by this parameter. It means that lower erythrocyte count in Landraces, in comparison with Durocs and Yorkshires, enhances their tendency to form and size transformation. And vice versa, higher erythrocyte count in Durocs and Yorkshires, in comparison with Landraces, reduced cells deformation capacity. This was confirmed by RDW value, which was equal to 25.90±0.41% (Cv = 8.70%) in Durocs and 24.80±0.41% (Cv = 14.50%) in Yorkshires.

It was determined that erythrocyte oxygen transportation capacities were defined not only by their count, but, primarily, by their capability for reversible deformations (microcirculatory capillaries diameter several times smaller than erythrocyte diameter, so their deformation capabilities define their possibility to flow through capillary network [28]. Thus, erythrocyte count increase in Duroc and Yorkshire blood resulted from the reduction of their capability for deformations and, as a result, for circulation in micro vessels.

Hence, lower values of MCV and RDW in Duroc and Yorkshire gilts, in comparison with Landraces, initiated increase of erythrocyte count, reflecting the organism attempt to compensate the reduced capability for transformation. This regulated cells gas transporting functions and oxygenation rate of peripheral tissues.

Erythrocyte count in blood influences on hematocrit that characterizes the relation between corpuscular volume and plasma. Thus, this parameter in Durocs and Yorkshires was higher than in Landraces by 12.33 ($p \leq 0.05$) and 4.03%, respectively. Replacement gilts in the test groups had insignificant individual variations in hematocrit (Cv varied within the range of 7.19-8.70%), which indicated on the uniformity and precision of the obtained mean value (Table 1).

Durocs and Yorkshires had higher hemoglobin level in blood in comparison with Landraces. Thus, Hb level in Duroc gilts was higher than in Landrace gilts by 16.19% ($p \leq 0.05$) and in Yorkshire gilts by 13.47% ($p \leq 0.05$). In statistical sampling this parameter was characterized by higher variability, estimated by the variation coefficient, than erythrocyte count and hematocrit.

According to the research data [4], Hb level in blood defines the rate of oxidation-reduction processes in pigs and, as a result, their productive characteristics. Based on this suggestion, we can state that in upscale livestock Duroc and Yorkshire gilts had higher oxidation-reduction processes rate in comparison with Landraces.

It should be mentioned that the defined differences in replacement gilts in erythrocyte count, hemoglobin, hematocrit, corpuscular volume and mean red cell distribution width were not of pathologic nature, because erythrocytes, regardless of the breed, did not differ significantly by the level of Hb concentration. This conclusion was confirmed by MCH and MCHC values (Table 1), their variation in statistical sampling was 3.73-6.27 and 4.40-5.27%. Besides, ESR value, that reflects cells sedimentation stability in blood, also varied within the range of 5.03-5.94 mm/h, which was within the norm.

Replacement gilts breed influenced on the platelet count. Thus, maximal count of platelets circulated in Durocs blood (333.16±13.57 thous/μL), and minimal count was in Landrace blood (245.2±22.15 thous/μL). At the same time, this parameter values in the tested animals significantly differed, because the variation coefficient was within the range of 22.31-35.96%.

Platelets are the cells that take part in the formation of dense clusters (clots) in order to stop bleeding in places where the blood vessels were damaged. Besides, these cells feed epithelium, take part in regeneration processes of blood vessel walls and maintain blood in liquid state. Hence, replacement gilts breed influenced on protective properties of blood vessels epithelium.

The results of our study agree with the research data [13]. The authors in their work identified the influence of breed on platelet count.

Endocrine system significantly influences in pigs on their constitutional type, adaptation reactions, height and productive characteristics [10, 25]. Economically beneficial features formation is based on metabolism rate and type, which is associated with oxygen supply and gas transportation blood capacity. Thus, it is suggested that there is an interrelation between hormones levels in blood and morphological blood parameters.

The reviewed studies contained evaluation of the correlation between cortisol levels and blood parameters, as well as, some economically beneficial features in replacement gilts. It is known that in animals adrenal hormone cortisol is characterized by diverse biological action. In particular, it took part in regulation of mineral, fat, protein, nuclear acid and carbohydrate metabolism [20]; it is required for formation and maintenance of reproductive function, in particular, fertilization processes and follicular maturation [6]; it mediates the action of any stress factor on organism vital processes at the molecular, cell, organ and system levels [15, 32, 40, 41]. At the same time, cortisol level in animal blood is defined by its relevance in biochemical processes regulation and mediation at the level of hypothalamo-pituitary-adrenal axis. The research data on the hormone level in gilts blood is quite controversial [10, 12, 24, 33, 39], although, in general, it shows the association between cortisol concentration and age, height, sex, breed, etc.

The analysis of cortisol assay results in replacement gilts showed that, firstly, there was a great variation of values in replacement gilts from the test groups and, secondly, there was great variation in statistical sampling within each breed. Variation coefficient varied within the range of 51.30-59.12% (Table 1). Probably, the inconsistency in animals resulted from the breeding work performed on the farm, that did not consider the polymorphism of rhyanodine receptor gene (RYR1), which genetically determines cortisol secretion and, consequently, defines individual differences in gilts by this feature [23, 27].

Secondly, the hormone level in blood was determined by the gilts breed and, consequently, by their genotype. The highest cortisol level was identified in Yorkshires (457.12±23.49 nmol/L), it was higher than in Durocs and Landraces by 26.97 ($p \leq 0.05$) and 86.93% ($p \leq 0.05$), respectively (Table 1). Based on the research data [12] that cortisol level in blood of 6 – 7 months replacement gilts is defined by the formation of sexual dominant, it can be suggested that gilts breed influenced on the reproductive function in their organisms.

The analysis of correlations between cortisol and the level of main and additional hematologic parameters in animals from the test groups identified the following peculiarities (Table 2):

1. Positive correlations prevailed over negative. In Durocs they were equal to 66.67% and in Yorkshires 55.56% from the total amount, which indicated on the direct hormone influence on the studied morphological parameters values, i.e. on its influence on oxygen transportation processes in replacement gilts.

Table 2 – Correlation of cortisol and morphological blood parameters, X±Sx

Parameter	Breed		
	Group I, Duroc (n=30)	Group II, Yorkshire (n=91)	Group III, Landrace (n=15)
Erythrocytes, 10^{12}/L	-0.37±0.16*	0.40±0.09*	-0.35±0.22*
Hb, g/L	0.25±0.17	-0.11 ±0.10	-0.18±0.24
Ht, %	0.08±0.18	-0.26 ±0.10*	-0.39±0.21*
MCV, fl	0.38±0.16*	0.15 ±0.10	0.19±0.24
RDW,%	-0.21±0.17	-0.06±0.11	0.15±0.25
MCH, pg	0.38±0.16	0.08±0.10	0.02±0.25
MCHC, g/dl	-0.08±0.18	-0.12 ±0.10	-0.24 ±0.24
Platelets, thous/µL	0.03±0.18	0.15±0.10	0.02±0.24
ESR, mm/h	0.09±0.18	0.04±0.11	0.11±0.25

Note: * - $p \leq 0.05$

2. The number of significant correlation coefficients did not depend on the gilts breed and was equal to 22.23% from the total amount.

In particular, cortisol concentration was significantly interconnected with erythrocyte count. Correlation coefficients in Durocs, Yorkshires and Landraces were r=-0.37±0.16 ($p \leq 0.05$), r=0.40±0.09 ($p \leq 0.05$) and r=-0.35±0.22 ($p \leq 0.05$). On the one hand, this was the result of cortisol circulation not only in free and bound state, but also in the composition of erythrocytes, that act as hormone transport and deposit systems [34, 35]. On the other hand, cortisol regulates catabolic reactions rate that is associated with energy synthesis. Whilst, energy efficiency of oxidative breakdown of carbohydrates, proteins and fats is associated with oxygen supply that feeds organs and tissue cells due to oxygen transportation capacity of erythrocytes. Probably, one of the reasons for cortisol and erythrocyte correlation is the hormone capability to influence on cells rheology [18].

The results of our study agree with other research data [2, 7]. The authors in their studies also identified mean correlations between cortisol and erythrocytes.

Apart from erythrocytes, cortisol significantly influenced on MCV value in Durocs and on hematocrit in Yorkshires and Landraces, i.e. on parameters that determine cells size.

Since genes influence on metabolic processes in animals and, as a result, on their productive characteristics via hormones, the authors identified the association between cortisol and economically beneficial features. The analysis of correlation coefficients identified that the number of negative correlations in Durocs was 55.56% from the total amount, in Yorkshires 52.77% and in Landraces 42.85%, i.e. cortisol level, as a marker of encoded in rhyanodine receptor gene (RYR1) information realization, directly and indirectly regulated the formation of economically beneficial features, defining the volume of catabolic biochemical reactions. The number of significant correlations in Duroc group was 16.67%, in Yorkshire group – 27.78% and in Landrace group – 14.28% from the total amount.

Table 3 shows only statistically significant correlations between cortisol and economically beneficial features. Correlation analysis showed that their sets were defined by replacement gilts breed, i.e. cortisol diversely realized its biological effects, determining, as a result, the development of economically beneficial features. Thus, in Durocs cortisol level significantly correlated with the body length (r=-0.30±0.17), pastern girth (r=0.31±0.17), extension index (r=-0.33±0.16), blockiness index (r=0.46±0.14), fat depth in P1 point (r=-0.32±0.16) and exterior (r=-0.33±0.16). The hormone level in Yorkshire replacement gilts significantly correlated with the age of assessment (r=0.25±0.10), live weight (r=-0.25±0.10), absolute weight gain since birth (r=-0.25±0.10), daily weight gain since birth (r=-0.33±0.09), absolute weight gain post weaving (r=-0.27±0.10), daily weight gain post weaving (r=0.31±0.10), exterior (r=-0.25±0.10), points amount (r=-0.31±0.10) and number of dugs (r=0.25±0.10).

In Landraces (Table 3) glucocorticoid level defined the body weight at weaving (r=0.42±0.21), absolute weight gain at weaving (r=0.45±0.20), relative weight gain at weaving (r=0.45±0.21), height at the withers (r=-0.42±0.21) and thoracic index (r=-0.41±0.21).

Table 3 – Correlation between cortisol and economically beneficial features in replacement gilts, X±Sx

Parameter	Breed		
	Group I, Duroc (n=30)	Group II, Yorkshire (n=91)	Group III, Landrace (n=15)
Weight at weaving (kg)	-0.16±0.18	0.11±0.10	0.42±0.21*
Absolute weight gain at weaving (kg)	-0.09±0.18	0.12±0.10	0.45±0.20*
Relative weight gain at weaving, %	-0.004±0.18	0.11±0.10	0.45±0.21*
Assessment age	0.005±0.18	0.25±0.10*	0.07±0.25
Live weight, kg	0.099±0.18	-0.25±0.10*	-0.19±0.24
Absolute weight gain from birth, kg	0.11±0.18	-0.25±0.10*	-0.19±0.24
Mean daily weight gain from birth, g	0.09±0.18	-0.33±0.09*	-0.28±0.23
Absolute weight gain at weaving, kg	0.27±0.17	-0.27±0.10*	0.22±0.24
Mean daily weight gain at weaving, g	-0.06±0.18	0.31±0.10*	0.28±0.23
Relative weight gain from birth, %	-0.03±0.18	0.25±0.10*	0.24±0.24
Body length, cm	-0.30±0.17*	-0.16±0.10	0.10±0.25
Height at the withers, cm	0.12±0.18	-0.06±0.10	0.42±0.21*
Pastern girth, cm	0.31±0.17*	- 0.17±0.10	0.09±0.25
Extension index,%	-0.33±0.16*	- 0.06±0.11	-0.24±0.24
Blockiness index, %	0.46±0.14*	0.19±0.10	-0.03±0.25
Thoracic index, %	-0.11±0.18	-0.02±0.10	-0.41±0.21*
Fat depth P1	-0.32±0.16*	0.05±0.11	-0.03±0.25
Exterior, points	-0.33±0.16*	-0.25±0.10*	0.17±0.25
Total points	-0.18+0.18	-0.31±0.10*	0.21±0.24
Number of dugs, pcs	-0.17+0.18	0.25±0.10*	-0.17±0.25

Note: * - p≤0.05

Probably, the main reasons for the defined peculiarities in correlations are in differences in gilts productive orientation that are encoded in their genotype and define the general plan of organism development.

CONCLUSION.

The results of the present study allowed the authors to make the following conclusions:

1. At the age of 160-170 days the breed and, as a result, the genotype, of replacement gilts influence on the erythrocyte count and hemoglobin level. Their values are higher in Duroc gilts than in Yorkshire and Landrace gilts by 12.29; 2.39 and 17.59; 16.19% ($p \leq 0.05$), respectively.
2. The number of erythrocytes in animal blood vessels defines mean corpuscular volume and red cells distribution width: the higher the erythrocyte count, the smaller the corpuscular volume and their width of distribution by size. For this reason, in Landraces, who have lowest erythrocyte count (6.99±0.21 10^{12}L), the mean corpuscular volume, in comparison with Durocs and Yorkshires, is bigger (64.40±1.10 fl) and red cells distribution width is higher (27.62±0.60%), which characterizes their oxygen transport capability.
3. Gilt genotype defines platelet count in blood and protective properties of blood vessels epithelium: in Durocs this parameter is higher than in Yorkshires and Landraces by 14.57% and 35.87% ($p \leq 0.05$).
4. Cortisol level in reparatory gilts blood is characterized by great variability of values in statistical sampling, determining individual differences in animals by this parameter. Maximal level of cortisol is contained in Yorkshire blood (457.12±23.49 nmol/L), it is higher than in Durocs and Landraces by 26.97 ($p \leq 0.05$) and 86.93% ($p \leq 0.05$), respectively.
5. Cortisol significantly correlates with erythrocyte count in Durocs ($r=-0.37 \pm 0.16$; $p \leq 0.05$), in Yorkshires ($r=0.40 \pm 0.09$; $p \leq 0.05$) and Landraces ($r=-0.35 \pm 0.22$; $p \leq 0.05$), which proves its role in regulation of oxidation-reduction processes rate in replacement gilts.
6. Cortisol directly and indirectly regulates formation of economically beneficial features, which is confirmed by statistical significance of correlation coefficients. In Durocs they are equal to 16.67%, in Yorkshires – 27.78% and in Landraces – 14.28% from the total amount.

RECOMMENDATIONS.

The data, presented in this work, can be used in breeding and are of practical value for veterinary specialists, because can be used for evaluation of pigs clinical status.

ACKNOWLEDGEMENTS.

The present study was conducted within the research program "Development and implementation of innovative competitive Russian technologies in genetics and animal breeding for intensive pig production" under the title "Development and implementation of innovative competitive Russian technologies in genetics and animal breeding for intensive pig production". The number of state agreement/number of agreement for subsidy supply is 14.610.21.0018. The subsidy was received from the federal budget approved for the respective financial year and planned period within the budget assignations and budgeting responsibilities limitations, designated for Ministry of Education and Science of the Russian Federation. The data presented in this work is included into the following documents:

1. Intermediate report on the research program that included the results on evaluation of breeding animals biological status (Part 1): the description and main parameters of biological passport of breeding animals; the research program on blood parameters testing of replacement gilts used in breeding.
2. Intermediate report on the research program that included the results on breeding animals biological status evaluation (Part 2): The analysis results of replacement gilts lab tests and the description of associations between productive parameters and main parameters, that characterize biological properties of an organism.

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