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Original Contribution

EFFECT OF INTRODUCTION ON MINERAL STATUS IN DIFFERENT PIG BREEDS I. MACROELEMENTS AND BLOOD CHEMISTRY STATUS

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ABSTRACT

The pig spread all over the world, belonging to the their worthwhile biological qualities wee intimate adulthood, the short period in a pregnancy and the high fertility are in crucial sense on the preferences of the farmers then the other animal species.These issues assisted as a basis for the new pig breeds or lines introduction.

The purpose of the present study was to follow the blood mineral status in four groups of pigs and their crosses. Analysis of macro elements, Ca, P, Mg, Ca:P ratio and Albumen in the blood plasma was done. 96 pigs were used and they were divided into 4 groups: group I aged 3-, 4- and 5-months female Danish Yorkshire and 4-month-old male Danish Landrace; group II according to the breed and sex (Danish Duroc, Danish Landrace and Danish Yorkshire from both sexes); group III according to the physiological states young females /.♀/ Danish Yorkshire, pregnant-first half /Pr.I-st ½/, pregnant-second half / II-nd ½/,dairy pigs, dry pigs and group IV according to the breed and sex: big white pig /♀/, Landrace /Л.♂/, mix between big white pig (female) and Landrace (male) /F_1-♀/ and English Durock /А. Д.♂/.The results could serve to elaborate confidence intervals for these parameters.

Key words: pigs, mineral exchange, disbalance

INTRODUCTION

The pig-industry is one of the active branches to the livestock breeding and plays main role for ensuring the population with meat and meat products The problem for increasing the efficiency from breeding of pigs particularly is current in this connection. The broad distribution belongs to the worthwhile biological qualities that they have got in the world of us as well at the sows. The early sexual adulthood, the short period of the pregnancy and the high fertility are in crucial importance on the preferences of the farmers than the other animal species.

The stated facts were the main motive of a lot of our pig commercial holdings to develop the strategies for the contemporary organization of the production process. The new strategies guaranteed the pigindustry effectiveness and they necessitates the introduction to new breeds or lines/ 1/.

With regard to the positive aspects of the new lines there are some disadvantages – the appearance of some noninfectious diseases, according to the breeding, adaptation and technologies. These lied to the disturbance of the substances exchange and to some pathological changes. According to our experience the growing and remedial pigs they are particularly sensitive for these violations and they are conducting with the endemic characterization /2, 3, 4, 5/.

The importance of the investigations in this direction is increased from the lack of similar pig industry organization in other countries. The investigations are with the high priority in all cases, where in the commercial pig industry is performed by the pyramidal structure of breeding /6, 7, 8/.

In accordance with the Carlson, M. /9/ opinion nearly 5 percent of whole pig weight is consisting of mineral elements. Those elements are essential for the most of the basic metabolitic reactions in the body. They play important role in the digestion, in the metabolism of proteins, oils, carbohydrates and also in the structure on the enzymes, the nerves, the blood, the milk and the skin. They are really an important factor in the reproduction, in the growing and to the resistence against the vermins and diseases.

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The mineral deficits are detected more frequently in pigs then in other animal species /3, 5, 9, 10/. The reservoirs of minerals are used in case of emergency needs, but this is not enough for the maximum production.

The investigation on different authors shows that at least 12 elements of the minerals are necessary on each pig on their ration, namely: calcium, phosphorus, natrium, chlorine, kalium, magnesium, molybdenum, zinc, iodine, iron, copper, selenum, /9, 10, 14, 15/.

The aim of the present investigation is a traceability of the mineral status in the outgoing pig breeders and their mixes- their adaptation, status and the clinical investigations of some deficiency diseases, according to this disbalance.

MATERIALS AND METHODS:

We held the present investigations in the commercial pig holdings: "Hibriden center po swinewadstvo" (HCS) Ltd, Shoumen city and "Invest holding" (HC) Ltd, village of Radko Dimitrievo, municipality of Shoumen. In the investigation were included 96 pigs, divided in four groups:

- First group- HCS; according to different ages- three, four and five month's female pigs, breed – Danish Yorkshire and four month male pig, breed Danish Landrace.
- Second group- HCS- according to breed and sex: Danish Duroc /d. d. ♀/, Danish Duroc /d. d. ♂/, Danish Landrace /d. l. ♀/, Danish Landrace /d. l. ♂/, Danish Yorkshire /d. y. ♀/, Danish Yorkshire /d. y ♂/.
- Third group- HCS- Shoumen- according to the physiological status- Danish Yorkshire- young females /.♀/, pregnant- first half /Pr.I-st ½/, pregnant- second half / II-nd ½/,dairy pigs, dry pigs.
- Fourth group- HC- Radko Dimitrievo- according to the breed and sex: big white pig /♀/, Landrace /Л.♂/, mix between big white pig (female) and Landrace (male) /F_1-♀/ and English Durock /А. Д.♂/.

The technology of breeding is a free boxing system. The animals from both centers were set up in the same the manner of the feed, imunoprophylactic and parasitic programme. The blood samples were taken by sinus ophtalmicus. The macroelements determination was performed by a semiautomatic biochemical machine VA- 88 with GIESSE DIAGNOSTICS.

The results per each group are analyzed, according with the average values, the standard mistakes and the standard mistakes of the average values. The method of Student (t-criterion)the of the equality of the two average values is used, for the importance of the deviations in the values of the parameters with the different groups of the survey of the different ages as well to be explored.

RESULTS AND ANALYSES

The results of the quality determination of macroelements of first group are showed in ***Table 1*** and ***Figure 1.***

Table 1. *HCS Shoumen: Age variation of macroelements Ca, P, Mg and Ca/P.*

Age	*Ca – mmol/l*	*P - mmol/l*	*Ca/P*	*Mg - mmol/l*	*Albumen- g/L*
3 months ♀	2.63±0.03	3.18±0.08	1/1.19	1.08±0.04	66.2±2.31
4 months ♀	2.54±0.07	3.04±0.21	1/1.20	1.05±0.07	67.6±0.81
5 months ♀	2.62±0.017	2.83±0.19	1/1.08	1.09±0.05	63.8±2.50
4 months ♂	2.60±0.08	2.85±0.07	1/1.10	1.09±0.03	66.8±1.83

The analysis of the data shows that the Calcium level in 3, 4 and 5 months females and 4 months male pigs is 2.54 to 2.63 mmol/l. The values are not different from the normal values in imported pigs and for the breed.

The same tendency was observed in the phosphorus level as well. The results for the phosphorus level that we find out are 2.83-3.13 mmol/l. The data for the three and four months females are higher than the data for the four months males, but the results are statistically unproved.

The results for the Ca and P at the end of the adaptational period are the same as the outgoing bases.

The results shows that the animals which are put on the new conditions do not showed any differences in the level of Ca and P, according to the outgoing bases, but there are some differences in the relation Ca/P.

The available literary data shows that in different ages, sex and breeds relation Ca/ P is between 1/1 to 1. 2/1. /2, 4, 6, 9/.

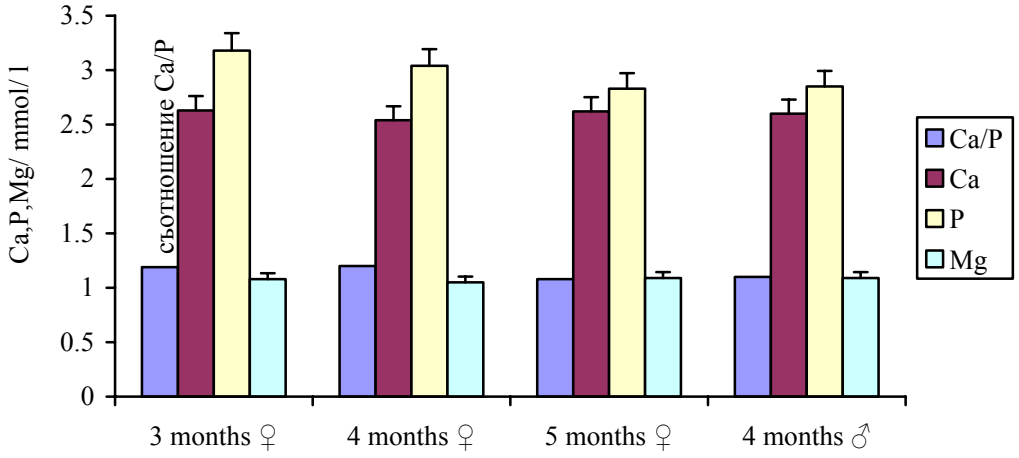

Figure 1. *HCS Shoumen: Age variation of macroelements Ca, P, Mg and Ca/P.*

The changes in this ratio /2, 4, 6, 9, 10/ is according with the feed ration- balanced or unbalanced /after the supplementation of the minerals, related with the investigated macroelements/ and also with the level of the exchange processes, growing process, pregnancy, lactation but there is no relation with the genetic specialty.

The analyses of this correlation during the all adaptation period shows that it is completely different from the data, given by Carlson, S. /9/ .The data for the P are between 1. 08 and 1. 19. Very important fact is that after the 4 month age the P value is going to the normal level, but it is not the same as the data given by different authors /4, 6, 10/.

The results of the quality determination of macroelements, according to the breed ad sex are showed in ***Table 2*** and ***Figure 2.***.

Table 2. *HCS Shoumen, Age and sex variations of the macroelements for the Duroc, Landrace and Yorkshire*

Age	*Ca – mmol/l*	*P - mmol/l*	*Ca/P*	*Mg - mmol/l*	*Albumen- g/L*
Danish Duroc ♀	2.38±0.02	2.86±0.18	1/1.20	1.01±0.04	66.6±0.81
Danish Duroc ♂	2.41±0.01	2.88±0.19	1/1.19	1.12±0.03	69.3±2.96
Danish Landrace ♀	2.41±0.01	2.83±0.11	1/1.18	0.94±0.06	68.2±1.93
Danish Landrace ♂	2.52±0.01	2.97±0.35	1/1.18	0.94±0.06	71.33±1.76
Danish Yorcshire ♀	2.53±0.06	2.70±0.05	1/1.07	1.07±0.03	71.4±1.21
Danish Yorcshire ♂	2.39±0.03	2.75±0.11	1/1.17	1.04±0.04	69.6±0.75

Analyzing the data the Ca value is the highest by Yorkshire female pigs 2.53 mmol/l and Landrace male pigs. The lowest Ca value is by Duroc breed - males and females/ 2.38±0.02 to 2.41±0.01/. The results are the same for P value and the data are shown in the ***Table 1***. The values for the different breeds are between 2.7 mmol/l to 2.88 mmol/l.

The both sexes of breed Duroc shows the highest P values, and the ratio Ca/P is also the highest for this breed /1,19-1,2/.

With regard to the relations between Ca, P and Mg, the quantity of Ca and P in the ration depends on the values of the both elements /10/. These elements are very important for the construction of the skeleton and for the reproduction system/4, 7, 9/. Different authors /10, 15, 16, 17/ included the higher values of Ca and P in the ration with the aim to have better breeds and to prevent the animals against diseases, but the results are very negative.

Although these evidences are wholly distinct the fast growing pig breeds (young females and boars) need the higher level-calcium and phosphorus in the ration /18/.

Analyzing the results, according to the physiological status the female pigs- Danish Yorcshire (showed in ***Table 3*** and ***Figure 3***), the Ca- value is between 2.23 and 2.4 mmol/l, the lowest Ca- values are to the pregnant pigs-first half.

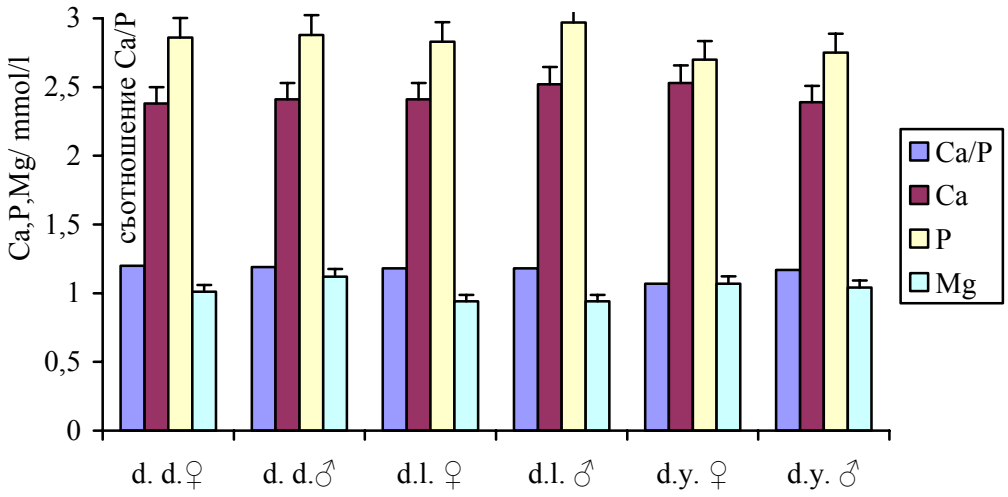

Figure 2. *HCS Shoumen, Age and sex variations of the macroelements for the Duroc, Landrace and Yorkshire*

Table 3. *HCS Shoumen, Physiology status variations of the macroelements for the Yorkshire*

Age	***Ca – mmol/l***	***P - mmol/l***	***Ca/P***	***Mg - mmol/l***	***Albumine- g/L***
Young females	2.31±0.03	2.02±0.16	1/0.87	1.12±0.07	76.4±1.90
Pregnant first half	2.23±0.03	2.35±0.11	1/1.053	0.9±0.10	71.6±1.19
Pregnant second half	2.37±0.01	2.69±0.19	1/1.13	0.89±0.07	74.4±3.85
Dairy	2.41±0.03	2.39±0.05	1/0.99	1.03±0.07	64.7±2.08
Dry	2.35±0.03	2.75±0.12	1/1.17	0.99±0.09	69.4±1.60

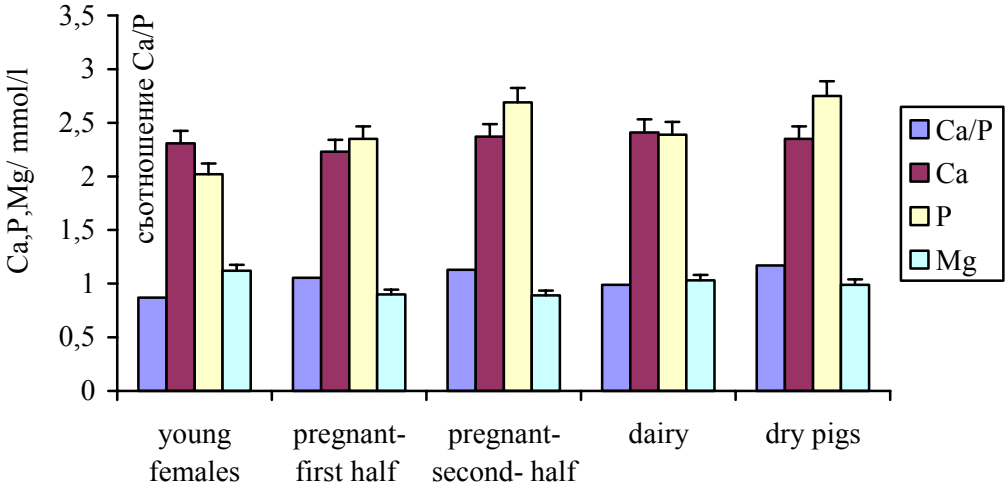

Figure 3. *HCS Shoumen, Physiology status variations of the macroelements for the Yorkshire*

The increasing Ca- value are showed in the second half of pregnancy and for dairy pigs and this is normal because of the supplement of minerals in the daily ration. The P- value is lower in these groups and the level is between 2.02 and 2.75 mmol/l. The Ca/P correlation for these animals is from 0.87 until 1.17.

There are different opinions, regarding

the Ca and P values in pigs with different physiological status. Some authors /19/ gave the higher level of Ca and P, then the given by NRC 1998 /21/.According to this data we could conclude that the daily rations should be calculated in relation with the daily needs and the breed of mother- pigs.

The Mg- values in the three groups are in the physiological norm. There is not enough data for the Mg, but the Mg level in feed and grain is nearly 50 % from the MgO /10/.

The maximum skeleton strength is according with the available Ca and P in the ration and the blood reflection of the breeding pigs. The values of Ca and P are higher for the maximum skeleton strength than the levels for increasing the economic effectiveness /a growth rate, consumption of the blood units, reproduction, quantity of milk /10, 20/.

The results in ***Table 4*** and ***Figure 4*** show that the Ca- levels are different for the pigs from PIG holding. The levels are lower for the male Landrace than the Duroc and Big white pig. The F1 (Big white pig ♀ x Landrace ♂) have the higher values.

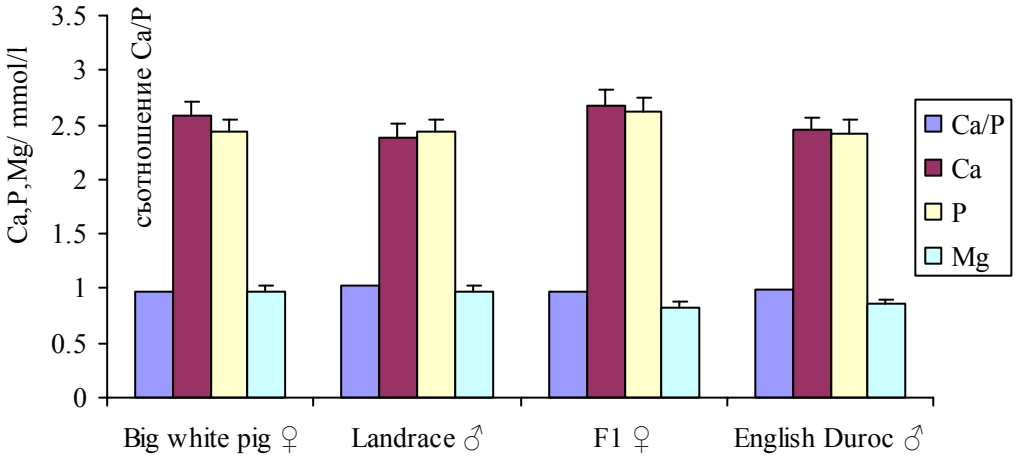

Figure 4. *HC Radko Dimitrievo, the macroelements values, according to the sex and physiological status for the Yorkshire*

Table 4. *HC Radko Dimitrievo, the macroelements values, according to the sex and physiological status for the Yorkshire*

Age	*Ca – mmol/l*	*P - mmol/l*	*Ca/P*	*Mg - mmol/l*	*Albumin- g/L*
Big white pig ♀	2.59±0.09	2.43±0.11	1/0.94	0.97±0.01	62.11±1.37
Landrace ♂	2.39±0.12	2.43±0.18	1/1.02	0.97±0.006	60.20±3.10
F1 ♀	2.68±0.1	2.62±0.08	1/0.98	0.83±0.02	74.78±10.58
English Duroc ♂	2.45±0.02	2.42±0.09	1/0.99	0.86±0.02	70.52±1.71

The P- values for the F1 are higher that the values for the imported pigs, where the levels are in the norm (2.62 ±0.08). The correlation Ca/P by the imported pigs in the HC Radko Dimitrievo is between 1/0.9 to 1. For the imported pigs in HCS Shoumen this correlation is 1/1.2. This data confirm the results given by Odink. J. 1990 /20/.

The analyses of the data shows that the used animals with different genotype, sex and age have a higher capability for formation of frail meat and higher level of body minerals than the breeding pigs in the past /2, 7, 8/. They also have the higher ability to formatted a meat without fats /1.22/.

CONCLUSION

The summary and analyses of the changes of macroelements level (Ca, Mg, P), related with the introduced processes, adaptation abilities, influenced by breed, technical aspects and the physiological status, let to come out some determinate factors, related with this changes.

The introduced process, related with the new technologies is an important factor for the changes of the Ca, P and Mg level and especially the correlation of Ca/P.

The genetic potential of the different pig- breeds and lines is the stabilized factor for the higher adaptation possibilities in the commercial technologies.

In conclusion with the presented results is the fact that in the all structures the Ca, P and Mg levels stay in the physiological norms.

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