

## Specifics of pigs' growth depending on growing conditions considering physiological maturity

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**Abstract.** Sow polycarpicae is important for meet production increase. But using technological solutions for breeding, environmental impact and sow polycarpicae decrease the quality of born pigs. Pigs with different physiological maturity are born that affects their quality. According to several researches from 16 to 45% of pigs in sow farrow are born in the state of physiological immaturity, physiological physiological measures do not correspond to calendar age. Results of research of growth and development of physiological immature pigs are described in the article and comparative characteristic of growth and fertility of sows born in different state of physiological maturity depending on growing conditions is provided.

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### Introduction

Pigs born in different stage of maturity have different rates of growth and development [1]. High rate of growth is important term of high quality meat production [2].

Analysis of local and foreign literature does not provide enough information about growth and development from the moment of birth and till the end of period of technological growing of pigs born in the state of antenatal immaturity [3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13]. Pigs born in the state of physiological immaturity may serve as one of the reserves for sow livestock restoration in commercial farming [3]. Facilitating relevant conditions for growing pigs born with physiological immaturity may provide achieving appropriate maturity in a certain age [14]. But there are no information about breeding capacity, feeding and meat quality of such animals. So the **aim** of the research is to study physiological and productive characteristics of sows, determine specifics of growth and development of pigs born in different state of physiological maturity depending on growing conditions.

### Material and methods

Materials provided in the article are the results of in-house research carried out in accordance with the plan of scientific researches of Ural State Academy of Veterinary Medicine in the topic "Development and deployment of methods and approaches of pigs' safety improvement in industrial pork production" # 01.2002.02378.

Number of pigs born in the state of physiological immaturity and antenatal immaturity was measured after farrowing. Than three groups of farrows were selected, first – 5 farrows of matured

pigs, second – 5 farrows of physiological immature pigs, third – 15 full farrows with both matured and immatured pigs. There were 10 animals in each farrow. 25 sows and 250 pigs were observed in total, 96 of them (36.4%) were physiologically immature, 154 (61.6) % - physiological matured.

Evaluation of the state of maturity was made with the system of integral indicators including external appearance, mass of a body, number of calf's teeth, constitution, nutritional state, behavior, reaction on external stimulants, color of visible mucous tunic, skin condition (A.I. Kuznetsov, V.N. Lusin, V.G. Lukoshina, et al, 1984).

A number of animals with antenatal immaturity were calculated as a percent of total number of pigs. All groups were formed with newborn animals by the principle of analogue. Farrows with a certain level of maturity were formed in first 6-8 hours after farrowing by shifting matured pigs to one sow and immature pigs – to another. Forming independent farrows in second group from immature pigs allowed observing the factor of tough competition for life in a nest with matured pigs. Growing conditions in each farrow were created in accordance with requirements of breeding farm technology. Animals' growth was determined by live weight, absolute and relative average daily liveweight gain. Live weight was measured by weighing animals on scales. Statistical processing of obtained data was done according accepted methods of variational statistics.

### Main body

Phases of more or less intensive growth of physiological matured pigs may be observed in the first group. The highest growth intensity was observed in first 30 days of life – 327.7 % and daily

average – 10.9 %. Absolute average daily liveweight gain was in the range 142.0±7.2 g and live weight on 30<sup>th</sup> day - 5.56±0.11 kg. Then intensity of growth became lower. From 31<sup>st</sup> to 60<sup>th</sup> day growth intensity was 164.4 %, and as per day – 5.4 %. Due to such energy daily average live weight growth was defined on the level 304.6±6.8 g, live weight on 60<sup>th</sup> day of life – 14.70±0.79 kg. On 5<sup>th</sup> day after weaning and moving them to growing shop growth intensity lowered from 5.4 to 1.9 % and absolute average daily liveweight gain from 304.6±6.8 to 274.4±3.9 g and live weight on 60<sup>th</sup> day was 16.07±0.17 kg. From 65<sup>th</sup> and 70<sup>th</sup> day daily average growth intensity grew from 1.9 to 2.1 % and daily average growth of live weight from 228.4±6.1 to 334.2±9.2 g and live weight on 60<sup>th</sup> was defined on the level 17.74±0.18 kg. From 70<sup>th</sup> to 120<sup>th</sup> day daily average growth intensity was 2.18 %. absolute daily average liveweight gain increased to 385.7±5.6 gr and live weight was defined in the limits of 37.04±0.56 kg. After moving pigs to final growing shop from 120<sup>th</sup> to 125<sup>th</sup> day daily average growth rate reduced from 2.18 to 0.94 %, absolute daily average liveweight gain from 385.7±5.6 to 351.8±4.3 g and live weight on 125<sup>th</sup> day was 38.79±0.57 kg. On 130<sup>th</sup> day daily average growth intensity increased from 0.94 to 1.10 %, daily average liveweight gain from 351.8±4.3 to 438.3±4.1 g and live weight was 40.98±0.49 kg. In following days growth intensity was relatively high. From 131<sup>st</sup> to 240<sup>th</sup> day daily average growth intensity was about 1.31 %, absolute daily average liveweight gain was 538.6±8.3 gr and live weight on 240<sup>th</sup> day – 100.23±0.93 kg. In the period from 241<sup>st</sup> to 270<sup>th</sup> day absolute daily live weight gain increased from 538.6±8.3 to 640.0±9.4 g, live weight increased from 100.23±0.93 to 119.43±0.21 kg. From 271<sup>st</sup> to 300<sup>th</sup> day absolute daily average liveweight gain increased from 640.0±9.4 to 683.7±9.5, live weights from 119.43±0.21 to 139.93±0.20 kg.

Growth intensity and rate of pigs born in the state of physiological immaturity that were growing in separate groups was high but lower than these indicators of pigs born physiologically matured. High daily average growth intensity in first 30 days was 14.3 % that caused daily average liveweight gain in the range 131.3±6.7 g, and live weight in the age of 30<sup>th</sup> days - 4.86±0.19 kg. Comparing with the first group these measures were lower respectively on 7.5 and 12.6 %. In the following period from 31<sup>st</sup> to 60<sup>th</sup> day daily average growth intensity became lower from 14.3 to 5.4 % and daily average liveweight gain grew from 131.3±6.8 to 264.7±6.6 g. Live weight in the age of 60<sup>th</sup> days was 12.8±0.68 kg that was lower than in the first group respectively on 13.1 and 12.9 %. On the 5<sup>th</sup> day after weaning pigs and moving them to growing shop daily average growth intensity

reduced from 5.4 to 1.8 % and absolute daily average liveweight gain reduced from 264.7±4.6 to 228.4±6.1 g, live weight grew on 8.9 % and on 65<sup>th</sup> day was in the range 13.94±0.65 kg. Comparing with analogous measures of pigs of the same age was 83.2 and 86.7 %. From 65<sup>th</sup> to 70<sup>th</sup> day absolute average liveweight gain increased from 228.4±6.1 to 270.1±7.2 g, live weight grew from 13.94±0.65 to 15.29±0.71 kg or on 18.3 and 9.7 % respectively. Comparing with the same measures they related as 80.8 and 86.2 %. To the age of 120<sup>th</sup> day daily average growth intensity grew from 1.9 to 2.13 % and daily average liveweight from 270.1±7.2 to 325.7±3.8 g and live weight from 15.29±0.56 to 31.59±0.63 kg. These measures were lower than analogous measures of animals in first group: absolute liveweight gain on 13.6 and live weight 14.7 %. After moving pigs from growing shop to final growing shop from 121<sup>st</sup> to 125<sup>th</sup> day daily average growth intensity reduced from 2.13 to 0.91 % and absolute liveweight gain from 325.7±3.8 to 288.2±6.6 gr and live weight grew only for 1.44 kg or for 4.6 %. Then it was observed compensatory growth of these measures. Absolute daily average growth intensity was 1.37 % and daily average liveweight gain 478.1±4.6 gr and live weight 87.48±0.84 kg. But they were lower than those of pigs in first group: daily average growth on 11.2 and live weight on 12.7 %. In the period from 241<sup>st</sup> to 270<sup>th</sup> day daily average growth intensity reduced from 1.37 to 0.68 % absolute daily average liveweight gain only on 24.1 and live weight on 16.9 %. Absolute daily average liveweight growth in this period was 593.6±3.8 g and live weight on 270<sup>th</sup> day was 105.28 ± 0.26 kg. These measures were lower than analogous measures of animals in first group respectively on 7.2 and 9.0 %. In the period from 271<sup>st</sup> to 300<sup>th</sup> daily average growth rate was on the level 0.61 % and daily average liveweight gain 643.5±7.6 gr and live weight on 300<sup>th</sup> day was 124.58±0.96 kg. Comparing with these measures of pigs in first group daily average gain was 94.1 and live weight 88.6 %.

Pigs born in the state of physiological immaturity that had been grown in sowing period, growing period and final growing period together with matured pigs had the lowest growth rate 11763.3%. High growth rate was observed from 1<sup>st</sup> to 30<sup>th</sup> day than growth rate significantly reduced. Comparing with analogous measures of animals from the first group they were lower on 18.5; 36.1 and 36.1 in the second - 18.5; 16.3 и 20.3 %. After weaning and moving pigs into growing shop growth intensity and rate had been reducing more pronounced comparing with these indicators of pigs from the first group and less intensively than in the second. Live weight grew only on 8.0 %. So in the age of 65 days these measured were in first group respectively 58.6

и 68.6 % and in second - 70.35 и 79.1 %. From 66<sup>th</sup> to 70<sup>th</sup> day compensatory growth energy and intensity was observed till 120<sup>th</sup> day. But comparing with these measures of animals from the first group they were lower on 20.2; 44.3; 39.7%, second - 18.3; 36.4 и 29.3% respectively. Effect of moving pigs from growing shop to final growing shop was more negative comparing with pigs of the same age in first and second group. From 121<sup>st</sup> to 125<sup>th</sup> day daily average growth intensity reduced and from 131<sup>st</sup> to 240<sup>th</sup> day increased from 1.05 to 1.80 % with absolute gain from 246.5±9.4 to 442.3±5.9 g and live weight from 24.45±0.53 to 73.10±0.76 kg or 71.4; 79.4; 72.9%. Comparing with the same measures of pigs of the same age from the first group they were significantly lower: absolute gain on 17.9 and live weight on 27.1 %; second, respectively. On 7.5 and 16.4 %, from 271<sup>st</sup> to 300<sup>th</sup> day of observation growth rate decreased. Comparing with analogous indicators of pigs from the first group they were lower: absolute daily average liveweight gain on 11.7 and live weight on 23.7 %; second on 6.2 and 14.3 %.

### Conclusion

Pigs born in the state of physiological maturity grown in the first group have the highest growth rate and energy, live weight and less negative reaction on wearing, forming new groups, moving to growing shop and from growing shop to final growing shop.

Pigs born in the state of physiological immaturity and growing separately has also high growth rate and energy but lower than pigs from the first group and had more negative reaction on changes in growing conditions than physiologically matured.

Pigs born in the state of physiological immaturity and growing on farrows with matured pigs had the lowest growth rate. Growth intensity indicators, absolute daily average liveweight gains and live weight was lower than those of pigs of first group on 21.9; 23.7; 23.7%; analogous second – 12.5; 14.4; 14.3%.

Research showed that growing pigs born in the state of antenatal immaturity without competition with matured pigs by grouping immature newborn animals in separate farrows in first 6-8 hours after born and placing them with highly lactic sows provides high growth rate and growing highly productive animals and animals with high fattening and meat quality. But these qualities are still lower that of matured pigs. So pigs born in the state of antenatal immaturity and growing according this technology may be used as reserve for main sow livestock and for meat production.

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