Effect of stress susceptibility of sows on milk production under their intensive use

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Abstract. This work presents the research results on age-related dynamics of lactation performance of stress-resistant and stress-susceptible sows. It is revealed that the lactation performance of stress-resistant sows during the first three lactations is 12.5-13.6% higher than that for the stress-susceptible saws. Lactation performance of the sows increases with the age; for stress-resistant animals it increases up to the third lactation, inclusive, while for stress-susceptible sows – up to the fourth lactation; then the lactation performance decreases. The most intensive decrease is observed in stress-resistant sows. Consequently, during the fifth lactation the sows' lactation performance becomes 4.3% lower, than for the stress-susceptible animals.
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Introduction

Lactation performance of sows is significantly higher than that for any other kind of food producing animals, including cattle [1, 2]. It is found that the efficiency of sows' lactation performance, determined on the basis of milk energy per unit of feed energy may amount 45%. Sows' lactation performance index varies within the wide range from 150 to 500 kg, while its average value is 400-500 kg over the lactation period of 60 days. Note that 230-370 g of protein, 400-500 g of fat, 270 g of lactose, and 25-30 MJ of energy is released with milk per day. Therefore, the sow's body, especially of highly productive animals, experiences huge functional stress during the lactation periods. In this regard, for maximum realization of the genetic productivity potential, one of the main tasks is proper feeding of pigs with regard to their physiological characters, and the stress susceptibility, in particular [3, 4, 5, 6]. Kuznetsov, A. I. (1991) and I.V. Molokanova (2002), when studied the physiological makers of sows with different stress susceptibility, have found that during the first lactation stress-resistant animals have higher lactation performance, than the stress-susceptible sows [2, 3]. However, to date, there is no information on how the lactation performance of sows with various stress-susceptibility changes depending on their age under intensive use. Accordingly, we have set a **goal** - to study lactation performance in stress-resistant and stress-susceptible sows depending on their age under intensive use.

Methods.

Based on analogy principle, 7 groups of stress-resistant animals and 7 groups of stress-susceptible sows, each consisting of 8 animals, were formed to study the effects of intensive use of animals on their lactation performance depending on their age. In total, 112 sows were investigated. The first groups included replacement gilts before insemination, the 2nd groups consisted of animals having one farrow, the 3rd groups – two farrows, the 4th – three , the 5th – four, the 6th – five , and the 7th – having six farrows. During the year, 2.1-2.2 farrows were obtained from each studied sow. The days of the measurements of lactation performance, on the 2nd, 10th, 20th, 30th, and 45th day of lactation, piglets were not fed. The amount of milk secreted by sow was determined in kg by weighing the piglets before and after each suckling [1, 2, 7, 8, 9, 10].

Main part.

The results on determination of milking capacity of stress-resistant sows showed that with increase in number of lactations, lactation performance of sows varies. Thus, after the first farrow, on the 2nd day of lactation, the amount of secreted milk was determined within the range 4.31±0.23 kg, on the 10th day – 4.76±0.31, on the 20th day – 5.01±0.28, on the 30th day – 5.87±0.39, and on the 45th day – 5.56±0.34 kg. Over the entire period of lactation, milk yield was determined in the amount of 229.5 kg that corresponded on average to 5.10 kg of milk per day. Milk productivity increased with the sow's age. During the second lactation, on the 2nd day, the amount of milk secreted was by 6% higher than that during the first lactation, on the 10th day – by 10.3, on the 20th day – by 12.6, on the 30th day – by 14.5, and on the 45th day – by 11,3%. In general, over the 45 days of suckling period the determined lactation performance was higher by 11.2%. After the third farrow, on the 2nd day of lactation, milk yield

was by 10.7% higher, on the 10th day – by 15.4, on the 20th day – by 18.9, on the 30th day – by 23.6, and on the 45th day – by 19.3%. For all controlled lactation periods, milk productivity increased by 18.0%. Then there was a decrease in milk productivity. In the fourth lactation, the amount of the secreted milk on the 2nd day was higher just by 4.6%, on the 10th day – by 3.9, on the 20th day – by 4.9, on the 30th day – by 8.2, and by the 45th day – by 0.9% relative to the sows' lactation performance after the first farrow. Over the entire controlled lactation period the increase amounted to 2.4%. Decline in lactation performance continued also in the subsequent lactations. Thus, after the fifth farrow, on the 2nd day of suckling period the amount of milk secreted was less by 5.3% in comparison with the lactation performance in the first reproductive cycle, on the 10th day – by 7.7, on the 20th day – by 5.8, on 30th day – by 7.6; in general, over the 45 days the overall decrease was 8.6%. Lactation performance was the lowest during the sixth lactation period. On the 2nd day of suckling period, the milk secretion was less by 4.4% as compared with the figure, obtained for the first farrow; on the 10th day – by 10.7, on 20th day – by 10.0, on the 30th day – by 14.7, on the 45th day – by 12.6%, and for the entire period of observations the reduction in lactation performance was 12.7% lower than that for the respective days of the first farrow.

As a result of milk yield studies in stress-susceptible animals it was determined that during the first lactation period, on the 2nd day the amount of the secreted milk was 3.74±0.44 kg, on the 10th day – 4.12±0.36, on the 20th day – 4.55±0.49, on the 30th day – 5.23±0.32, and on the 45th day 4.65±0.26 kg. For the whole period of observations this figure amounted to 200.7 kg that corresponded to 4.46 kg per day. Milk yield of these animals increased with their age. After second farrow, on the 2nd day of lactation, the amount of milk obtained was within the range on the 10th day – 10.7, on the 20th day – 10.0, on the 30th day – 14.7, and on the 45th day – 12.6 kg. For the whole suckling period the amount of milk secreted was 227.3 kg that corresponded on average of 5.05 kg per day. In comparison with the same indicators, corresponding to the first lactation period, the figures were respectively: on the 2nd day – 107.2%, on the 10th day – 109.6, on the 20th day – 114.1, on the 30th day – 116.4, on the 45th day – 90.7%, and 113.2% for the whole lactation period. The increase in milk yield was observed also during the third reproductive cycle. Thus, on the 2nd day of the third lactation the amount of milk has increased by 9.2%, on the 10th day – by 113.4, on the 20th day – by 117.8, on the 30th day – by 119.1, and on the 45th day – by 113.5, while over the 45 days of the observations the total increase was 116.6% higher as compared with the figures corresponding to the first lactation. After the fourth farrow there was decline in the amount of secreted milk. On the 2nd day of suckling period milk yield was within 3.99± 0.27 kg, on the 10th day –4.55±0.38, on the 20th day – 5.22±0.41, on the 30th day – 6.08±0.45, on the 45th day – 5.19±0.34, and 225.5 kg for the entire period of records. Relative the same quantities for the first farrow the following figures were recorded: on the 2nd day – 106.9%, on the 10th day – 110.5, on the 20th day –114.8 , on the 30th day –116.3, on the 45th day –111.6, and in total 112.4% for the entire period of observations. Reduced lactation performance was found in subsequent reproductive cycles. Comparing with the respective figures for the first lactation period, the sixth farrow was characterized by the following records: on the 2nd day the amount of the secreted milk was 93.8%, on the 10th day–100.9, on the 20th day –105.7, on the 30th day –108.5, on the 45th day – 97.8, and 100.2% over the 45 days of observations.

Data analysis when comparing characteristics of lactation performance of stress-resistant and stress-susceptible sows showed that milk yield of stress-resistant animals was significantly higher than that of the stress-susceptible sows. Milk yield was the lowest during the sixth lactation period. Milk yield on the 2nd day of suckling period was by 4.4% less than that for the proper day of the first farrow, on the 10th day – by 10.7, on the 20th day - by 10.0, on the 30th day –by 14.7%, on the 45th day – by 12.6, and 12.7% lower for the entire period of observations.

The results of the studies of milk yield in stress-susceptible animals showed that in the first lactation period the amount of the secreted milk on the 2nd day was 3.74±0.44 kg, on the 10th day – 4.12±0.36, on the 20th day – 4.55±0.49, on the 30th day – 5.23±0.32, and on the 45th – 4.65±0.26 kg. During the whole period of observations the total amount of milk was 200.7 kg that corresponded to the average of 4.46 kg per day. Lactation performance of the sows increases with their age. After second farrow, on the 2nd day of lactation, the amount of milk obtained was varied within the range on the 10th day – 10.7, on the 20th day – 10.0, the 30th day – 14.7, the 45th day – 12.6, and for the whole suckling period – 227.3 kg that corresponded on average to 5.05 kg per day. In comparison with the proper indicators for the first lactation period they were, respectively: on the 2nd day – 107.2%, on the 10th day – 109.6, on the 20th day – 114.1, on the 30th day – 116.4, and on the 45th day – 90.7%, and 113.2% for the whole lactation period. The increase in milk yield was observed during the third reproductive cycle as well. Thus, on the 2nd day of the third lactation period the amount of milk yield was by 9.2% higher as compared with the proper indicator for the first lactation, on the 10th day

– by 113.4%, on the 20th day – by 117.8%, on the 30th day – by 119.1%, and on the 45th – by 113.5%. During 45 days of observations the total increase in the third lactation was 116.6% higher as compared with the first lactation period. It was revealed that after the fourth farrow milk yield rate declines. On the 2nd day of the suckling period milking capacity was within 3.99±0.27 kg, on the 10th day – 4.55±0.38, on the 20th day – 5.22±0.41, on the 30th day – 6.08±0.45, on the 45th – 5.19±0.34, and in total - 225.5 kg for the entire period of record. The proper quantities for the first farrow were, respectively: on the 2nd day – 106.9%, on the 10th day – 110.5% , on the 20th day – 114.8%, on the 30th day – 116.3%, on the 45th day – 111.6. For the entire period of observation total increase amounted to 112.4%.

Reduction in lactation performance index was found in subsequent reproductive cycles. After the sixth farrow, as compared to the first lactation period, the following figures were obtained: on the 2nd day the amount of the secreted milk was 93.8%, on the 10th day – 100.9, on the 20th day – 105.7, on the 30th day – 108.5, on the 45th – 97.8, and 100.2% during the 45 days of research.

When analyzing comparative characteristics of lactation performance of stress-resistant and stress-susceptible sows, it was revealed that the milk yield in stress-resistant animals was significantly higher than that in the stress-susceptible sows.

During the first lactation period of stress-resistant sows, on the 2nd day of lactation, the amount of milk secreted was 13.2% higher than that for the stress-susceptible sows, on the 10th day – 13.4, on the 20th day – 9.2 , on the 30th – 10.9, on the 45th – 16.4, and 12.5% for the whole observation period. Revealed difference in lactation performance remained until the third lactation period. Then, with increasing the number of farrows, a difference in milking capacity was reduced. This reduction in the difference between the determined values was due to a significant decrease in the productivity of stress-resistant animals. Thus, after the fourth farrow in stress-susceptible animals, milk yield on the 2nd day of lactation was 88.5% as compared with the proper indicator for stress-resistant sows, on the 10th day – 91.9, on the 20th day – 99.23, on the 30th day – 95.7, on the 45th day – 92.5, and for the entire observation period – 95.9%. During the fifth lactation the difference in milk yield was much less, and for the entire observation period was just 4.3% in favor of stress-resistant saws. In the next age period the milk yield in stress-resistant sows, as compared with the same indicator for the stress-susceptible animals, continued to decline significantly. This led to the leveling-off their lactation performance. Thus, in the sixth lactation period the milk yield in stress-susceptible sows on the 2nd day was 85.2% relative to the proper indicator for the stress-resistant sows of the same age, on the 10th day – 97.9, on the 20th day – 106.7, on the 30th day – 104.2, on the 45th day – 102,1 and 100.4% for the entire observation period.

Conclusions.

Thus, based on the data presented above, we can conclude that the lactation performance for stress-resistant sows during the first three lactations is 12.5-13.6% higher than that for the stress-susceptible animals. Lactation performance of sows increases with their age; up to the third lactation – for stress-resistant sows and up to fourth lactation – for stress-susceptible animals, followed by subsequent reduction. The most intensive decrease was observed in stress-resistant sows. Therefore, their milk yield during the fifth lactation was 4.3% lower than that for the stress-susceptible animals.

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References

1. Kuznetsov, A.I. and F.A. Sunagatullin, 1991. Valuation method of pigs based on stress susceptibility, Author's Certificate #1653680 USSR, 08.02. 1991.
2. Kuznetsov, A.I., 2004. Characteristics of reproductive function of sows with different stress susceptibility in conventional farm conditions, RIS Svinovodstvo, 1: 6 .
3. Molokanova, I.V., 2005. Lactation performance of stress-resistant and stress-susceptible sows, Technological problems in livestock production, Proceedings of scientific conference, UGAVM: 66-68.
4. Ruchkina, G.A. and A.S. Segizbaeva, 2008. Comparative characteristics of the general physiological status of gilts, born with varying degrees of physiological maturity, over the suckling period, NPW "Bulletin of Agricultural Science of Kazakhstan", Almaty, LLP "Bastau", 2: 42.
5. Segizbaeva, A.S., 2009. Physiological and productive features of sows with different degrees of aborning physiological maturity, Scientific and practical journal "Animal Nutrition and Forage", Moscow, 4: 31-35.
6. Segizbaeva, A.S., 2010. Productive features of sows with different degrees of aborning physiological maturity, Improvement and implementation of modern technologies for the

production and processing of livestock products, Proceedings of international scientific and practical conference, Troitsk, UGAVM: 396-399.
7. Segizbaeva, A.S. 2011. Economic and biological peculiarities of the major types of farm animals, Kostanai: 71-78.
8. Avivi, A., 2004. Jodine metabolism and effect of TSH in thyroid glands of early bovine embryos, Acta endocr, 98 (3): 377-382.
9. Berhowitz, M. 2003. Autoregulation of thyroid iodide transport. Possible mediation by modification in sodium cotransport. 240 (1): 37-42.
10. Endo,Y. and H.Iodide, 2001. Transport of thyroid plasma membranes. Acta endocr. 98 (2): 227-233.

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