

CORTISOL LEVEL IN THE BLOOD PLASMA OF PIGS IMMEDIATELY BEFORE AND AFTER TRANSPORT

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Abstracts

The research was carried out with the purpose to, on the basis of the cortisol level in the pigs blood plasma, establish the amount of stress caused by the weaning and the transport. The piglets were weaned at the age of 24 days and transported by a truck to the breeding place, what lasted for 65 minutes. The piglets' blood, in the amount of 5 ml, was taken, for each piglet, immediately before and after the transport. The cortisol level in the blood plasma was determined by the radiochemical method (RIA). The average cortisol concentration in the plasma of the blood samples taken immediately after the weaning and the transport amounted to 334,12 nmol/l while the largest concentration amounted to 665 nmol/l and the lowest was 175 nmol/l. The average cortisol concentration in the samples taken immediately after the transport amounted to 362,88 nmol/l with the highest noted concentration of 670 nmol/l and the lowest of 201 nmol/l. In accordance with the results obtained, the cortisol level in the blood plasma of the weaned piglets varies to a large extent, speaking thus for the fact that each individual reacts differently to the stress caused by the weaning and the transport. Besides, an increase of the cortisol level was noted with all piglets after the transport for an amount of 9 to 64 nmol/l in regard to the cortisol level before it, confirming thus the hypothesis that the transport may be an additional stress factor for weaned piglets. Accordingly, we may conclude that the weaning and the transport causes a stress which may, taking the cortisol level in the blood plasma, endanger the welfare of the animal.

Key Words: piglets, cortisol level in the blood plasma, stress, weaning, transport.

INTRODUCTION

It is a well known fact that the exposure of animals to a new environment may cause various stress reactions. These reactions may be manifested by the removal of the animal itself from the cause of stress (flight) or by trying to find a way to remove the cause of stress by fight. The above described reactions may be considered as an active balance response. Beside the above, the animals usually responded by an answer arising from the nervous simpaticus system, characterized by an increased heratbeat, increased cortisol level and increased blood pressure (Santoro, 1996). Owing to this fact it will be enough to expose the pigs to a new environment for only a short time period and they will respond with a raised cortisol level in the plasma (Dantzer and Salaün, 1992). A certain number of research made on pigs with adaptable characteristics and of various breeds and breeding, was analyzed exactly on the ground of their adrenocortical activity (Mormede et al., 1984; Baldi et al., 1989; Gade and Christensen, 1998). It was thus proved that the grouping at the time of ablactation, or 2 weeks thereafter, may cause a significant rise of the cortisol level in the plasma (Arnone and Dantzer 1980; Blecha et al., 1983). There are, however, very few data present regarding the research on the influence of the ablactation and the transport on the stress of the

pigs. Therefore, the purpose of this research was to establish the cortisol level in the weaned pigs immediately before and after the transport as well as the influence thereof on the animal welfare.

MATERIAL AND METHODS

Twenty - five pigs of the Swedish Landrace breed, acquired from the intensive breeding, participated in this research. The pigs were weaned at the age of 24 days and transported by a truck to the breeding place in the duration of 65 minutes. From their farm of birth to the new breeding place the pigs were transported in boxes constructed for the transport of 9 - 10 pigs. The boxes were previously covered with hay and the transport lasted from 8.10 to 9.15 a.m. The pigs were, immediately before and after the transport, taken 5 ml of blood each. The blood was, following a previous local eye anaesthesia by procaine drops, taken from the orbital sinus by introducing the needle fixed on the syringe of 5 cm³, to the medial eye corner, between the third eye lid and the eyeball, in the medio - ventral - caudal direction (45° from the vertical and app. 30° from the horizontal intersecting in the medial eye corner), The cortisol level in the blood plasma was determined by the commercial RIA - kit (Incostar). After processing the data regarding the pigs in the experiment we established the maximal, the minimal and the average values of the cortisol level in the blood serum immediately before and immediately after the transport.

RESULTS AND DISCUSSION

Table 1. Maximal, minimal and average values of the cortisol level in the blood plasma immediately before and immediately after the weaned pigs' transport

Values	Maximum (nmol/l)	Minimum (nmol/l)	Average (nmol/l)
Cortisol before the transport	665	670	334, 12
Cortisol after the transport	175	201	362,88

In accordance with the thesis stating that the glucocorticoids concentration in the plasma is the decisive clinical indicator regarding the stress level (Hartmann, 1988) the pigs' blood was taken immediately before the transport, singly, while the corresponding intervention was in the duration of up to one minute per animal. Besides mild flow of tears and in irritation in two cases, this intervention did not cause any damaging consequences on the pigs' eyes. The short transport, when compared to a long one, may create very stressing components in a young animal, attributed to a short time period between the loading and unloading of animals (Tarrant, 1988). Owing to this fact the pigs were, immediately after the transport, taken the blood, again from the orbital sinus. According to the received results all pigs had an increased cortisol level after the transport, for 9 to 64 nmol/l, reflected in the minimal and maximal values of cortisol as presented. Accordingly, the pigs showed a high grade of the variation regarding the cortisol in the blood plasma, a fact speaking in favour of the belief that each individual reacts differently to the stress caused by the weaning and the transport. If we compare the average results of the cortisol level in the research (Table 1) we may observe that the cortisol grew after the transport for 8,6 percent, in comparison with the average cortisol level before the transport. If we consider that the average cortisol value level in the blood plasma of the Yorkshire and Duroc crossbred amounted to 118,68 nmol/l (Hannon et al., 1990), then the pigs in our research were already significantly stressed before the transport.

Therefore the transport was only an additional stress factor for the weaned pigs. Besides, considering that the rise of the cortisol in the blood plasma for more than 40 percent endangers the animal welfare (Barnett and Hemsworth 1990), we may conclude that, in comparison to the research of the authors mentioned, the pigs' welfare in our research was already endangered immediately before the transport. However, considering that the cortisol level varies significantly, in cycles, during the day (Mormede, 1988) the question may arise here what would have been the level of the cortisol in the blood plasma were the pigs transported, for instance, in the afternoon hours. Besides, considering that the cortisol concentration in the saliva and the pigs' blood plasma may be highly significant (Cook et al., 1997) it will be necessary, when transporting the pigs in the future, to consider their mutual relationships as well.

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