

HAPTOGLOBIN IN THE BLOOD SERUM OF PIGS EXPOSED TO TRANSPORTATION STRESS

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Abstract

The paper describes the results of the studies on concentration of haptoglobin (Hp) in 20 finishing pigs weighing 110 kg, transported by road from the farm to the slaughterhouse in the winter season. The distance was 550 km and it took 22 h to cover it. After unloading, the pigs were kept for resting in a slaughter pen for 22 h. Blood samples were taken from every individual three times (altogether 60 measurements): before the transport (series 1 - control), after unloading (series 2) and at slaughter (series 3). In blood serum, Hpt concentration was determined using the Jones G.E., Mould D.L (1984) method. The mean of all samples was 1.162 g/l. The mean of series 1 was 0.602 g/ml, ranging from 0.02 to 1.55 g/l. In 45% of all individuals examined in the experiment, Hpt concentration exceeded 0.50 g/l, which indicated the activation of immune system in the pre-transport period, brought about by disease or poor keeping conditions. The mean of series 2 increased to 0.996 g/l (0.175-2.95 g/l), and the percentage of individuals with Hp > 0.50 g/l was 70%. In series 3 the mean reached 1.854 g/l (0.875-3.90). There were statistically significant differences between series 1 and 3, and series 2 and 3 ($p < 0.01$). The resting period did not influence the normalisation of Hp concentration. On the contrary, the concentration was 86.2 % higher than that measured directly after transporting ($p < 0.01$).

INTRODUCTION

Nowadays more and more farm animal research is focused on animal welfare. The essential need is to find the markers that can provide an objective measure of the welfare status. One of the most often occurring situations of poor welfare is the treatment of animals during transportation. Numerous stressful factors in transporting pigs to slaughterhouses cause many stressful situations (moving, loading, transporting, unloading). Each of them *per se* initiates a stress response. The sequence of events leading to increased synthesis of acute phase proteins (APP) is as follows (Dugue et al. 1993): stress exposure → cortisol ↑ (peak of concentration in blood serum ≈ 6 h after) → cytokines (≈ 18 h) ↑ → APP ↑ (≈ 48 h).

In pigs, Haptoglobin is one of the acute-phase reactants that increase in blood serum after stress reaction. The aim of the study was to determine the effect of long distance road transportation of pigs on the changes of serum haptoglobin concentration. Another objective of the present study was to test whether haptoglobin can be used as a marker for welfare status of transported pigs.

MATERIALS AND METHODS

The material was a group of 20 commercial finishing pigs (mean weight - 110kg) transported by road from the farm to the slaughterhouse. The animals were transported at the distance of 550

km in the winter season and extremely bad road conditions, so it took 22 hours to cover the distance.

Blood samples were obtained from every individual via v. jugular puncture three times:

- before the transport (series 1 - control);
- after unloading (series 2)- 22 h from the transport beginning;
- at slaughter (series 3) – 44 h from the transport beginning.

Serum samples were analysed for haptoglobin by the Jones G.E., Mould D.L (1984) method. The results were processed statistically (Statgraph 5.0)

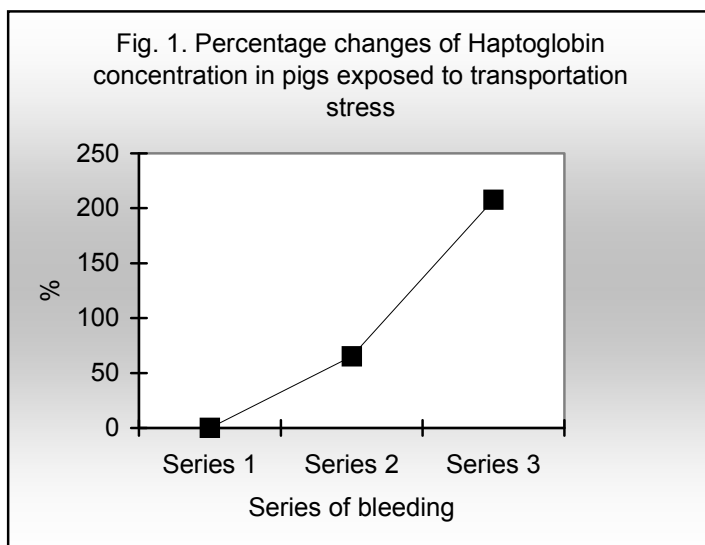
RESULTS AND DISCUSSION

In our experiment pigs were exposed to many stressful factors, different in type and intensity. Factors related to transportation conditions were as follows: extremely low temperature, lack of food, water and straw, shake, vibrations, crowding, slippery floors, etc. Bad climatic and road conditions significantly prolonged transportation time.

Table 1. Haptoglobin concentration in pigs exposed to transportation stress

Series of bleeding	Number of pigs	Hp g/l	Standard deviation
1	20	0.602 A	±0.512
2	20	0.996 A	±0.702
3	20	1.854 B	±0.809

A – B : $p \leq 0.01$



The mean in series 1 was 0.635 g/ml and ranged from 0.02 to 1.55 g/ml. In 45% of all individuals examined in the experiment, Hp concentration exceeded 50 g/ml, which indicated the activation of immune system in the pre-transport period resulting from disease or poor keeping conditions. The mean in series 2 increased to 0.996 g/l (0.175-2.95) and the percentage of individuals with Hp > 0.50 g/ml was 70%. In series 3 the mean reached 1.854 g/l (0.875-3.90). There were statistically significant differences between series 1 and 3, and series 2 and 3 ($p < 0.01$).

Transportation stress (series 2 vs. 1) resulted in 65.3% Hp concentration increase (not statistically significant differences). Resting period (series 3 vs. 2) did not stop the increase of Hp level, which was 86.2% ($p < 0.01$).

According to Pineiro M et al. (2001), transportation conditions determine serum APP (pig-MAP, haptoglobin) to a higher degree than the time of journey. Comparing two transports, one lasting 48 h and the other one - 24 h, where the first provided excellent conditions (2 m²/boar, feed, water, sawdust) and the second only average (1.5 m²/boar, no feed, water, sawdust), it was found that pig-MAP increased 1.4 and 3.4 times and haptoglobin 1.2 and 1.4 times.

The results of our study indicated that haptoglobin is useful and sensitive marker in monitoring of transportation stress in pigs and their welfare status.

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