

AGGRESSIVE BEHAVIOUR RELATED ACUTE PHASE RESPONSE IN PIGS

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Introduction

Swine loading and transport both involve exposure to social stress (mixing of unfamiliar animals) and physical stress (rough handling). Severe and persistent stress, or a series of stressors, can lead at first to a pre-pathological state, and eventually to a diseased state which itself leads to decreased reproduction, changed metabolism and the development of abnormal behaviour such as tail and ear biting or cannibalism. Tail biting is one of the most important welfare reducing factors in modern pig production.

The acute phase response consists in the release, stimulated by proinflammatory cytokines, of acute phase proteins (APP) into the bloodstream, in response to a challenge. Positive APP in pigs include haptoglobin (Hp), C-reactive protein (CRP), major acute phase protein (pig-MAP) and serum amyloid A (SAA). Their induction is associated with a decrease in synthesis of negative APP such as albumin (Alb), the most abundant constitutive plasma protein, retinol binding protein (RBP), α_1 -acid glycoprotein and transthyretin. The combination of results from positive and negative APP in an acute phase index can increase their diagnostic potential.

The aim of this work was to evaluate the role of some positive and negative APP in farming pigs after a long distance transportation and a subsequent aggression episode.

Materials and Methods

20 Landrace x Large White 4-months old gilts were imported from Denmark to Italy (a 48 h journey) and then monitored for 28 days. The animals were located in a 6 x 3.5 meter pen with food and water *ad libitum*. Blood samples were collected from the jugular vein immediately upon arrival and 28 days later (T₁, T₂₈). On day 25 the pigs developed an aggressive behaviour consisting in tail biting episodes and resulting in physical injuries (skin lesions, wounded and bleeding tails).

Serum samples were obtained by centrifugation (3000 rpm, 10 min) and stored at -80°C. Serum haptoglobin and SAA concentrations were measured with commercial assay kits (Tridelta Development, Greystones, Ireland), while pig-MAP concentration was determined with a sandwich ELISA test (PigCHAMP Pro Europa S.A., Segovia, Spain). Serum albumin was first separated by agarose gel electrophoresis (Paragon Serum Protein Electrophoresis Kit, Beckman Coulter) and then quantified by densitometry. Total proteins concentration was performed with a commercial assay kit (BCA Protein Assay Reagent Kit, Pierce, Rockford). Results were statistically analysed by the Spearman test, parametric methods (t-paired student test) and non parametric methods (Kruskal-Wallis and Wilcoxon tests) with the Analyse-it software.

Results

Results here below show acute phase proteins concentrations related to the total proteins concentration: APP values in Fig. 1 are expressed as the percentage of total proteins. Positive acute phase proteins, Hp and pig-MAP, concentrations were found to be significantly increased ($p < 0,001$) on T₂₈ compared to their values on T₁. SAA showed very low concentrations in T₁ and higher levels on T₂₈. Negative acute phase protein albumin showed a high and statistically significant decrease ($p < 0,001$) in T₂₈ levels, compared to T₁ levels.

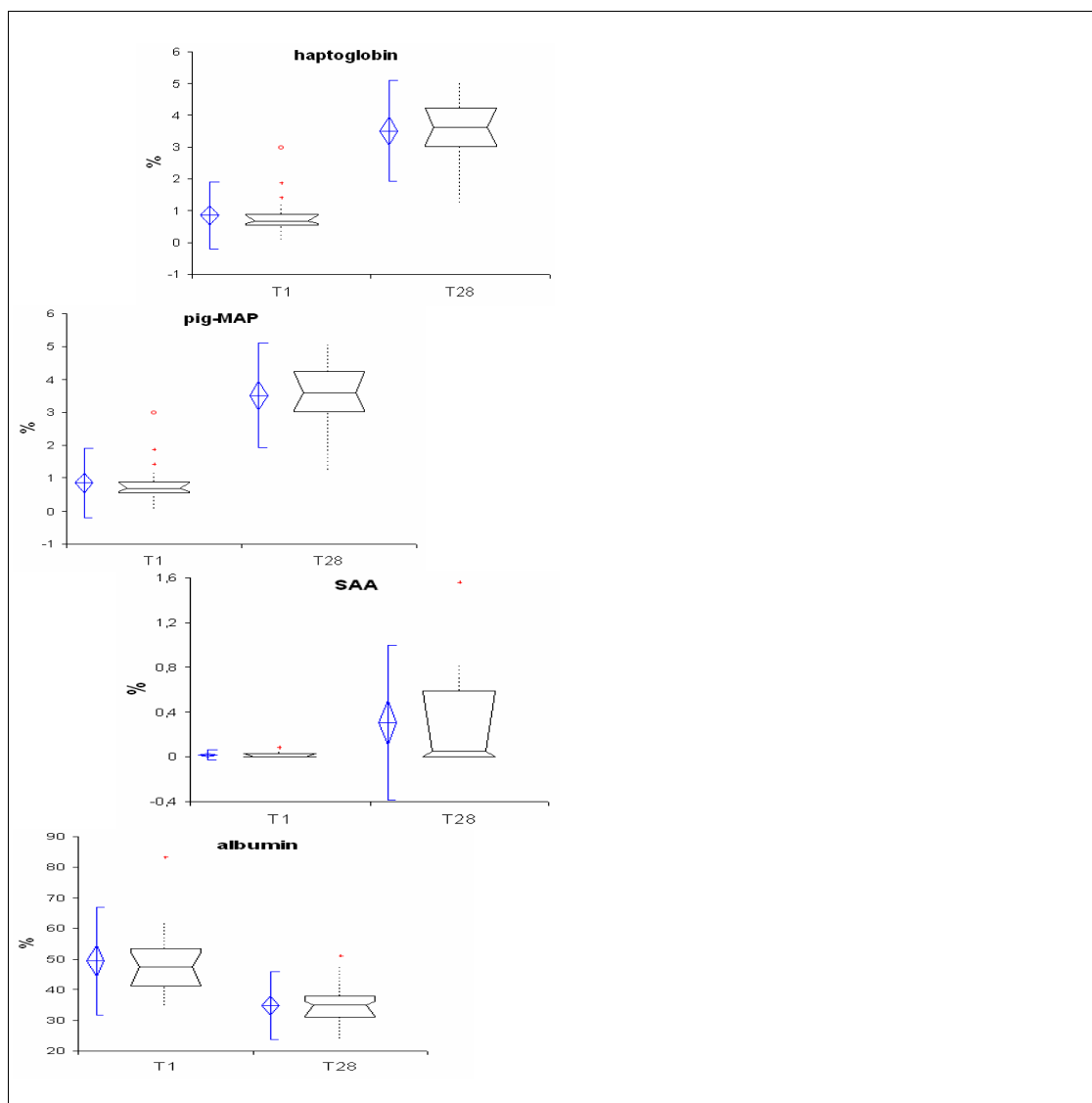


Fig.1 – pig-MAP, SAA, Hp and Alb boxplots.

Discussion

These results show that stress affects the behaviour and the welfare of farming animals. Furthermore, tail biting induces a strong acute phase reaction, demonstrating the great potential of acute phase proteins in veterinary medicine: APP are useful tools in monitoring inflammatory processes for diagnostic and prognostic purposes and also for analyzing various non-inflammatory conditions. An acute phase index, incorporating positive and negative acute phase proteins, can provide valuable information for assessing animal health and help to promote an optimal growth in the farm.