

THE STRESS RESPONSE IS STRESSOR-SPECIFIC: COMPARISON OF RESPONSES TO SOCIAL AND INFLAMMATORY CHALLENGES IN PIGLETS

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Introduction

The aim of the present experiment was to characterise the stress response in weaned pigs at endocrine, immune and behavioural levels. For this purpose, the responses to psychic and immune stressors were compared.

Material and Methods

At twenty eight-days, piglets were moved to a weaning room and housed with their litter-mates. Stress treatments were administered five days after weaning (day 0), when most of the acute physiological adjustments of weaning have disappeared. Piglets were either separated from their litter and moved in a new group until the end of the experiment (mixed (M) group, n=8), either injected by intra-peritoneal route with 50 µg/kg lipopolysaccharide (LPS group, n=8) or remained undisturbed in their litter pen (control group, n=8). Responses to stressors were assessed by measuring salivary cortisol, blood lymphocyte proliferation and behavioural activity from day -1 (one day before stress) until day 3 (three days after stress). In mixed pens, an index of dominance, assessing the final social rank of each cage-mate, was determined by direct observation of agonistic interactions.

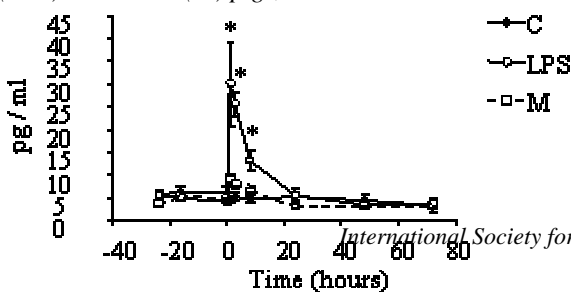
Results and discussion

LPS induced a transient increase in salivary cortisol (figure 1) and inhibited the phytohemagglutinin-induced proliferation of lymphocytes (figure 2). Mixed pigs fought during the first thirty minutes after regrouping. Mixing induced a smaller increase in salivary cortisol than LPS administration and lymphocyte proliferation was not affected.

Consequences of mixing on behaviour were very different from the response to LPS (figures 3 and 4). LPS challenged pigs displayed sickness behaviour (decreased locomotor activity and feeding behaviour). A transient increase in the frequency of activities that were not synchronised with the other group members on day 0 reflects the higher frequency of resting activity in LPS pigs.

In mixed pigs, the frequency of desynchronised activities was increased until day 2 while locomotor activity and feeding behaviour were not affected. This behavioural desynchronisation could be interpreted as an attempt to avoid other pigs at the feeder or at the water nipple. Interestingly, salivary cortisol and locomotor activity were correlated with social rank (figure 5).

Figure 1: salivary cortisol in control (C), LPS-challenged (LPS) and mixed (M) pigs, * $P < 0.05$.



Conclusion

These results show that mixing young pigs is stressful and that the amplitude of the stress response depends on social rank. Furthermore, they demonstrate that animals develop stressor-specific endocrine, immune and behavioural responses to adapt the situation

Figure 2: Blood lymphocyte proliferation in response to increasing doses of phytohemagglutinin in control (C), LPS-challenged (LPS) and mixed (M) pigs, * $P < 0.05$.

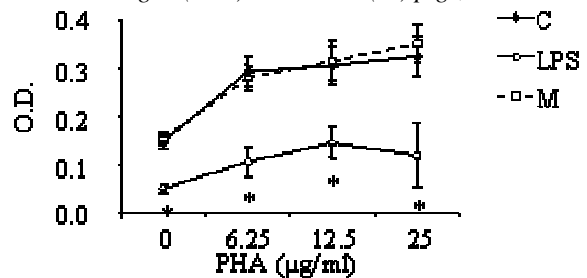


Figure 3: Locomotor activity from day -3 until day 3 after challenge (day 0) in control (C), LPS-challenged (LPS) and mixed (M) pigs, * $P < 0.05$.

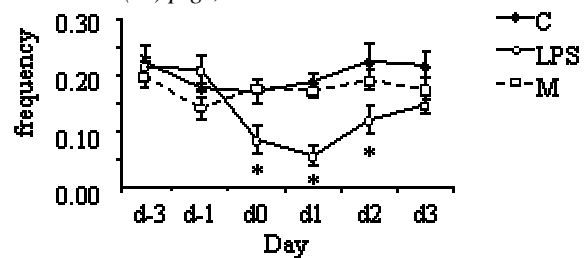


Figure 4: Behavioural desynchronization of control (C), LPS-challenged (LPS) and mixed (M) pigs with their group, * $P < 0.05$.

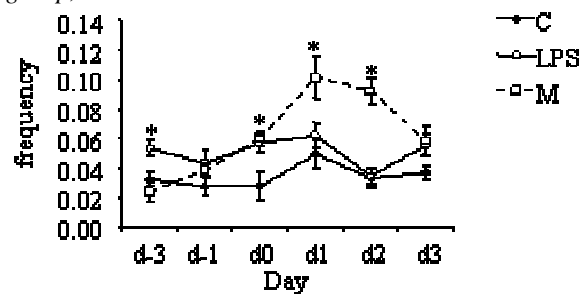


Figure 5: Correlation between dominance index and salivary cortisol 3 hours after mixing.

