Shipment associated effects on the somatotropic axis in pigs - a pilot study

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Methods

Animals: ECE market weight (115 ± 7.9 kg) crossbred gilts (Danish Landrace x Yorkshire x Essex × Pietrain boar). All gilts were assigned to transport trials according to slaughterhouse regulations. 

Analysis: IGF-1 and -2 were analysed using ELISA. IGF-binding proteins -3, -2 and -5 were analysed using quantitative Western Ligand blotting (qWLB). As markers for IGFBP binding capacity, IGF-1 bioavailability and somatotropic growth, the total amount of IGFBPs, the ratio of IGF-1 to total IGFBPs and IGFBP-3 to -2 were calculated, respectively. Stress and inflammatory response were characterized by corticosterone (ELISA), corticosterone (MS/MS), stress vocalization (STREMODO software) and Interleukine-2 (IL-2, ELISA).

Results

Effects of sampling time on stress and inflammatory response

- Shipment-induced increase of glucocorticoids
- Increased levels of IL-2 after shipment
- Increased stress vocalization especially during loading and unloading

Effects of repeated blood sampling in the pre-slaughter period on parameters of IGF-system in exsanguination blood

- Plasma concentrations of IGFBP-3 and IGFBP-2 were reduced over time
- Plasma IGFBP-5 concentrations were highly dynamic between selected segments of the transportation chain and similar to IGF-1
- IGF-1 concentrations were not regulated acutely
- Increase of IGFBP-5 after shipment
- Plasma concentrations of IGF-1, IGFBP-3 and the IGFBP-3/IGFBP-2 ratio in exsanguination blood
- Decrease of IGFBP-3, -2 and IGFBP-5 after exsanguination

Summary and Conclusion

- Evidence that compounds from the IGF-system are regulated by a number of stressors
- Plasma concentrations of IGFBP-3 and IGFBP-2 were reduced over time
- Plasma IGFBP-5 concentrations were highly dynamic between selected segments of the transportation chain and similar to IGF-1
- IGF-1 concentrations were not regulated acutely
- Increase of IGFBP-5 after shipment
- Decrease of IGFBP-3 and IGFBP-5 after exsanguination
- The signature of the IGF-system contains a complex set of information for specific segments in the transport process from farm to slaughter

> Evidence that compounds from the IGF-system are regulated by a number of stressors

> Monitoring compounds from the IGF-system in pigs may generate novel biomarker information and improve current standards of animal husbandry.

Background

The acceptance of animal products is increasingly associated with standardized animal welfare, which relates to appropriate animal husbandry in conditions from birth, weaning, and fattening. In particular, shipment to the slaughterhouse is considered as a critical process exposing the animals to a number of, in part outmost, stressors. For the documentation of animal welfare, significant animal-based biomarkers are still missing. In the present study, the IGF-system has been assessed in a commercial pig transport in conjunction with established markers of stress response. Furthermore, the effect of repeated restraint as experimental model for repeated acute stress was investigated.