

Does housing in a „social box“ change faecal cortisol metabolites concentration in stallions?

C. Wyss¹, A. Zollinger¹, R. Palme², I. Bachmann¹

¹ Agroscope, Swiss National Stud Farm, Les Longs Prés 191, CH-1580 Avenches, Switzerland

² Institute for Medical Biochemistry, University of Veterinary Medicine, Veterinärplatz, A-1210 Vienna, Austria

Corresponding author: christa.wyss@agroscope.admin.ch, phone +41(0)584826103

In order to improve the housing conditions of stallions in individual boxes by offering a possibility to have more social contact, the Swiss national stud farm tested a new box system for horses, allowing increased physical contact with the neighbouring stallion. The aim of this part of the study was to investigate whether this type of housing system (named “social box”) potentially induces a change in stress reactions in stallions compared to conventional boxes. Therefore faecal cortisol metabolite (FCM) concentration was measured as a non-invasive parameter to assess endocrine responses related to this new environment.

Four groups each consisting of eight adult Freiberger breeding stallions were included in the test design. Every stallion spent three weeks in a conventional box and in a social box respectively (cross-over design). The conventional box consisted of a separation wall with a lower opaque part and an upper part with vertical barriers (5 cm between barriers), allowing visual and olfactory contact but strongly limiting tactile contact. The separating wall of the social box consisted of two lateral sections, one part being opaque to the ceiling and the second part consisting of vertical barriers (30 cm between barriers), allowing the horse to have physical contact with its neighbour or to avoid it.

In horses, FCM concentration reflects an average level of circulating cortisol over a period of approximately 24h. Faecal samples were collected the day following integration in social / conventional boxes, reflecting the potential stress induced by increased social interactions

during the integration. In order to assess potential chronic stress, faeces samples were also collected in week one, two and three after the integration into the social / conventional box (in total: 4 samples per horse and housing system). The samples were immediately stored at -20°C until they were analysed. The samples were not analysed in the laboratory until the end of the experiment, therefore the duration of conservation in the freezer varied from 40 to 429 days.

A considerable percentage of data from groups 1 and 2 was below the detection limit (<0.8 ng/g) (Tab. 1). Thus the statistical analysis was conducted with the FCM concentration from groups 3 and 4 (n horses = 16) which contained no values below the detection limit.

Tab. 1: Details about FCM values and storage time for the 4 groups of stallions

Group	Storage duration [d]	Proportion of data below the detection limit (<0.8 ng/g)	Mean [ng/g]	Median [ng/g]
Group 1	384-429	55.6 %	2.2	0
Group 2	315-360	25.5 %	5.8	6.3
Group 3	41-79	0.0 %	8.7	8.0
Group 4	40-85	0.0 %	5.8	5.4

Despite the impressive social interactions observed between the stallions directly after being introduced into the social boxes, we did not find any differences in FCM concentration between the stallions being introduced into the conventional box and the social box on the day of integration (social box: n samples = 16, mean±SD: 6.9±4.7 ng/g; conventional box: n samples = 16, mean±SD: 9.0±11.2 ng/g; Wilcoxon signed rank test V = 70, p = 0.94).

Overall the samples taken during integration and in week one, two and three did not show

evidence of changes in FCM concentration in either housing system over a longer period of time (social box: n samples = 64, mean±SD: 7.9±6.2 ng/g; conventional box: n samples = 64, mean±SD: 6.6±3.4 ng/g; Linear mixed model (LMM), $p = 0.56$).

Our results suggest that the possibility of having physical contact with a conspecific does not induce changes in FCM concentration in breeding stallions. The considerable percentage of values below the detection limit in groups 1 and 2 seemed to correlate with the increasing duration of storage before analysis. During the IESM Network Meeting 2015, we would like to discuss possible methodological issues and the possibilities to correctly integrate these low values in the statistical analysis.

Keywords:

housing system, stallions, social interaction, stress, faecal cortisol metabolites