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**Plasma and Faecal Corticosterone
in Chickens (*Gallus domesticus*)**

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of the requirements for the degree of

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ABSTRACT

The overall aim of this thesis was to investigate stress, and plasma and faecal corticosterone secretion in chickens. It is known that social rank may be correlated with glucocorticoid levels and glucocorticoid responses to a stressor in both birds and mammals. The relationship between social rank and glucocorticoid secretion may only be evident during periods of increased environmental stress, such as that caused by social disruption. In the first experiment of the present study, the relationship between social rank index and corticosterone responses to a handling stressor was investigated before and after mixing together two unfamiliar groups of hens. Handling elicited corticosterone responses in most hens and the levels of corticosterone during a response and the magnitude of the response varied between individuals. Middle ranking hens tended to have elevated corticosterone responses to handling relative to low or high ranking birds, but overall, the results did not demonstrate a significant relationship between social rank and corticosterone levels during a corticosterone response or between social rank and the magnitude of the response. Mixing two groups of hens did not produce a sustained period of social stress so there was no concurrent increase in the number of aggressive interactions, corticosterone levels or corticosterone responses to handling after mixing. It was thought that this was because corticosterone responses and behavioural interactions were measured over days rather than hours, and the sampling protocol may have missed any changes in these variables that occurred within a few hours of mixing.

The second experiment investigated the non-invasive measurement of corticosterone in cockerel droppings and the relationship between plasma and faecal corticosterone responses to an ACTH injection. An intramuscular dose of ACTH produced a peak in faecal corticosterone levels whereas two smaller intravenous doses of ACTH, which increased plasma corticosterone levels, did not significantly alter faecal corticosterone. This showed that faecal corticosterone levels may give a non-invasive measure of plasma corticosterone in chickens although the increase in plasma corticosterone levels might need to be large and sustained to be detected in the droppings. The magnitudes of the plasma and faecal corticosterone responses to ACTH were not correlated. Problems with the method used to extract corticosterone from droppings in this study may have affected faecal corticosterone measurements and the radioimmunoassay was not validated. As a result, a different extraction method is now used in our laboratory.

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