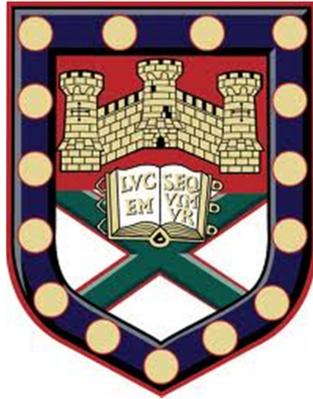


**Howl vocalisations of captive black and gold howler monkeys
(*Alouatta caraya*); acoustics, function and applications for welfare.**



Submitted by Holly Lavinia Antonia Farmer, to the University of Exeter
as a thesis for the degree of Doctor of Philosophy in Psychology
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ABSTRACT

This thesis aims to determine the function of howl vocalisations performed by the black and gold howler monkey, *Alouatta caraya*, and to examine the connections between howling, welfare and breeding in captivity. Comparisons of the behaviours performed during natural howling bouts and during howling bouts in response to experimental playbacks provide evidence for a range of howl functions including regular advertisement of the caller's occupancy and mate defence and attraction. Detailed analyses of howl call acoustics provide the first evidence of both individuality and context-specificity in the calls of *A. caraya* males. These findings further support the functions of intergroup spacing, mate defence and attraction and suggest that howling may act as an honest signal of male quality. Experimental playbacks of conspecific calls stimulated howling by captive male *A. caraya* and affected other behaviour patterns suggesting that playbacks are an effective form of environmental enrichment to enhance captive welfare. However, the efficacy of conspecific call playbacks as a form of enrichment were not reflected in the opinions of *A. caraya* keepers surveyed: responses to the use of this type of enrichment were unenthusiastic, and the routine use of auditory enrichment for captive primates was limited. Analysis of the European studbook found that individuals housed in a family group rather than a pair, and those which are regularly exposed to the calls of conspecific males had higher reproductive success. Also, males who performed higher rates of howling had higher reproductive success providing the first evidence of a link between howling and breeding rates. These findings contribute to the knowledge of howl vocalisations in *Alouatta* species and the influence of captivity on a highly vocal primate species. From thesis results it is recommended that captive *A. caraya* be housed in social groups containing more than one male and one female and that the playback of conspecific

male howl calls be introduced into the husbandry of groups to provide a more naturalistic auditory environment.

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