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Some characteristics of brain electrical activity in the
domestic chicken

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Amanda Elizabeth McIlhone

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Abstract

Studies in mammals have used measures of brain activity, such as the electroencephalogram (EEG), to assess animal welfare. The aim here was to determine whether the EEG could be used in a similar way in birds.

The effects of anaesthesia on the chicken EEG were relevant for later studies on anaesthetised chickens. Therefore the effects of different concentrations of four anaesthetics were recorded. The EEG was also used to examine the development of brain activity in chicks with relevance to the onset of consciousness. The EEG has been used to record responses to noxious stimulation in anaesthetised mammals (i.e. without the animals experiencing pain). To test this model in birds, anaesthetised chickens were exposed to noxious stimuli as their EEG was recorded. The EEG response to decapitation was also recorded in anaesthetised chickens to assess whether this is a suitable method to use for killing chickens.

Halothane caused less suppression of brain activity than some of the other agents, which suggests halothane would be a suitable agent to use in chicken EEG studies. EEG first appeared on day 13 of the chick's incubation, frequency and amplitude increased until day 17. EEG activity decreased before hatching, possibly due to an oxygen shortage in the egg. Consciousness seems unlikely until after hatching. There did not seem to be any consistent change in the EEG after noxious stimulation. This result contrasts with that found in mammals, and may be due to differences in brain anatomy between the two species. It would be worthwhile conducting further research to explore generators of the EEG and pain processing in birds. After decapitation there were significant changes in the EEG. The EEG also persisted for around 35 seconds following decapitation. This may indicate that consciousness is not lost instantly at the time of decapitation and that decapitation is an unsuitable method of killing chickens.

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Commonly used acronyms

Acronym	Meaning
ANOVA	Analysis of variance
BSR	Burst suppression ratio
ECG	Electrocardiogram
EEG	Electroencephalogram/electroencephalographic
MAC	Minimum anaesthetic/alveolar concentration
SEM	Standard error of the mean