

Hens know what they are waiting for: the effect of reward type on appetitive behaviour

Janicke Nordgreen¹, Randi O Moe², Andrew M Janczak², Berry M Spruijt³ and Morten Bakken⁴

¹The Norwegian School of Veterinary Science, Department of Pharmacology and Toxicology, Oslo, Norway

²The Norwegian School of Veterinary Science, Department of Production Animal Clinical Sciences, Oslo, Norway

³University of Utrecht, Department of Biology, Utrecht, The Netherlands

⁴The Norwegian University of Life Sciences, Department of Animal- and Aquacultural Sciences, Aas, Norway

janicke.nordgreen@nvh.no

Animal behaviour in unconditioned choice tests and in instrumental (operant) and classical (Pavlovian) conditioning paradigms can be used to assess what animals like and the strength of motivation for incentives. Such tests in laying hens (*Gallus domesticus*) indicate that mealworms (WORM) have a higher incentive value than whole wheat (WHEAT). In a classical conditioning paradigm, laying hens display a sequence of appetitive arousal-like behaviours including frequent head movements and an upright body posture with their neck stretched in response to a cue signalling a mealworm reward. However, whether this conditioned appetitive behaviour is modulated by the incentive value of the announced feed reward has not yet been tested in laying hens. The purpose of this study was therefore to investigate whether conditioned cue-induced appetitive behaviour in sated or fasted laying hens differentially reflects the incentive value of expected rewards. A potential involvement of opioid receptors in mediating cue-induced appetitive responses was investigated by blocking μ -opioid receptor transmission with naloxone. A classical conditioning paradigm was used to train hens to associate a cue (green or red light flash) with a forthcoming reward (WHEAT or WORMS, respectively). Blue light served as a non-rewarded control. Cue-induced appetitive behaviours; i.e. number of head movements, latency to initiate first head movement, number of steps, and latency to peck at the reward was investigated in a cue-reward interval (i.e. anticipation period) of 25 sec. Incentive value of signalled reward was differentially reflected by the number of cue-induced head movements ($F_{2, 139} = 90.13, P < 0.0001$; WORM (mean \pm SE) 33.0 \pm 0.9, WHEAT 28.9 \pm 1.1, unrewarded control 17.2 \pm 1.0). The type of reward also affected the number of steps ($F_{2, 139} = 16.05, P < 0.0001$) and the latency to display the first head movement (Kruskal-Wallis test: $P < 0.0001$). Both WORM and WHEAT induced a higher number of steps and a lower latency to display head movements than the unrewarded cue. Hunger increased the number of head movements ($F_{1, 139.9} = 12.21, P < 0.0006$), and steps ($F_{1, 139.7} = 6.42, P < 0.013$). There was no evidence for a role of naloxone in modulating the intensity of cue-induced appetitive behaviour in laying hens. The results indicate that hens can discriminate between light signals associated with rewards differing in their attractiveness, and that appetitive behaviour can be used to measure appetitive emotional responses.