Factors influencing the motivation of sheep for food

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Abstract

The measurement of strength of motivation is a tool used to assess the resources that an animal values and, subsequently, may aid in determining its welfare. However, the relationship between animal motivation and welfare is not well defined, with conclusions based on the assumption that welfare is reduced if a ‘valued’ resource is not provided. One possible way to better understand the relationship between changes in motivation and welfare is by investigating the factors that influence motivation in a demand test. This may provide a better understanding of motivation and may assist in elucidating the implications of changes in motivation on welfare and welfare assessment. Therefore, this thesis aimed to investigate factors that may alter the motivation of sheep for food in a behavioural demand test. Mature Merino wethers were trained in a 50m U-shaped lane to access a double-sided feeder and earned a food reward with each access event. Three different experiments were undertaken examining the effects of: 1) energy balance (comparing a 0h and 14h food deprivation); 2) energy density (comparing motivation for a high energy and low energy food) and; 3) the opioid reward system (comparing motivation for a high energy and low energy food with and without the administration of an opioid antagonist) on a ruminant’s motivation for food. In each experiment either 8 or 10 sheep were tested to see how many times in a 20h period they would walk various distances (costs) for a 4g food reward after exposure to differing treatments. The main results indicated that energy balance (the difference between energy expended and energy consumed) may aid in determining feeding motivation at costs of 25m and less. However, no sheep stopped working for food at or near the point of zero energy balance (where energy consumed equals energy expended) and all sheep consistently worked for food at longer costs while in an energy deficit. The $P_{\text{max}}$ (cost at which maximum responding occurred) and the estimated cost at zero energy balance were between 29 and 41m across all treatments and experiments. This may suggest that feeding motivation begins to decline near the point of zero energy balance. However, it is difficult to identify which metabolic feedback system or nutritional parameters might be influencing this result. Sheep also exhibited higher levels of motivation toward a low energy compared to a high energy food at costs of less than 25m, and a µ-opioid receptor antagonist, naltrexone hydrochloride, was effective at reducing food rewards earned. This indicates that sheep work harder to access food with a lower energy density, possibly, to attain sufficient energy levels, and suggests that both energy balance and the opioid reward system may be influencing feeding motivation. The experiments undertaken for this thesis were not able to provide conclusive
evidence as to how these factors might influence welfare and welfare assessment. However, various hypotheses have been proposed, as have possible directions for further research.
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