

Visual discrimination learning and spatial acuity in sheep

ABSTRACT

Visual acuity is an important component of environmental recognition in sheep, yet knowledge about it is limited in this or other herbivorous species. We tested the ability of British Friesland × Texel female lambs to discriminate black and white square-wave gratings, presented vertically or horizontally, from a grey stimulus. Animal and environmental conditions were optimised for detection of visual acuity. Sheep could rapidly learn to discriminate some gratings from a grey stimulus. There was no difference in the ability of sheep to discriminate vertical or horizontal stimuli from a grey stimulus. Visual acuity, determined at between 11.7 and 14.0 cycles/degree, was greater than that previously predicted from anatomical measurements (7610 cycles/degree), and considerably greater than that measured for sheep by the Landoldt C ring technique (2.665.7 cycles/degree). It was also greater than that measured previously in most research using ungulates and other herbivores, with a variety of techniques. It is concluded that sheep visual acuity is potentially greater than hitherto realised, but that standardisation of techniques is required to make accurate comparisons with data gathered previously. Additionally, the ability to gauge an animal's awareness and its response(s) to various visual optotypes in its macro-environment will enable us to design livestock housing, handling and transport facilities that promote animal welfare.

Keyword: Discrimination learning; Sheep; Square-wave gratings; Visual acuity