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Technical contribution: a cautionary note on the use of behavioural diversity (H-Index) in animal welfare science

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Abstract

Animal welfare scientists actively seek reliable and practical metrics that can serve as indicators of animal welfare for use with agricultural, laboratory and zoo-housed animals. Behavioural diversity as a welfare concept originated from early welfare scientists linking poor animal welfare with a high proportion of time spent engaged in stereotyped behaviours and little expression of behaviours that would be expected under wild, or natural conditions. Recently, the concept of behavioural diversity as a welfare indicator has been widely adopted and is frequently quantified by the Shannon-Wiener Diversity Index (H-index). However, the H-Index is fraught with theoretical and mathematical limitations when applied to animal welfare. Four key problems with this metric are demonstrated: the metric's responsivity to the size of the behavioural repertoire and the underlying assumption that larger behavioural repertoires reflect better welfare, the sensitivity of the metric to arbitrary decisions about the resolution of behavioural categories, the fact that the calculation of the metric is agnostic to the valence of behaviours, and the metric's susceptibility to the common practice of excluding some behavioural categories. Moving forward, we recommend focusing on validated welfare measures that are sensitive to valence when evaluating animal welfare.

Keywords: *animal welfare, behavioural diversity, H-index, Shannon-Wiener Diversity Index, welfare metrics, well-being*