



Research

Browse-related behaviors of pastured horses in Australia: A survey

Mariette van den Berg^{a,b,*}, Wendy Y. Brown^a, Caroline Lee^c, Geoffrey N. Hinch^a^aSchool of Environmental and Rural Science, University of New England, Armidale, New South Wales, Australia^bMB Equine Services, Armidale, New South Wales, Australia^cCSIRO Agriculture Flagship, Armidale, New South Wales, Australia

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ABSTRACT

This study investigated the husbandry and management practices of Australian horses at pasture and observed browsing behavior (i.e., the consumption of nonpasture plant species). Horse owners were contacted via horse magazines, social media Web sites, and horse industry councils and invited to complete an online survey. Information was collected on location, husbandry, and feeding management of their horse(s), pasture conditions, the observation of specified behaviors and forage selection by their horse(s) at pasture. The survey had 497 respondents across Australia who owned a total of 3,082 horses. Most horses (85%) had access to grazing areas 16–24 hours per day. Owners commonly (90%) observed ≥ 1 pasture problems on their property, and the mean number of problems was similar across grazing areas of < 2 , 2–10, and > 10 ha. Although the horses had access to pasture, there was a heavy reliance on supplementary feeding. Approximately 95% of the horses were fed concentrates and/or supplements on a daily basis, and 86% of the horses were offered conserved forage. Surveyed behaviors were reported by 75% of the respondents, with bark chewing and licking or eating dirt being the most prevalent behaviors. Almost three-quarters of the horse owners indicated that their horses browse on parts of trees, shrubs, or other nonpasture species. This study verifies that Australian horses consume a range of nonpasture species and frequently demonstrate bark-chewing behavior while at pasture. It is currently unclear if the selections of browse and bark stripping observed in this study are a function of reduced pasture availability or vegetation diversity and diet choices.

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Introduction

The horse evolved as a grazing and browsing herbivore and is adapted to consume a diverse plant-based diet high in fiber (Goodwin, 1999; Harris, 1999). Feral and free-roaming horses have been observed to selectively sample over 50 different species of forage (Hansen, 1976; Putman et al., 1987). The selection of a wide range of plant species has also been recorded in pastured domestic horses (Archer, 1971, 1973). Horses exploit the heterogeneity of resources by taking a few bites of individual plants before walking a few steps to a new feeding station (patch foraging), which allows horses to choose a diet of better quality than the average vegetation on offer (Prache et al., 1998).

Many domesticated horses are managed under conditions far removed from the free-ranging environment. They are routinely housed in stables and small paddocks and rely completely on humans for the selection and delivery of their diets. Intensively managed horses commonly receive infrequent cereal-based concentrate diets with limited forage and little, if any, variation (Davidson and Harris, 2007; Goodwin et al., 2002). Such feeding practices reduce the opportunity for foraging behavior and subsequently may affect the well-being of the animal (Davidson and Harris, 2007; Nicol, 1999a). The restricted quantities and variety in the forage provided to stabled racehorses has been correlated with an increased risk of developing stereotypical behavior such as crib biting or wind sucking, wood chewing, and weaving (McGreevy et al., 1995a).

Many Australian horses are typically managed on small acreage pastures (paddocks) all year round and may be confined to stables for certain periods. Even where horses have access to pasture, certain stereotypical behaviors such as wood chewing and crib biting or wind sucking have been observed (Pell and McGreevy,

* Address for reprint requests and correspondence: Mariette van den Berg, BAppSc, MSc, School of Environmental and Rural Science, University of New England, Armidale, New South Wales 2351, Australia, Tel.: +61 (0)404 849 396; Fax: +61 (0)2 6773 3922

E-mail address: info@mbequineservices.com (M. van den Berg).

1999). Horses remain largely dependent on humans for the timing, selection, and delivery of their diet and pasture management. In situations of limited forage and pasture availability, time spent feeding is reduced, and this could have implications for the physical and mental health of the horse (Cooper and Albentosa, 2005; Nicol, 1999a; Pell and McGreevy, 1999). It is known that food and fiber restriction can prompt horses to consume alternative options including stable bedding, wood, and bark (McGreevy, 2004).

Australian pastured horses are kept in variable climates including temperate, arid, and tropical environments. The horses can be exposed to a wide range of vegetation types including forest and shrub lands. The selection of nonpasture species (browse) has been primarily studied in free-roaming and feral horses. Thus, there is limited information available regarding the time spent feeding, diet selection, and foraging behavior of domesticated horses in pasture environments. Therefore, the aim of the present survey was to investigate the frequency of owner-reported alternative forage selection by domestic pastured horses in Australia. We also asked for information on feeding management, pasture conditions, and animal behaviors.

Materials and methods

The study was approved by the Human Ethics Committee of The University of New England (approval number HE12-071). A questionnaire with 15 multiple-choice and 4 free-text questions was designed to gather information on horse-management practices and the horse owner's observation of browsing behavior in horses kept on pasture. Questions were asked regarding the demographic characteristics of the horse owners. The postcodes of the respondents were recorded to allow the data to be transferred to a vegetation map of Australia. The horse owners were asked to supply details about the husbandry and feeding management of their horse(s), including the total number of horses owned or managed, housing (e.g., own property and/or boarding), workload of the horse(s) (e.g., maintenance, light, moderate, or heavy exercise), and supplementary feeding practices (e.g., conserved forage, concentrates, and additives). We also collected data on the total hours the horse(s) had access to pasture, the estimated total size of the grazing area available to their horse(s), and the type of pasture or land problems encountered (e.g., overgrazing, weeds, erosion, compaction, water logging, salinity, and other land or pasture problems). If horses had access to pasture, then the respondents were prompted to provide information about the presence of trees and shrubs directly in or around the pasture areas, the ingestion of vegetation other than grasses and legumes by horses (e.g., evergreen trees, deciduous trees, coniferous trees, shrubs, water plants, forbs, ferns, mosses or lichens, and other browse species), and parts of the plant consumed (e.g., leaves, twigs, bark, flowers, and roots). In addition, questions were asked about owner's observation of specified behaviors such as bark chewing, eating or licking sand or dirt, pawing the ground, crib biting or wind sucking, excessively licking objects, pacing paddock or boundary fence, grinding teeth, weaving, and other behaviors. We also asked questions about the circumstances associated with these behaviors (e.g., pasture, stable, feeding, or other circumstances).

For each question on the management, feeding, or behavior of the horse(s), the horse owners provided a binary response of yes or no, and the number of horses per question. Horse owners were able to select multiple options that applied to the care or management of their horses. For example, horse owners were able to select ≥ 1 feed ingredient option when asked about the use of supplementary feeds (concentrates, supplements, and roughage) and could provide the total number of horses receiving these products. A free-text area was provided for multiple-choice questions that included the option "other."

The survey targeted Australian horse owners who manage their horses on pastures. The target group included private owners, breeders, studs, and boarding operations. There is no horse-owner database available from a central point in Australia. Therefore, a variety of approaches were used to reach the target group. The questionnaire was made available online via the QualData (Courtts J&R Pty Ltd, Toowoomba, Queensland, Australia) market research and evaluation Web site with a timed link (available for 6 months). The online questionnaire was advertised in 3 national equestrian magazines and circulated on social media Web sites and national horse forums between the months of July and December 2012. In addition, the Australian Horse Industry Council and Queensland Horse Council distributed the Web link via e-mail to members. The cover letter emphasized the anonymity of the survey and the importance of responding, even if the owners did not observe any foraging behaviors. There were also incentives advertised to improve the response rate from the target groups. It was estimated that a total population of 25,000 horse owners was reached on the basis of the magazine readership, horse council member database, and social media statistics. The respondents are not necessarily representative of the general horse-owner population because of the voluntary nature of the responses.

Statistical analysis

All data from the completed questionnaire were transcribed into Microsoft Excel (Microsoft Office 2011). All analyses were performed in R, version 2011 (Team R, 2011), and the level of significance was set to $P < 0.05$. A 1-way analysis of variance was used to determine the means and confidence intervals (CIs) for the number of horses in the different grazing areas, and if nonparametric, a logarithmic transformation was applied. Linear models were used to examine whether the average number of horses or pasture or land problems differed across the grazing areas. When terms were significant, a least significant difference post hoc test was used to determine which levels were different from each other. The differences in the distribution of horse counts for pasture, stabled, and feeding circumstances across the observed behaviors were analyzed. The behavior options weaving, grinding teeth, and "Other" were removed from the analysis because of their low occurrence, which may violate the assumption of analysis < 5 counts for $> 5\%$ of the responses. Contingency tables were tabulated and tested using a chi-square test. If the overall test was significant, then follow-up pairwise comparisons within the contingency table were performed.

Results

The response rate of the survey was approximately 2% (512 respondents) and consisted mainly of equestrian horse owners (470 of 512). The completed questionnaires were obtained from a total of 497 horse owners across all states and territories of Australia. The owners had a total of 3,082 horses.

Demographics and population

Of the 497 respondents with completed survey data, 236 (48%) resided in Queensland, 120 (24%) in New South Wales, 88 (18%) in Victoria, and 22 (4%) in Western Australia. In addition, 14 (3%) resided in South Australia, 11 (2%) in Tasmania, 3 (1%) in Northern Territory, and 3 (1%) in Australia Capital Territory. The higher number of respondents from Queensland may be a result of a targeted e-mail or newsletter spread by the Queensland Horse Council. This horse council has a large and active database.

The dispersal of the respondents based on the postcodes indicated that a large range of climate zones was covered including

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