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Equine nutrition: A preliminary investigation of feeding practices in equine veterinary hospitals in the USA

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Abstract:

Nutrition plays an important role in equine rehabilitation, with contradictory approaches existing on correct nutritional management of patients. The preponderance of information related to nutrient requirements for horses was designed for healthy horses. Very little scientific research has been undertaken to determine specific recommendations for horses with health issues. This study provides a preliminary assessment of current feeding practices within equine hospitals in the USA. A survey was distributed to equine veterinary hospitals (n=115) and the response rate was 21%. The responses provided information on the demographics of equine veterinary professionals, facilities and equine patients, and current nutritional practices. A substantial number of hospitals housed 51 to 100 patients (30%) on a short-term basis of between 1 to 3 days (38%), treating a wide variety of conditions; several of which require strict dietary management (colic, laminitis and metabolic disorders). All facilities fed hay as the forage source and 9 (38%) provided pasture turnout. Only one facility fed forage only, the rest fed supplementary feeds: including complete feeds, pelleted feeds and cereal grains. Seven facilities (30%) fed all patients the same type of feed, but none fed patients the same amount of feed. Most facilities had specific nutritional protocols in place (79%); half had conducted feed analyses and half also consulted a nutritional advisor. As the first known study to investigate the nutritional management strategies of equine hospital environments, a clear need for further research and validation of results is required.

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Introduction

Nutrition is an essential component of equine health and welfare [1]. Nutritional recommendations for the domestic horse allow us to calculate basic feed requirements based on different parameters such as age, weight and activity level [2]; however, there are little recommendations available for the nutritional management of horses with impaired health. Thus, it would seem sensible that equine patients post-surgery and during a rehabilitation period may benefit greatly from the support of an individual nutritional assessment taking place. Several conditions, such as hepatic diseases, renal diseases, metabolic (equine metabolic syndrome, laminitis, pituitary pars intermedia dysfunction) and digestive system problems, particularly colic, require unique nutritional management. Aside from postoperative and rehabilitative status, other factors to be considered when formulating patient rations include: geographic location, medical history, exercise, use and individual metabolism [3], bodyweight and body condition. Consequently, in agreement with AAEP recommendations, an equine nutritional expert should be consulted and nutritional evaluation of feedstuffs should be undertaken to ensure the patient's needs are met and appropriate dietary support is formulated. However, anecdotal evidence suggests that appropriate nutritional protocols are not always available and/or implemented in equine hospitals. Moreover, whilst there have been several surveys relating to nutritional practices of horse owners, none have been conducted to assess the nutritional management of horses in equine hospital environments.

Consequently, the aim of this study was to ascertain information on post-operative and rehabilitation feeding practices in equine hospital environments in the USA to determine if nutritional strategies appear appropriate.

Materials and methods

Participants

This study involved a survey designed to ascertain information relating to post-operative and rehabilitation feeding practices in equine hospitals. The target population was equine hospitals in the USA.

Survey design

Pre-testing via a pilot survey was carried out as recommended by Robson [4]. Pilot study feedback inferred only minor modifications to question phrasing, aimed at making sure questions were interpreted correctly. A copy of the survey can be obtained from the corresponding author. Electronic correspondence and survey methods were used, including initial invitational emails designed to identify willing participants [4], an approach that has been shown to enhance response rates compared to paper-based versions [5]. All efforts were made to identify direct correspondence emails for owners or employees involved directly, or in supervision/management of post-operative and rehabilitative care of patients; however, in some instances, general facility email addresses had to be utilised, inhibiting regulations on participating individuals.

Statistical analyses

Data were gathered in the Bristol Online Survey tool and were downloaded into an Excel spread sheet in a coded form with a key. Quantitative data were analysed for descriptive statistics and non-parametric statistical tests using SPSS statistical software. All data were analysed for median and measures of variation.

Results

Demographics

The survey response rate was 21 %, with 24 out of a possible 115 responding. The majority of respondents were veterinarians (n=18: 75%), with the remaining being veterinary nurses (n=6). All respondents reported to have more than 5 years experience in the equine veterinary industry and all received their training in the USA.

Respondents were from facilities located in Texas (n=3), Kentucky (n=2), California (n=1), Colorado (n=1), Florida (n=1), Illinois (n=1), Pennsylvania (n=1) and Tennessee (n=1). Half of the establishments surveyed had been in operation servicing the horse industry for >20 years.Just under half of respondents claimed ownership of the facilities surveyed (47%) with the remainder being employed. A large number of facilities were large-scale operations housing between 51 and 100 patients (30%:), with 22 % housing between 21 and 30, and a further 22 % housing between 21-30 and the remaining 26 % housing under 20. Most facilities (38%) housed the majority of their patients for between 1 and 3 days; remaining facilities stated length of stay as follows: 34 %for 1-3 weeks; 19 %for 1-3 months. All facilities reported to treat a range of horse breeds engaged in a variety of equestrian disciplines (dressage, eventing, show jumping, racing) and across all ages, but with the majority of patients being over 7 years of age. All facilities specified treatment of soft tissue injuries (including tendon and ligament surgery or disorders); colic and laminitis/founder, orthopaedic and metabolic conditions.

Nutritional practices

Both forage and grain (including single cereals and complete feeds) were fed by 23 facilities, only one facility fed solely forage. All facilities fed hay as a conserved forage source, with 9 facilities (38 %) providing pasture turnout (Figure 1). Seventeen respondents reported to feed complete feeds, with 14 feeding pelleted feeds and the remainder feeding grains. Seven facilities fed all patients the same types of feed. None of the facilities fed patients the same amount of feed. Rehabilitative status and type of surgery/disorder were the major factors (97 %) considered when deciding on feed types, followed by age and weight (84%).

Half of the respondents reported their facility to undertake feed analysed for nutrient content (Figure 2). Twelve (50%) of facilities reported to consult a nutritional advisor. Most facilities (79%) had specific nutritional protocols in place based on surgeries, disorders or conditions that were based on the facility's experience of managing these conditions. However, just over 21% of respondents' report that their facility had no specific nutritional protocols in place for specific conditions. Colic surgeries were specified most often as requiring a specific nutritional protocol (33 %).

Discussion

All respondents had over five years of experience operating within the veterinary industry with half of the participating facilities in operation for over 20 years. This may be presumptive of an in-depth knowledge and confidence concerning the formulation and implementation of current clinical nutrition practices, and the value of such protocols to the rehabilitation and ongoing health of their equine patients. However, in a recent

survey of equine veterinarians in Georgia USA, the authors reported no correlation between length of time in practice and the reported level of equine nutrition knowledge [6].

Most facilities housed between 51-100 patients, treating all ranges of breeds and disciplines. Age range was less varied with most facilities identifying majority patient age to be ≥7 years. This may coincide with ages more likely to be in consistent work or competition and therefore at greater risk of illness/injury. Colic, laminitis, orthopaedic and metabolic conditions were common nutrition-related conditions specified by over 90% of respondents as reasons for hospital admission and rehabilitative care. Similar to those reported by other authors [7], they are also common nutrition-related problems reported in horse owner surveys for both pleasure and performance horses [8]. It is also important to note that several studies have identified failings in nutritional practices to be causative reason for admission to an equine clinical facility [9]. Thus, continuing to educate horse owners and carers on appropriate nutritional management is pertinent to aiding the reduction of nutrition-related health issues.

An association between diet and gastrointestinal health is widely recognised. Many dietary factors can affect the health of the equine digestive system, including diet composition, meal size and changes in dietary management. An adequate supply of forage in the diet of the horse is essential in maintaining both gut health and satisfying the behavioural needs of an animal that is intended to eat on an almost continual basis. Forages should therefore form the basis of all rations since this is the most logical and economical approach to feeding horses. In fact, the National Research Council, 2007 recommendations for maintaining gut health and integrity are 1 kg Dry Matter (DM) forage per 100 kg of live weight. There are a number of studies that report the many benefits of forage-only diets on gastrointestinal health, superior nutrient provision, behavioural health, effects on post-exercise recovery of performance horses [10]. Moreover, studies on faecal microbiota of forage-fed horses report a more diverse bacterial community that is responsive to abrupt feed changes [11]. Yet despite this, traditional industry feeding practices commonly include a combination of forage and concentrates (typically cereal grains), a practice reported by the majority of respondents in this study. Only one veterinarian-owned hospital facility housing short-term patients, reported feeding forage only. Moreover, when given the opportunity to provide additional information on nutritional practices, only 2 facilities noted the provision of small amounts of forage, fed multiple times per day as basis for their nutritional programmes. With the exception of one, all of the facilities fed a supplementary compound feed with complete and pelleted feeds preferred by the majority of facilities attributable to these being regarded as the easiest methods of providing balanced rations to wide varieties of horses. Given that patients were in rehabilitation and were receiving limited or no turnout, it is unclear why additional concentrates were fed and thus further work to investigate the rationale for doing so is required.

Dietary changes are also an important risk factor for gastrointestinal ill-health, particularly in the development of colic [12]. Changes to the microbial populations in the hindgut have been observed within a few hours of a dietary change [13]; thus the introduction of new feeds and feeding regime on admittance to the facility may increase the likelihood of gastrointestinal disturbance. Whilst abrupt changes in feed type can cause gastrointestinal disturbance, changes in the microbial populations in the hindgut have also been seen with changes in forages batches that have different chemical compositions [14], which must also be considered during hospitalization. Moreover, a change in forage type is also known to affect the microbial populations in the hindgut [14], albeit to a lesser extent than that seen with the rapid introduction of concentrates [15], and the patient's forage source prior to arrival must to ascertained to minimise the risk of GI upset with a sudden change in this fraction of the diet. Pasture turnout was provided by 38 % of facilities and again, the patient's management prior to admittance needs to be accounted, a horse previously maintained at pasture and then stabled with hay as a forage source is encountering an abrupt dietary and management change, which is known to increase the risk of that individual developing gastrointestinal issues such as colic [16].

Thus, given the stressful situation of hospitalisation, including the likely abrupt dietary and management change, appropriate nutritional protocols will help minimise gastrointestinal disturbance, potentially improving post-operative and rehabilitative outcomes. Most facilities (79%) employed nutritional protocols specific to presenting conditions/disorders of individual patients; however, there will some (21%) that had no nutritional protocols in place at all. The length of stay and importance placed on nutritional management of patients was not investigated in this study. However, shorter stays may coincide with a reduced investment in correct nutritional protocols and practices. Factors influencing ration formulation included rehabilitative status and surgery/disorder type followed by weight, age, physical activity level, discipline, breed and height respectively; with importance placed on current physical and metabolic states of patients.

No relationship was identified between number of patients housed and likelihood of feed analysis or condition dependent protocols; however, as in a previous [17], data did suggest an increased likelihood of consulting a nutritional adviser as facility size (number of patients housed) increased. In contrast to previous studies [6,7] identified equine nutritionists as an important source of nutritional information from a veterinarian perspective; 80% of whom indicated an equine nutritionist to be a "very" or "somewhat" important resource. Despite this, only 58 % of veterinary establishments consulted a nutritional adviser. Moreover, given the expected role the veterinarian plays as an important source of nutritional advice [17-19] and the subsequent position of influence, authority and ethical obligation they commit to as a licensed practitioner, and the importance good nutrition plays in the health and wellbeing of the horse [1,6,9] it was surprising that only half of veterinarians surveyed considered it to be an 'very important' part of their practice philosophy [6]. Therefore, it would appear that further work is required to evaluate veterinarian's perspective on equine nutrition and identify strategies to promote the use of nutritional protocols in veterinary facilities [20-23].

Conclusion

Assessing the current feeding practices in equine veterinary hospitals in the USA has provided a unique insight into the nutritional management of horses in these types of facilities. It would appear that there is variation in the use of nutritional protocols for specific conditions and a wide range of feeding practices utilised. Further work is required to evaluate the nutritional protocols in use by such facilities to assess the consistency across establishments and determine the scientific basis

by which these approaches have been derived. Moreover, a greater understanding of veterinarian's perspectives on equine nutrition would be beneficial.

Figures

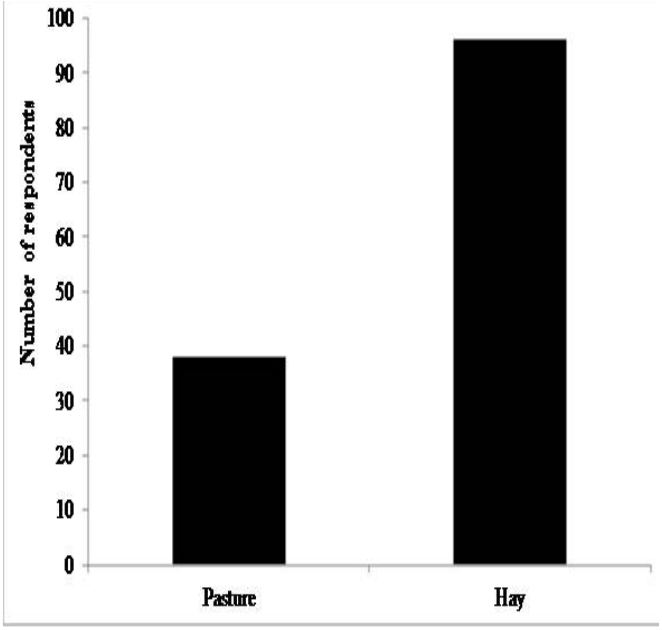

Figure 1: Type of forage source provided by respondents.

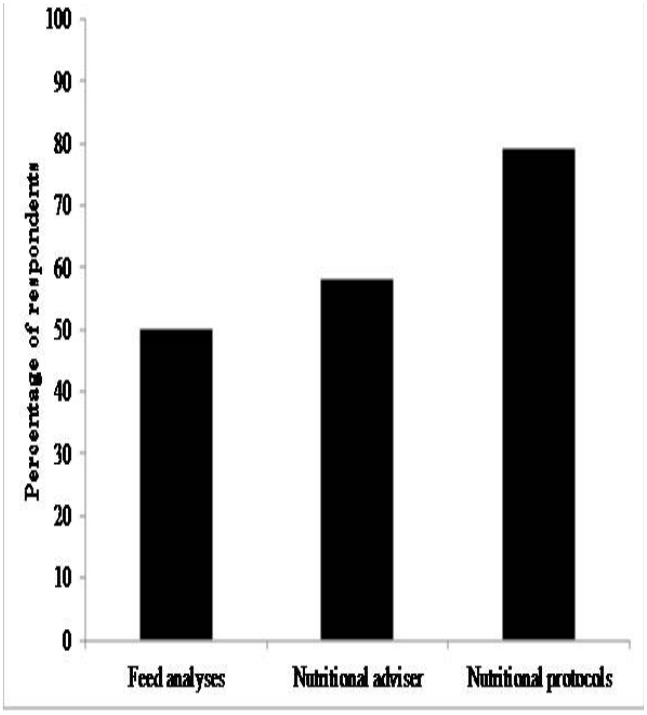

Figure 2: Number of respondents that analysed feed, consulted a nutritional adviser and had nutritional protocols in place.

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