

**PERCEPTIONS OF VETERINARIANS ON THE USE OF NUTRITIONAL
SUPPLEMENTS IN THE HORSE INDUSTRY**

by

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ABSTRACT

Previous studies indicated that horse owners refer to veterinarians for equine supplement information, yet veterinarian beliefs on use of supplements remain unknown. An online survey was administered via social media and veterinary groups to examine veterinarian perceptions on dietary supplements. This study hypothesized veterinarians do not perceive to be asked for supplement advice as often as horse owners report. 153 respondents were collected over 124 days. 91% of veterinarians agreed that supplements are safe to feed, and only 5% of veterinarians perceived their clients consulted them first for supplement information. 80% of veterinarians agree they should be a primary source of supplement information. Veterinarians with a mixed practice of equine and small animals reported more confidence in supplements to treat problems in horses than veterinarians seeing primarily equine patients ($P = 0.039$). These results suggest a disconnect between horse owners' claims and veterinarian perceptions regarding sources of supplement information.

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CHAPTER I: LITERATURE REVIEW

Introduction:

There is a growing trend in the equine industry for horse owners to look to dietary supplements for their supposed potential to increase longevity and performance, create a balanced diet, or improve the overall health and wellness of their horse. Similar trends can be seen in with human dietary supplementation. With the rising awareness of health and wellness trends in the United States, the use of dietary supplements has become a prominent feature of the economy. The North American dietary supplement market was estimated at \$37.4 billion in 2016, with the United States being the largest dietary consumer in the North American region (Grand View Research, 2017). The overall economic impact of the dietary supplement industry in the United States was estimated at \$122 billion and growing (Council for Responsible Nutrition, 2016).

Projections for the pet supplement market mirror the positive trend for supplements in the human health market, as pet owners are becoming more aware of their pets' nutrition and the ingredients in their food (Packaged Facts, 2017). According to the National Animal Supplement Council (NASC), the pet supplement market is valued at \$1.8 billion (Daniells, 2017) and globally is predicted to have a compound annual growth rate of 5.26% between 2016 and 2020 (TechNavio, 2016). It is difficult to determine the direct impact the equine supplement market has on the United States economy, since horse supplements are typically included in companion animal or pet supplement market research. However, NASC founder and CEO Bill Bookout noted that approximately 50%

of the \$1.8 billion industry accounts for dogs and cats, and the other 50% for horses (Daniells, 2017). This may appear as a surprisingly high proportion for horses, but Bookout also rationalizes that due to the horse's larger size, they naturally consume a higher percentage of ingredients by volume and therefore price (Reed, 2017). Research and Markets, a global market research store, conducted a research analysis of the global equine pharmaceutical and supplement market, and projected a compound annual growth rate of 2.0% to 2.5% from 2017 and 2023 (Business Wire, 2017).

The Council for Responsible Nutrition (CRN) reported in their 2017 annual CRN Consumer Survey on Dietary Supplements that supplement usage has reached an all-time high, with 76% of US adults consuming at least one dietary supplement (an increase of 5% from last year). Rationale for taking dietary supplements included achieving overall health/wellness benefits (46%), filling nutrient gaps in their diet (30%) and increasing energy (28%). Other reasons included improving immune health, bone health, heart health, and encouraging healthy aging (CRN, 2017).

When pet owners justify their decision to feed their pet a dietary supplement, their rationale is similar to their own reasons for consuming supplements. This rationale includes having a perceived distrust for commercial food formulation, preferring products marketed as "natural", perceiving pharmaceutical drugs to function best when combined with dietary supplements, and perceiving supplementation to reduce risk of disease or mortality (Shmalberg, 2014). More research in this area could warrant a better understanding of pet owner's perceptions about supplement use. In horses, reasons to feed supplements may include to meet increased nutrient demands from training or

competition, to improve performance, or to prevent or treat health issues (Burk and Williams, 2008). According to the American Horse Publications (AHP) 2012 Equine Industry Survey, the most important reason why respondents decided to feed their horse supplements was because they believed the horse needed it, followed by veterinary advice, and trusting recommendations from the supplier (Stowe, 2012). A study in Ireland found that when both non-professionals and professionals in the equine industry were surveyed, 35% reported feeding supplements to enhance performance, 34% to prevent joint disorders, along with other responses including to improve digestion and to support an underlying veterinary condition (Murray et al., 2018).

Previous research has indicated that horse owners seek nutritional advice and garner information about equine nutrition and supplementation from a variety of sources. Hoffman et al. (2009) surveyed a small population of horse owners in New England, noting 54% cited their veterinarian and 40% cited their trainer as their most commonly used resource for nutrition-related information. The 2012 AHP Equine Industry Survey revealed that 67% of respondents preferred to get nutrition-related information from their veterinarian, 56% from websites, and 44% from other horse owners (when given the option to choose multiple sources) (Stowe, 2012). The 2018 AHP Equine Industry Survey questioned horse owners about how they preferred to receive information on horses in general, and the results are quite different from the 2012 AHP Equine Industry Survey results. With the option to select more than one source, 67% reported preferred equine magazines, 65% preferred company/product websites, and 60% preferred social media as their source of information.

A recent study at Middle Tennessee State University surveyed horse owners across the United States to determine their supplement use and perceptions on supplement safety and efficacy (Swirsley et al., 2017). Results showed that 43% of horse owners identified veterinarians as their first choice specifically for equine supplement information. Farriers, other horse owners, and nutritionists or consultants were their next choices, respectfully.

In Swirsley et al.'s study, the 2,219 respondents fairly evenly represented the U.S. horse industry, with a wide variety of breeds, disciplines, and rider demographics recorded. Over 84% of respondents fed supplements to at least one of their horses, and there was no difference by discipline or competitive status how the horse owners perceived supplements. 80% of the horse owners also reported that they were likely to use supplements to provide nutrients not provided by other feedstuffs. Swirlsey discussed that this could indicate a misunderstanding among horse owners regarding the adequacy of a professionally formulated concentrate feed or the difference between a nutrient and a supplement.

Based on these previously discussed studies, horse owners clearly think that the veterinarian either is or would be preferred as their first source of information for making nutrition related decisions. It would be interesting to know whether these horse owners actually used their veterinarian for nutrition information this much, or if they only reported it knowing that they should use their veterinarian but do not, a survey phenomenon known as social desirability bias. Social desirability bias is a type of response bias that occurs in survey research when respondents feel either internally or

externally pressured to provide a socially desired response (Survata, 2019). Further research on veterinarian's perceptions of these responses could possibly shed light on the authenticity of the above-mentioned results.

Supplements in the Equine Industry:

Considering that such large portion of the horse owner population feeds dietary supplements to their horses (Hoffman et al., 2009; Swirsley et al., 2017), it's important to establish a general understanding of what supplements are, what types of supplements are available in the market today, and what regulations exist regarding their safety and efficacy.

The Merriam-Webster dictionary defines a dietary supplement as a product taken orally that contains one or more ingredients (such as vitamins or amino acids) that are intended to supplement one's diet and are not considered food (Merriam-Webster, 2019). The Food and Drug Administration (FDA) defines supplements as "products taken by mouth that contain a dietary ingredient." These dietary ingredients can include amino acids, herbs or botanicals, vitamins, and minerals. (FDA, 2015). Supplements can take many different physical forms, such as tablets, capsules, powders, or liquids. This helps emphasize the premise that a supplement must be taken orally, indicating that anything administered intramuscularly, intravenously, or subcutaneously is not considered a supplement.

There is a plethora of supplements available in the equine industry, and many can easily be purchased online. Popular categories of supplements include behavioral, joint, hoof, skin or coat, gastric health, and performance/energy supplements (State Line Tack,

2019; SmartPak Equine, 2019; Valley Vet Supply, 2019). Studies have shown that one of the most commonly fed types of supplements are joint supplements or chondroprotectives (Hoffman et al., 2009; Stowe, 2012; Murray et al., 2018). In a small population of horses visiting the Tufts Cummings School of Veterinary Medicine in New England, the second most popular supplement type used were electrolytes (39%), multivitamins (39%), fatty acids (30%), antioxidants (16%), and hoof builders (13%). All other supplement types represented less than 12% of the respondent population (Hoffman et al., 2009).

In the 2012 AHP Equine Industry Survey, respondents reported the second most popular supplement given to be hoof (49%), followed by trace minerals (40%), coat (32%), and digestive supplements (31%). All other types of supplements recorded were fed by less than 30% of the respondent population (Stowe, 2012). A study evaluating the perceptions of supplements in Ireland found that their second most popular type of supplement fed was calming supplements (13%) (Murray et al., 2018). Although 13% is a relatively low frequency, this pattern is also mirrored in the 2018 American Horse Publications (AHP) Equine Industry Survey. Results of this survey revealed that 51% of all respondents reported using either a prescription or non-prescription calming product, although these may not all be administered orally and may include drugs utilized for calming purposes. Still, this indicates an increase in horse owner's willingness to manipulate their horse's behavior and an increase in beliefs on the efficacy of these types of supplements.

It is important to note that the FDA does not review and approve dietary supplements based on their safety and efficacy, in humans or animals (FDA, 2018b).

Within the FDA, the Center for Veterinary Medicine (CVM) is responsible for the regulation of animal drugs, medicated feeds, and animal food additives. The FDA partners with their CVM, the Association of American Feed Control Officials (AAFCO) at the state level, and local and state agencies cooperate to regulate the use of animal feed products. However, the FDA claims that the “ultimate responsibility for the production of safe and effective animal feed products lies with the manufacturers and distributors of the products” (FDA, 2018a).

Regarding supplements, the Dietary Supplement and Health Education Act (DSHEA) of 1994 has affected the way the FDA regulates human food by determining whether a substance is considered a food additive or drug versus a dietary supplement. If supplement manufacturers create a supplement with a new dietary ingredient (one not marketed in the United States before October 15, 1994), they are required to give the FDA notification at least 75 days before marketing. This notification must also provide information to support the manufacturer’s claim that the supplement will be “reasonably be expected to be safe” (FDA, 2018b). However, this does not apply to animal feed or pet food. Therefore, the “regulatory status of a product is determined by the CVM on a case-by-case basis” (FDA, 2018a) but if the ingredients are generally recognized as safe (GRAS), then little is actually done by any of these organizations (FDA, 2018a).

The National Animal Supplement Council (NASC) was created as essentially a self-regulatory body for the animal supplement industry in 2001 to help provide oversight to this erratic regulatory process. This non-profit organization represents nearly 95% of animal supplement brands in the U.S., and by becoming members of the organization,

companies are encouraged to voluntarily embrace regulatory agencies and take responsibility for the safety of their products (Pearson, 2018).

Despite the fact that the FDA does not regulate the safety or efficacy of dietary supplements (for humans, companion animals, or horses), research studies have shown that people seem to be highly confident in the safety and efficacy of those supplements. New data from the 2018 Council for Responsible Nutrition (CRN) Consumer Survey on Dietary Supplements revealed that 75% of U.S. adults take dietary supplements, which has increased from 65% in 2009. 87% of these adults who take supplements have “overall confidence in the safety, quality, and effectiveness of dietary supplements...up from 84% in 2009” (CRN, 2018). However, the CRN does not provide information on how this survey was conducted, and it is hard to determine whether these results are an accurate representation of adults in the United States.

There is limited published information about horse owners' beliefs on the safety and efficacy of supplements. A survey of 2,219 horse owners in the United States was conducted by Swirsley et al. (2017) to examine their beliefs on supplement safety and efficacy, and to determine if those perceptions differed by rider discipline and competitive vs. recreational status. Using a series of six-point Likert scale questions, researchers determined that 50% of owners agreed with the statement that supplements are safe. 48% agreed that supplement safety is well researched, 47% agreed that supplements are useful to prevent problems, 47% believe supplements are useful to treat problems, and 48% agreed that the effectiveness of supplements is well researched. 51% agreed both that they used supplements to prevent problems in their horse and that they

use supplements to treat problems in their horse. 49% agreed that they use supplements to promote their horse's overall health, and 47% agreed that they use supplements to provide nutrients not provided in other feedstuffs (Swirsley et al., 2017). Since these responses all have very similar frequencies, it would be logical to rationalize that the horse owners surveyed had either positive or negative beliefs about supplement safety and efficacy, and their position on such topics was relatively consistent from question to question.

Murray and colleagues (2018) performed a study in Ireland where 134 horse owners or caregivers responded to an online survey designed to examine the use and perceptions of equine dietary supplements in the Irish equine industry. 93% of respondents reported thinking that supplements had to meet legal standards, 72% reported thinking that all batches of supplements manufactured were analyzed for quality, and 92% reported thinking that supplements must be tested on horses before market launch (Murray et al., 2018). These results represent a much more confident population of horse owners in Ireland than in the United States. However, regulatory procedures for equine supplements available on the market in Ireland may be much different from the United States' FDA procedures. Despite this reported high confidence in supplement safety and efficacy, 64% of respondents were not satisfied with the availability of product research, indicating that there may be a need for more transparency in supplement research and development (Murray et al., 2018). It is also possible that these horse owners and caregivers simply are not familiar with how to access product research materials.

Overall, it appears that horse owners in the United States are less confident about supplement safety and efficacy than horse owners in Ireland. However, both regions still indicated at least some confidence in the equine supplement industry. Yet many researchers cite a lack of evidence available to prove that equine supplements are safe or effective (Harris and Harris, 2005; Geor, 2006). It is possible that horse owner's innate trust for their own dietary supplements may be translating into a similar trust for equine dietary supplements.

Horse Owners' Perceptions on Equine Supplements:

Horse owners can access dietary supplements for their horses through many channels. They are available online through various equine supply websites, are available at many local retail suppliers, and can even be purchased through veterinarians. Price point can vary depending on the type of supplement and what the product claims to be able to do (SmartPak, 2019; State Line Tack, 2019; Valley Vet Supply, 2019).

Understanding how humans choose their own dietary supplements could be helpful in also understanding what processes horse owners go through to choose supplements for their horses. Bailey et al. (2013) surveyed adults in the United States regarding their motivations for supplement use, the types of products they used, and the role their physicians played in making decisions about supplements. They found that only 23% of the products used by respondents were based on the recommendations from their health care providers (Bailey et al., 2013).

Although the pet supplement industry is such a strong part of the economy, no research has been done to determine how pet owners choose supplements for their pets.

Horse owners have been surveyed about why they feed supplements (Burk and Williams, 2008; Stowe, 2012; Murray et al., 2018), but their specific decision making process on how to select a supplement product has not been researched.

Several recent studies have surveyed horse owners regarding what sources they use for supplement advice. Hoffman et al. (2009) surveyed horse owners who brought their horses to the Large Animal Hospital at the Tufts Cummings School of Veterinary Medicine in New England over a two-month period. They collected 67 responses from a relatively small subpopulation of horse owners, so the results may not accurately represent the United States as a whole. These horse owners were surveyed about their feeding practices, dietary supplement use, and knowledge about equine nutrition. Of respondents, 84% reported feeding at least one dietary supplement. The majority of respondents (53.7%) reported that veterinarians were their most commonly used resource for nutrition (not specifically supplements). The second most frequent resource was trainers (40.3%), followed by feedstores, books, the internet, horse magazines, nutritionists, friends, other horse owners, and feed companies (respectively) (Hoffman et al., 2009).

Another survey distributed more evenly across the United States was the 2012 AHP Equine Industry Survey. In this case, over 75% of respondents indicated using dietary supplements, which is slightly less than reported in Hoffman et al., (2009). 67% of respondents reported getting nutrition information (not specifically supplement information) from their veterinarian, followed by websites (56%) and friends or other

horse owners (44%) (Stowe, 2012). This varies slightly from Hoffman et al. (2009), but the veterinarian remains the primary source of information.

An online questionnaire was sent out to owners/riders of dressage and/or event horses in 2016 to collect data on supplement use. Similar to Hoffman et al. (2009) and Stowe (2012), the largest majority (49.8%) respondents also reported their veterinarian as their primary source of information. These responses were specifically in regard to supplement information, not just equine nutrition in general. Other sources for supplement information were internet articles/reviews (39.4%), other horse owners (38.7%), coaches/trainers (36.5%), and nutritionists (33.4%) (Gemmill et al., 2016). Interestingly, although nutritionists were ranked lower as a source of supplement information, they were ranked the second most reliable source of information (with vets being the first most reliable source). This suggests that these horse owners acknowledge the value of an equine nutritionist, but do not choose to use them as readily as other sources.

In the Irish equine industry, horse owners were surveyed about their use and perceptions on supplement use, and results varied slightly from previous studies done in the United States. When asked where they sought advice about supplements, 53% of respondents reported feed merchants as their main source of information, followed by their veterinarian (46%). They also reported seeking advice on supplements from their trainer (34%), the internet (32%), and nutritionists (31%). However, respondents did report that when considering which source is the most influential in choosing a

supplement, the veterinarian is most influential (90%), followed by cost of the supplement (69%) (Murray et al., 2018).

Carroll and colleagues (2018) surveyed the information-seeking preferences of equine caregivers in the Midwest United States, for both health and well-being topics, and nutrition and feeding topics. Participants in this nutrition and feeding survey reported seeking information about these topics from a wide variety of sources, including vets (77%), books/magazines (42%), horse enthusiasts (38%), friends/family (35%), internet/social media (28%), feed company representatives (28%), farriers (25%), scientific publications (25%), trainers/instructors (21%), equine nutritionists (19%), equine dentists (7%), extension specialists (7%), and the radio (1%). Veterinarians were also the preferred source of information for the general health and well-being topics in the second survey of the study as well (Carroll et al., 2018).

Swirsley et al. found a similar preference for information from veterinarians. From 2,219 responses, 43% identified vets as their first choice for supplement information, followed by farriers, other horse owners, and nutritionists or consultants. An additional consideration of this survey was the comparison of competitive to recreational riders, and consideration for the owner/rider's preferred discipline. It was hypothesized that these beliefs would differ by discipline and whether these riders rode competitively or recreationally. No difference was identified in sources of information.

Veterinarians Perceptions on Equine Supplements:

It has been consistently reported that veterinarians are a preferred source of advice on equine nutrition information and supplement information (Hoffman et al., 2009;

Stowe, 2012; Gemmill et al., 2016; Carroll et al., 2018; Swirsley et al., 2017). Therefore, it would be helpful to also understand veterinarian perceptions on equine dietary supplements (including their use, safety, efficacy), their confidence in giving nutrition advice, and their feelings about their nutrition education and continuing education. Some research has looked into veterinarian's levels of equine nutrition knowledge and comfort with the topic of equine nutrition. Currently there are no known surveys of veterinarian perceptions about supplement safety and efficacy.

A population of equine veterinarians in Georgia, USA were surveyed to evaluate this assumed role of primary nutrition advisor, from the veterinarian's perspective. A survey was sent to 391 veterinarians from a contact list generated from the American Veterinary Medical Association's (AVMA) online database, and surveys could be completed either by hand or online (Roberts and Murray, 2012). Usable responses were collected from 74/391 (20%) participants. There were slightly more male respondents (51%) than female respondents (49%). The majority of veterinarians surveyed had also been practicing for more than 20 years, saw less than 10 equine patients per week, and were mixed-practice clinicians. Those vets who saw more equine patients per week and who had a higher percentage of equine contact time were found to report a higher level of nutrition knowledge. However, this nutrition knowledge was not associated with time in practice, respondent gender, or the types of equine patients seen (Roberts and Murray, 2012).

The veterinarians surveyed in Georgia also reported which nutrition topics they felt more confident about and which topics they felt less confident about. Respondents

reported being most confident giving advice on colic, geriatric horses, laminitis, and obesity, whereas they felt least confident advising horse owners about hyperkalemic periodic paralysis (HYPP), developmental orthopedic disease (DOD), equine pituitary pars intermedia dysfunction (PPID), and equine polysaccharide storage myopathy (PSSM) (Roberts and Murray, 2012).

A similar study was done in a different region of the United States, this time in the Upper Midwest. Parker and colleagues (2018) surveyed 433 veterinarians to assess their confidence levels of different nutrition-related conditions and topics. 125 respondents ranked their confidence on a five-point Likert scale (1= not at all confident, 5= very confident), and the highest average response was obesity (3.2), followed by laminitis, geriatric horses, and colic (Parker et al., 2018). These responses are similar to Roberts and Murray's study (2012), and variance in order of these conditions may be a reflection of the different regions of the country these surveys were performed in.

The conditions which veterinarians in both studies reported to be most comfortable with (obesity, laminitis, geriatric horses, and colic) are also conditions with fairly straightforward links to nutrition and the veterinarian can make recommendations to manage these conditions based on a rudimentary understanding of nutrition principles (Parker et al., 2018). Veterinarians in this study expressed their lowest level of confidence with advising on PSSM (ranked an average of 2.1 on the 5-pt Likert scale), followed by insulin resistance (IR), HYPP, and DOD. These conditions are also similar to the results from Roberts and Murray (2012) except the condition insulin resistance is reported rather than PPID. This could indicate a growth from 2012 to 2018 in metabolic-

type conditions veterinarians face in their practice. However, IR is also interrelated with obesity and laminitis, topics which veterinarians reported having higher confidence levels in advising on. This could suggest a lapse in the connection made between IR and these other conditions and how they could be managed similarly (Parker et al., 2018).

When investigating veterinarian's perceptions on equine nutrition and specifically supplements, it is also important to consider their perceived quality of education on nutrition topics and their involvement with continuing education (and its perceived usefulness). Research by Buffington and LaFlamme (1996) involved a survey of veterinarians' knowledge and attitudes on nutrition, especially knowledge gained in veterinary school and with CE courses. Interestingly, 50% of respondents perceived that the quality of nutrition courses taken in veterinary school was inferior, and 70% reported that time spent on nutrition topics was inadequate. Respondents of this survey also felt that CE courses spent inadequate time on equine nutrition, although a smaller majority (25%) blamed CE courses with inadequacy (Buffington and LaFlamme, 1996).

Of the veterinarians from Georgia, 88% reported not attending any equine nutrition continuing education (CE) courses within the previous year (Roberts and Murray, 2012). A majority (54%) of these respondents reported this was due to the lack of courses available, along with inconvenient dates (15%) and a lack of personal interest (15%). No correlation was found between taking an equine nutrition CE course the previous year and their current perceived level of equine nutrition knowledge (Roberts and Murray, 2012).

Although the majority of veterinarians in this study reported not participating in CE courses recently, 89% expressed an interest in taking nutrition courses (in 2011), and 65% reported being more likely to complete an equine nutrition CE course if it was offered online. Interestingly, of those who were not interested in taking nutrition CE courses (in 2011; 11%), the majority of this group (75%) were still unwilling to pursue CE courses even if they were online. Veterinarians in this study also reported having higher equine nutrition knowledge after practicing than after graduating veterinary school (Roberts and Murray, 2012).

In a survey of Upper Midwest veterinarians' perceptions, 125 respondents were given the option to provide qualitative feedback. Four of the 24 respondents who utilized this option noted that the veterinary nutrition curriculum was lacking or felt that their own equine nutrition knowledge was generally lacking. Six of the 24 qualitative responses also indicated a desire to use a referral service for equine nutrition (Parker et al., 2018). The concept of using a nutrition consultant/referral service is important because veterinarians' willingness to use such services can suggest to what extent they embrace their role as a resource on supplement information.

Roberts and Murray (2012) reported that 80% of their respondents strongly emphasized the nutritionist as a source of information, yet they seemed reluctant to use a referral equine nutrition service. For this reason, the authors suggest that with the abundance of abundant and alternative information sources on equine nutrition, that the sole responsibility for nutrition advice be shifted away from the veterinarian. However, Parker et al. (2018) reported veterinarians having a relatively high interest in having

access to regionally appropriate information provided to them by an equine nutritionist, preferably in a handout or factsheet format and preferably containing material that would suit either a veterinarian or a horse owner.

To determine whether vets are embracing the responsibility as a main source for equine nutrition and supplement information, it would be most logical to ask the veterinarians what sources they think horse owners should use to obtain this information. The only research indicating this is from Roberts and Murray (2012), where all (74) respondents considered veterinarians and equine nutritionists to be a “very or somewhat important” source of information on equine nutrition. Interestingly, a very similar margin of 97% also considered magazines and books to be “very or somewhat important” sources of information, and 89% felt the same about the web/internet (Roberts and Murray, 2012). However, this only concerns their opinions on being a source for general equine nutrition information, not supplement information specifically. Further research is needed to understand veterinarian’s perceptions on what sources they think horse owners should consult regarding supplement information.

CHAPTER II: PERCEPTIONS OF VETERINARIANS ON THE USE OF NUTRITIONAL SUPPLEMENTS IN THE HORSE INDUSTRY

Equine supplements are becoming increasingly popular in the horse industry as horse owners hope to increase the longevity and performance, balance a diet, or improve the overall wellness of their horse. to increase. The overall economic impact of the

dietary supplement industry in the United States was estimated at \$122 billion and growing (Council for Responsible Nutrition, 2016), and the pet supplement market is seeing growth as well. According to the National Animal Supplement Council (NASC), the pet supplement market is valued at \$1.8 billion, and 50% of that is attributed to horse supplements specifically (Daniells, 2017).

Varieties of supplements used for horses include behavioral, joint, hoof, skin or coat, gastric health, and performance/energy supplements (State Line Tack, 2019; SmartPak Equine, 2019; Valley Vet Supply, 2019), and these are available through a plethora of sources. This can make dietary supplements more convenient to horse owners without needing to go through a veterinarian or other equine health professional. However, that can complicate a horse owners' attempt to navigate through the products and available information on supplements.

Horse owners have been previously surveyed on what sources of information they use to make decisions about feeding dietary supplements and about horse nutrition in general. Hoffman et al. (2009) surveyed a small population of horse owners in New England, noting 54% cited their veterinarian and 40% cited their trainer as their most commonly used resource for nutrition-related information. The 2012 AHP Equine Industry Survey revealed that 67% of respondents preferred to get nutrition-related information from their veterinarian, 56% from websites, and 44% from other horse owners (when given the option to choose multiple sources) (Stowe, 2012). The 2018 AHP Equine Industry Survey questioned horse owners about how they preferred to receive information on horses in general, and the results are quite different. 67% reported

preferred equine magazines, 65% preferred company/product websites, and 60% preferred social media as their source of information.

A recent study at Middle Tennessee State University surveyed horse owners across the United States to determine their supplement use and perceptions on supplement safety and efficacy (Swirsley et al., 2017). Results showed that 43% of horse owners identified veterinarians as their first choice specifically for equine supplement information. Farriers, other horse owners, and nutritionists or consultants were their next choices, respectfully.

Considering how veterinarians are reported as a prominent source of nutritional information, it would be helpful to also understand their perceptions on equine supplements and their perceived role as that information source. There is currently some information available on what nutrition topics veterinarians feel most comfortable advising about, on their attitudes about continuing education for nutrition topics, and on their willingness to educate on equine nutrition topics (Roberts and Murray, 2012; Parker et al., 2018). No research has been performed to measure veterinarian perceptions on the safety and efficacy of supplements, or on what sources they think horse owners should consult regarding supplement information.

Materials and Methods

To evaluate the perceptions of veterinarians surrounding supplement use, an online survey was created and hosted on a data collection website (www.surveymonkey.com). The survey included single answer, multiple answer, and 6-point Likert scale type questions (Appendix I). The survey and all methods of response

collection were approved by the Middle Tennessee State University Institutional Review Board (Protocol #18-1267; Appendix II). The survey was publicized through email, social media (Facebook), and veterinary association membership lists (such as the Middle Tennessee Academy of Equine Practitioners), and was open to collect responses from September 5, 2018 to January 7, 2019. All data was collected through Survey Monkey and data was downloaded to an external hard drive at the conclusion of the study.

The initial question of the survey asked whether the respondent was a veterinarian that practiced on horses, to rule out any potential misconceptions about the type of respondent targeted for this survey and a “yes” response was used as the selection criteria. Basic demographic information was asked to determine respondent’s gender, age, and whether they resided in the United States of America or elsewhere. However, no identifying information was collected. Respondents were also asked how long they had been practicing veterinary medicine, what combination of species represented their practice, how many equine patients were seen on a weekly basis, and what their primary use was, to better understand the characteristics of their practice and their equine experience.

In addition, respondents were asked whether they were a member of the American Association of Equine Practitioners (AAEP), and were asked to identify any and all types of supplements that they either recommended or sold to their clients through their practice. The survey asked questions regarding respondent’s opinions on evaluating supplements as well as supplement safety and efficacy using 6-point Likert Scale questions, as well as their opinions on supplement use in their personally owned horses.

Finally, respondents were asked about their perceptions on what sources horse owners use to seek supplement information.

Responses were collected for a total of 124 days, at which point the survey webpage was closed and all data collection ended. Data was downloaded into an Excel spreadsheet and coded to permit analysis. Summary statistics and frequency counts of the data were completed using SAS Ver. 9.2 (SAS Inc., Cary, NC) while a general linear models procedure was used to examine relationships between demographic variables and opinions on supplements. Statistical significance was set at $P < 0.05$.

Results

Out of 156 total respondents of this survey, 153 met the inclusion criteria that respondents must be a veterinarian that practices on horses. 64% of respondents reported being female, and 36% reported being male. The majority of respondents were between the ages of 31 to 50 (48%), while 42% of respondents were 51 or older and 10% were 30 years old or younger. As the survey was widely shared on social media, and to measure general geographic information, respondents were asked whether they resided in the United States of America or elsewhere. 93% of respondents reported living in the United States of America and 7% reported living in another country. Further information was not collected to determine what other countries respondents lived in.

When asked how many years respondents have been practicing veterinary medicine, 15% reported practicing 0 to 5 years, 16% reported practicing for 6 to 10 years, 12% reported practicing for 11 to 15 years, 11% reported practicing for 16 to 20, and 46% reported practicing for 20 or more years (Figure 1). Respondents were given the

option to classify their practice as either primarily equine, mixed practice with equine and other livestock, or mixed practice with equine and small animal. The majority (75%) of respondents saw primarily the equine species in their practice, while 14% saw a mix of equine and small animal species and 11% saw a mix of equine and other livestock species.

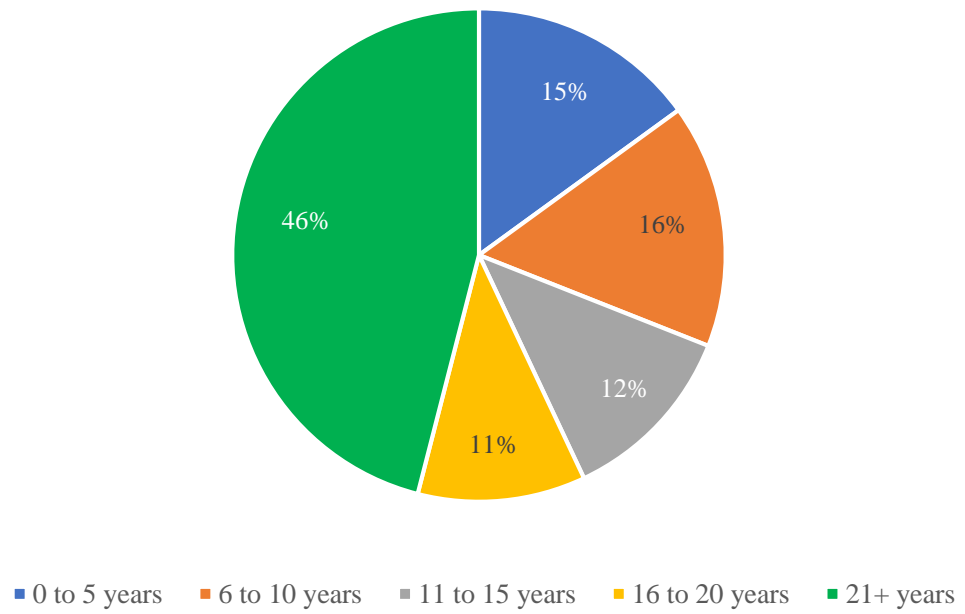


Figure 1: Length of Time Respondents Have Been Practicing Veterinary Medicine

Regarding the number of equine patients seen per week, 46% of respondents see an average of 1 to 20 patients per week, 35% see an average of 21 to 40 patients per week, and 19% see on average 41 or more horses per week. 47% of these equine patients were considered by respondents to be used for performance (including showing and racing), and 53% were considered to be used for pleasure or recreational purposes. This recreational category would have likely included horses not in work or horses managed as pets as well, since a third option was not given for this. To conclude questions on practice characteristics and demographics, 85% of respondents reported being members of the American Association of Equine Practitioners.

To gain a better understanding of respondent's involvement with different types of supplements, respondents were asked what types of supplements they recommended to their clients and what types of supplements they sold through their practice. The type of supplement most commonly recommended to clients were joint supplements (78%), gastric health supplements (67%), and hoof supplements (63%), followed by skin/coat supplements (52%), behavioral supplements (33%), and performance/energy supplements (24%) (Figure 2).

Respondents also reported joint (56%) and gastric health (46%) supplements as the most common supplements sold on average through their practice, although respondents then reported selling skin/coat supplements (25%), behavioral supplements (24%), hoof supplements (20%), and performance/energy supplements (16%) (Figure 2).

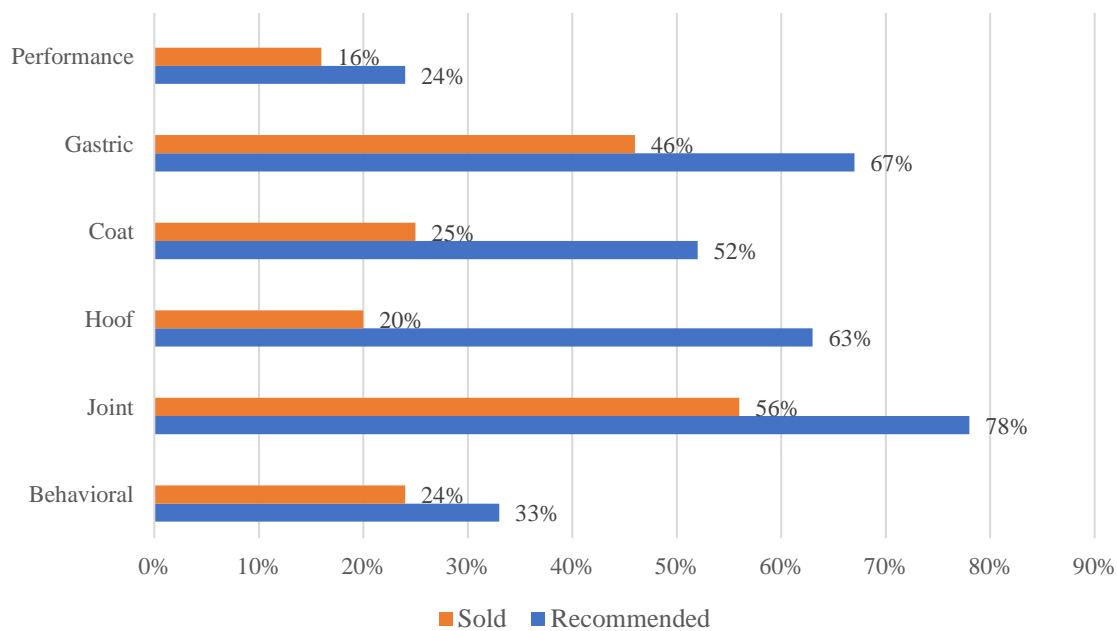


Figure 2: Types of Supplements Recommended and Sold by Equine Veterinarians

(n= 153).

Multiple questions were asked in the survey regarding respondent's perceptions on supplement safety and efficacy. Examining the responses "strongly agree", "agree", and "somewhat agree" collectively, 91% of respondents reported believing that supplements are safe to feed to horses (Figure 3), 29% reported believing the safety of supplements is well researched and studied (Figure 4), 72% reported believing supplements are useful to help prevent problems in horses (Figure 5), and 76% reported believing supplements are useful to help treat problems in horses (Figure 6). However, only 22% of respondents reported believing the effectiveness of supplements is well researched and studied (Figure 7).

Respondents were also questioned on how they evaluate supplements and what parameters are important in assessing supplements. 96% of respondents reported believing that manufacturer reputation is important (Figure 8), 98% of respondents believed clinical trials are important (Figure 9), 92% of respondents believed that ingredients are important (Figure 10), and 33% of respondents believed that label claims are important in assessing supplements (Figure 11).

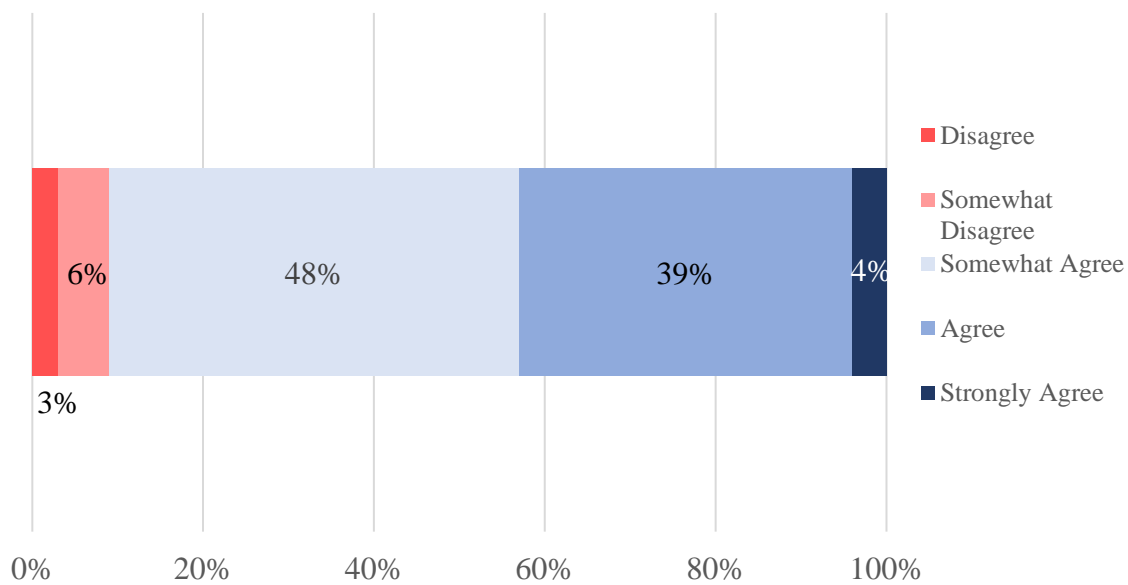


Figure 3: Responses of Equine Veterinarians (n=153) to the Statement “I Believe Supplements are Safe to Feed to Horses”

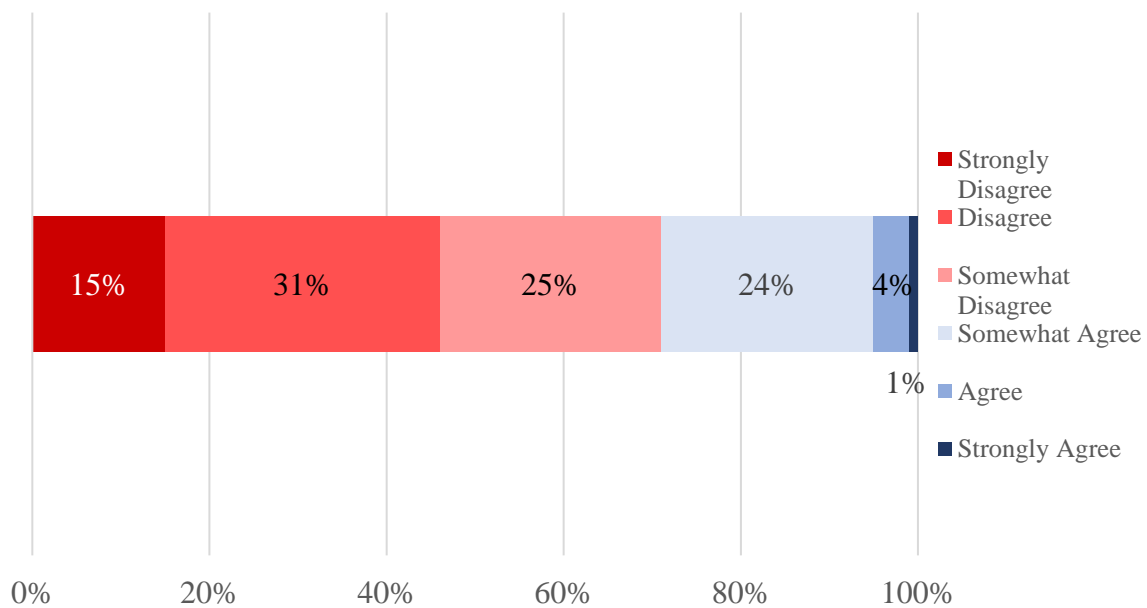


Figure 4: Responses of Equine Veterinarians (n=153) to the Statement “I Believe the Safety of Supplements is Well Researched and Studied”

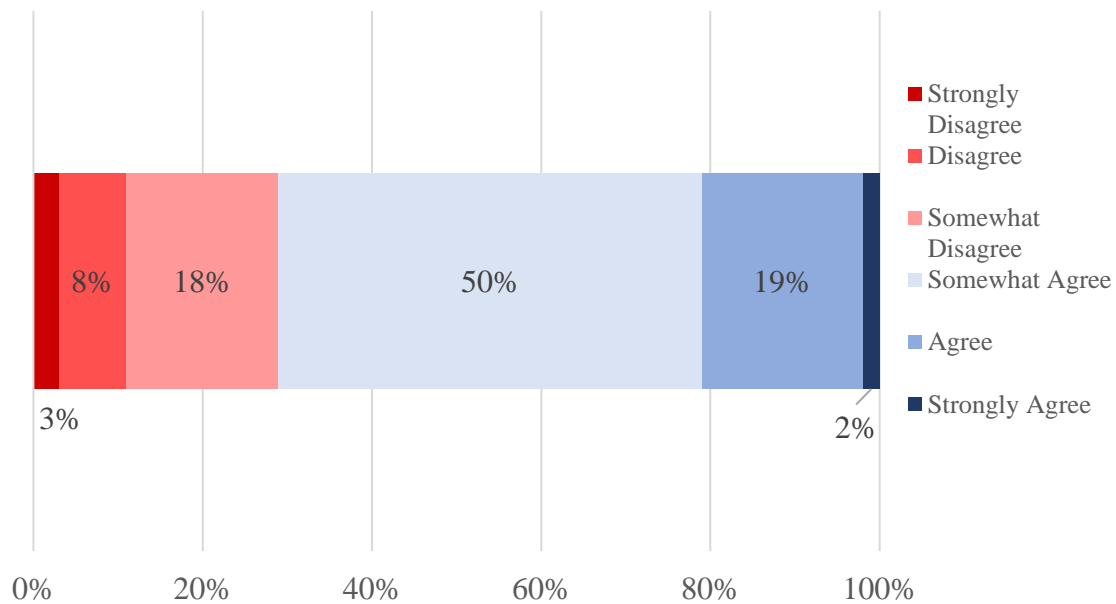


Figure 5: Responses of Equine Veterinarians (n=152) to the Statement “I Believe Supplements are Useful to Help Prevent Problems in Horses”

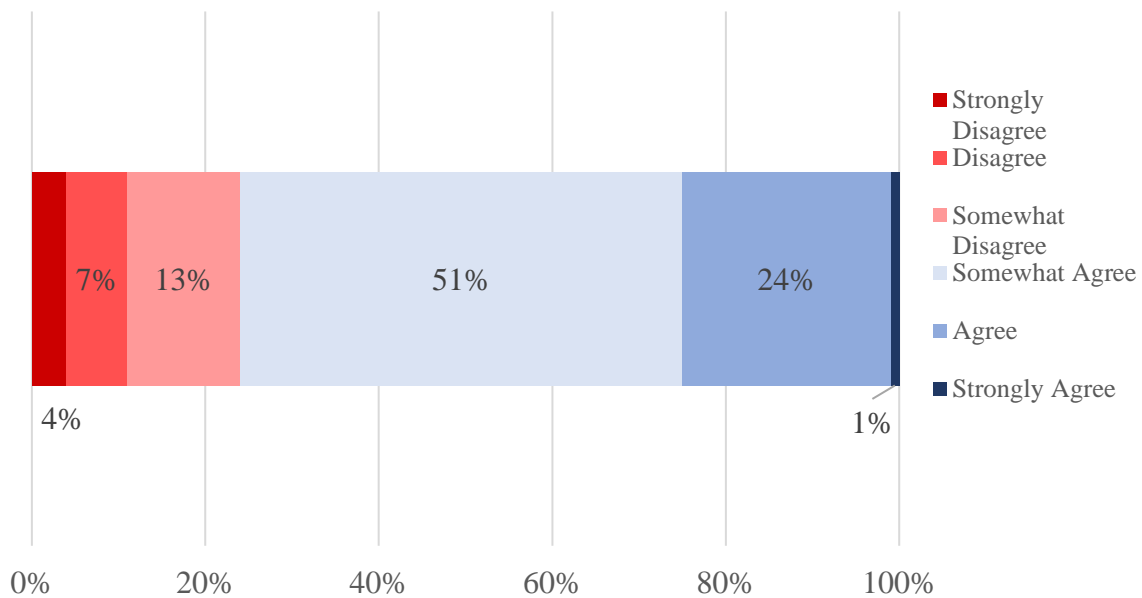


Figure 6: Responses of Equine Veterinarians (n=152) to the Statement “I Believe Supplements are Useful to Help Treat Problems in Horses”

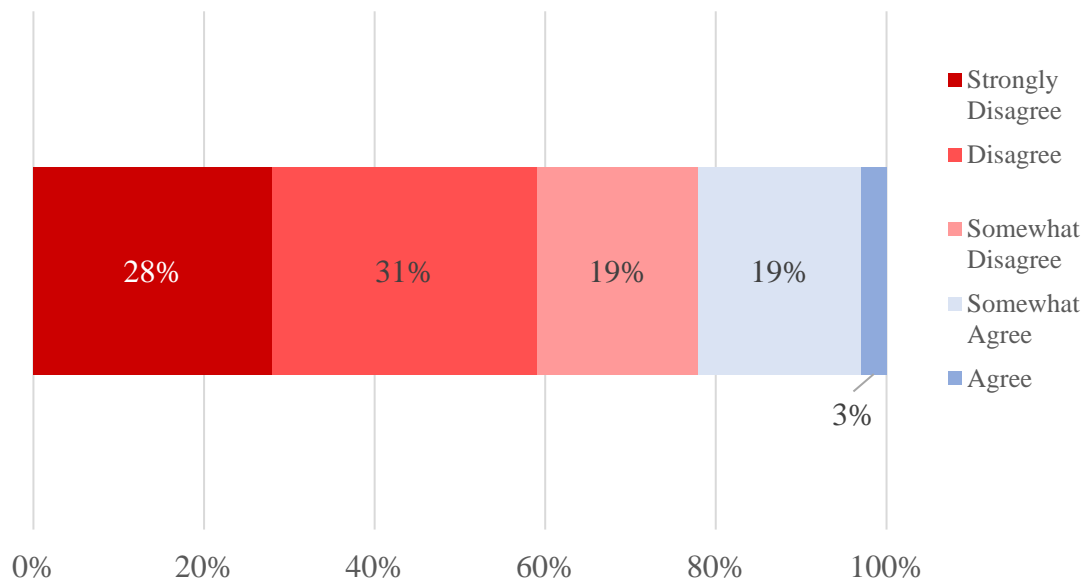


Figure 7: Responses of Equine Veterinarians (n=153) to the Statement “I Believe the Effectiveness of Supplements is Well Researched and Studied”

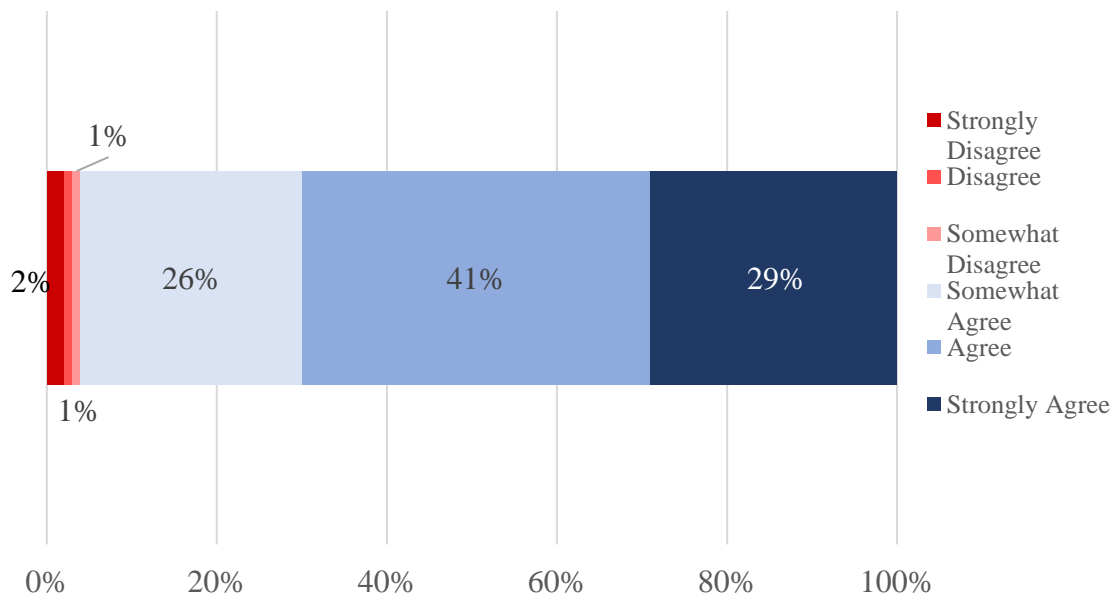


Figure 8: Responses of Equine Veterinarians (n=153) to the Statement “I Believe Manufacturer Reputation is Important in Assessing the Quality of Supplements”

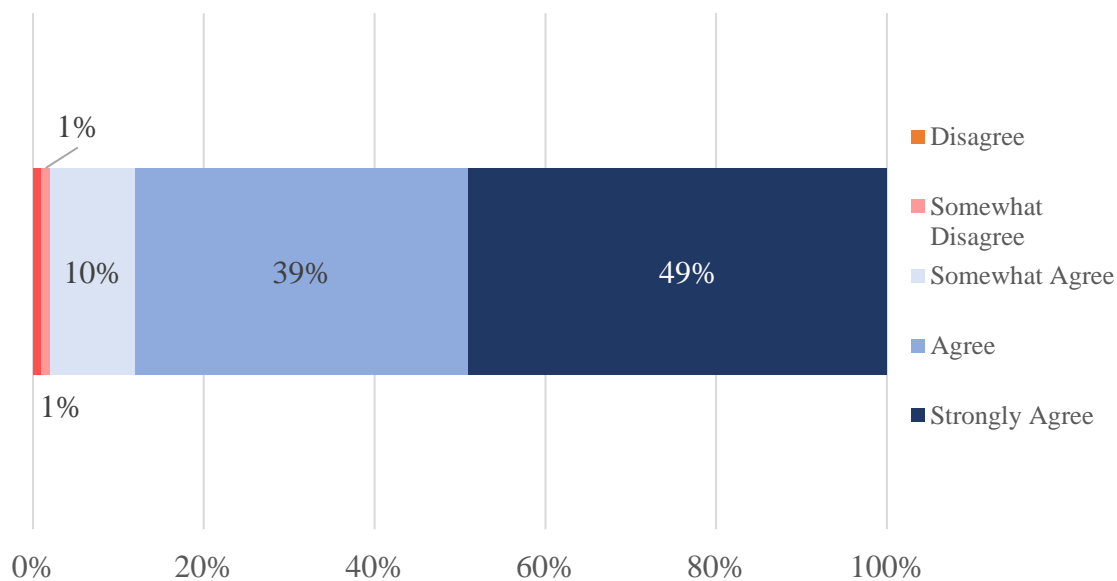


Figure 9: Responses of Equine Veterinarians (n=153) to the Statement “I Believe Results of Clinical Trials are Important in Assessing the Quality of Supplements”

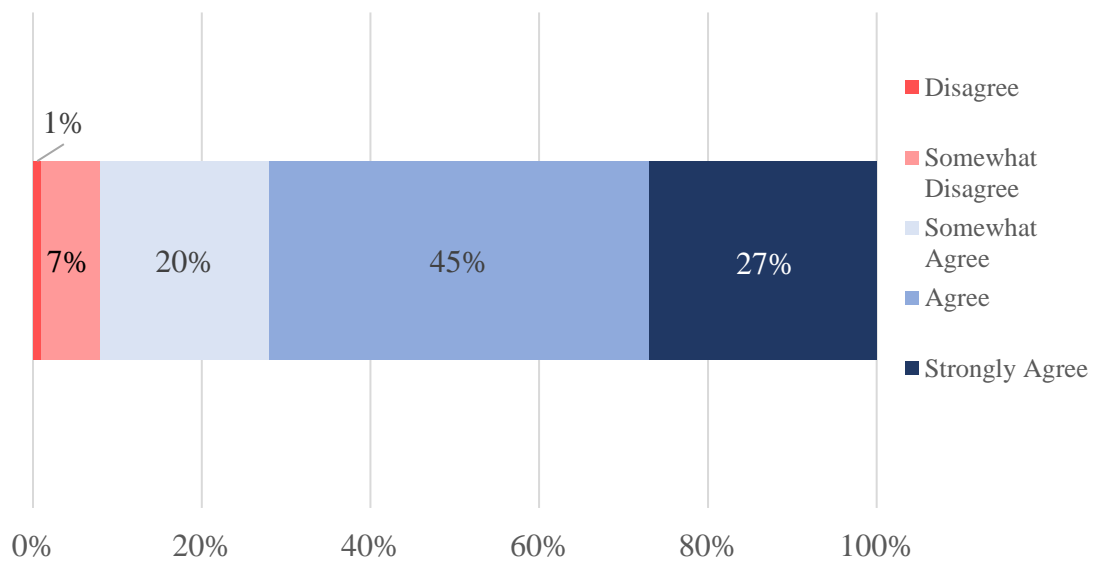


Figure 10: Responses of Equine Veterinarians (n=152) to the Statement “I Believe Ingredients are Important in Assessing the Quality of Supplements”

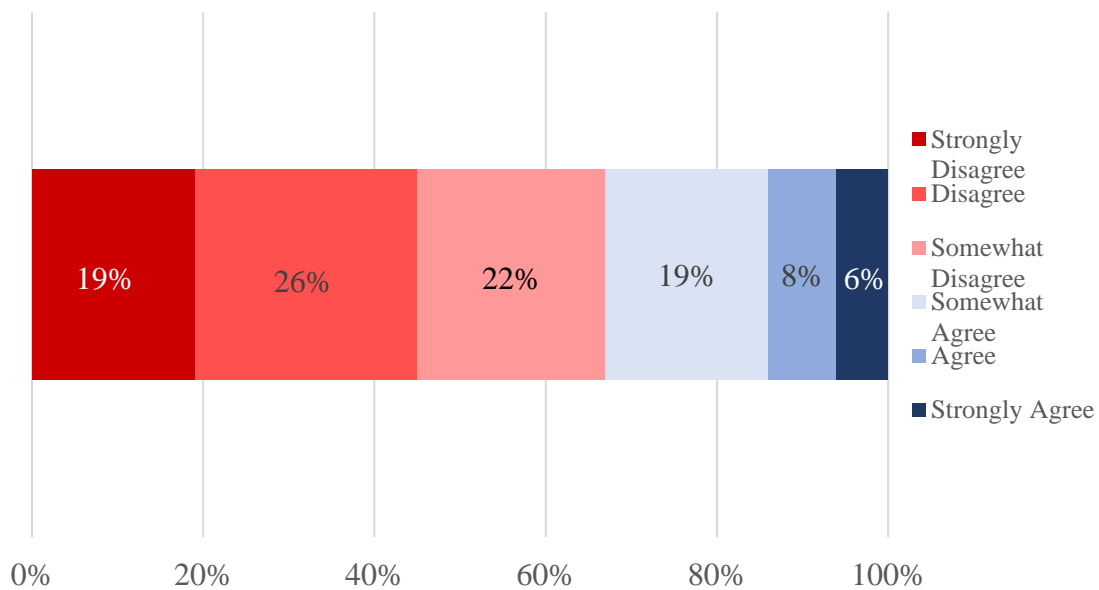


Figure 11: Responses of Equine Veterinarians (n=153) to the Statement “I Believe Label Claims are Important in Assessing the Quality of Supplements”

To evaluate veterinarian perceptions on supplements for their own personal use, respondents were asked about characteristics of their own horse ownership. 80% of respondents reported owning a horse personally, and when asked how long they had owned horses, 8% of the 132 who had horses reported owning them for 0 to 4 years, 6% owned horses for 5 to 9 years, 5% of those who responded had owned horses for 10 to 14 years, and 81% of those who responded reported owning horses for 15 or more years. 48% of the 153 who responded reported feeding supplements to their own horses while 52% did not, and when asked how many of their horses were fed supplements, 74 out of 153 (48%) answered. Therefore, of the 74 respondents who do give supplements to their horses, 28% feed supplements to 1 horse, 59% of them feed supplements to 2 to 4 horses, 8% feed supplements to 5 to 9 horses, and 3% feed supplements to 10 or more horses.

Using a 6-point Likert scale, veterinarians were asked to report their beliefs about supplement usage and the practical application of supplements. Responses of “strongly agree”, “agree”, and “somewhat agree” were collectively examined, and 53% of respondents (out of those who fed supplements) reported using supplements to prevent issues in their horse(s) (Figure 12), 54% reported using supplements to treat issues in their horse(s) (Figure 13), 57% reported using supplements to promote their horse’s overall health (Figure 14), and 57% reporting using supplements to provide nutrients that are not provided by other feedstuffs (Figure 15).

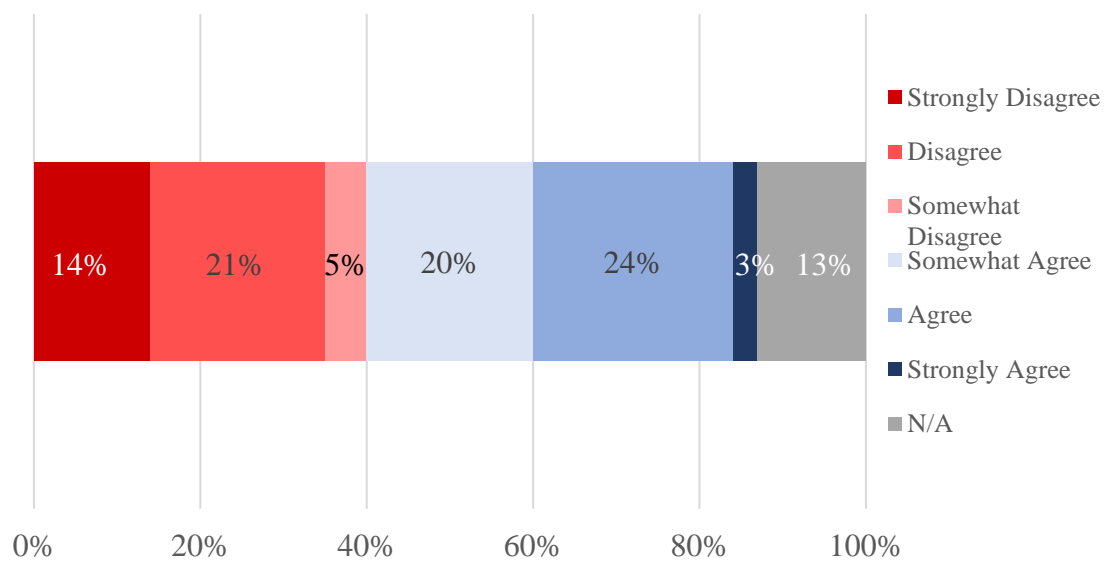


Figure 12: Responses of Equine Veterinarians (n=153) to the Statement "I Use Supplements to Prevent Issues in My Horse(s)"

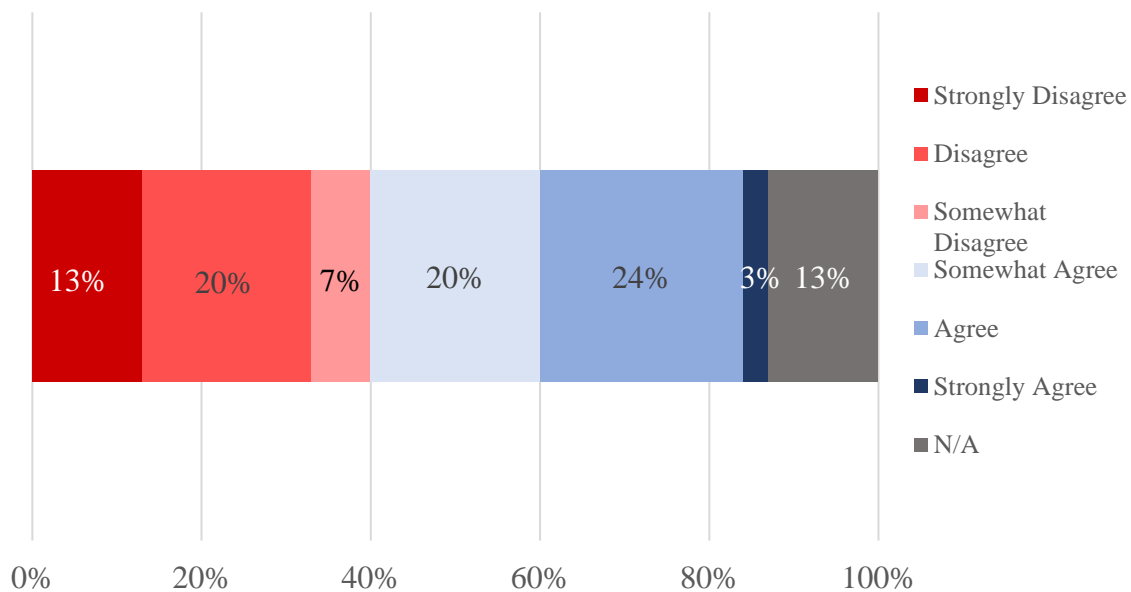


Figure 13: Response of Equine Veterinarians (n=153) to the Statement “I Use Supplements to Treat Issues in My Horse(s)”

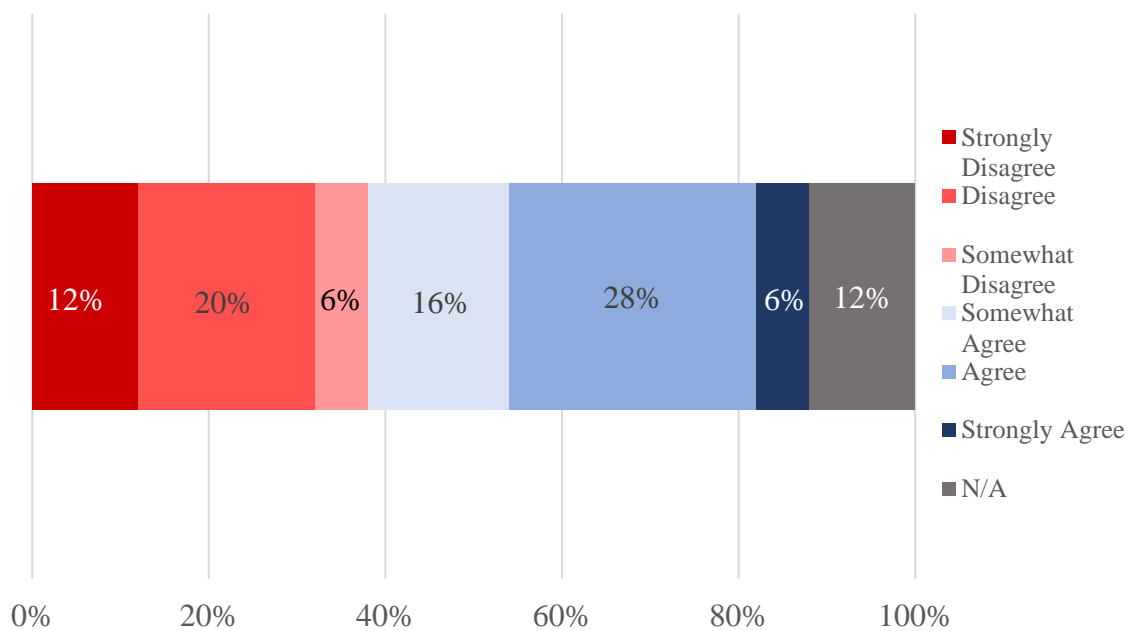


Figure 14: Responses of Equine Veterinarians (n=153) to the Statement “I Use Supplements to Promote My Horse’s Overall Health”

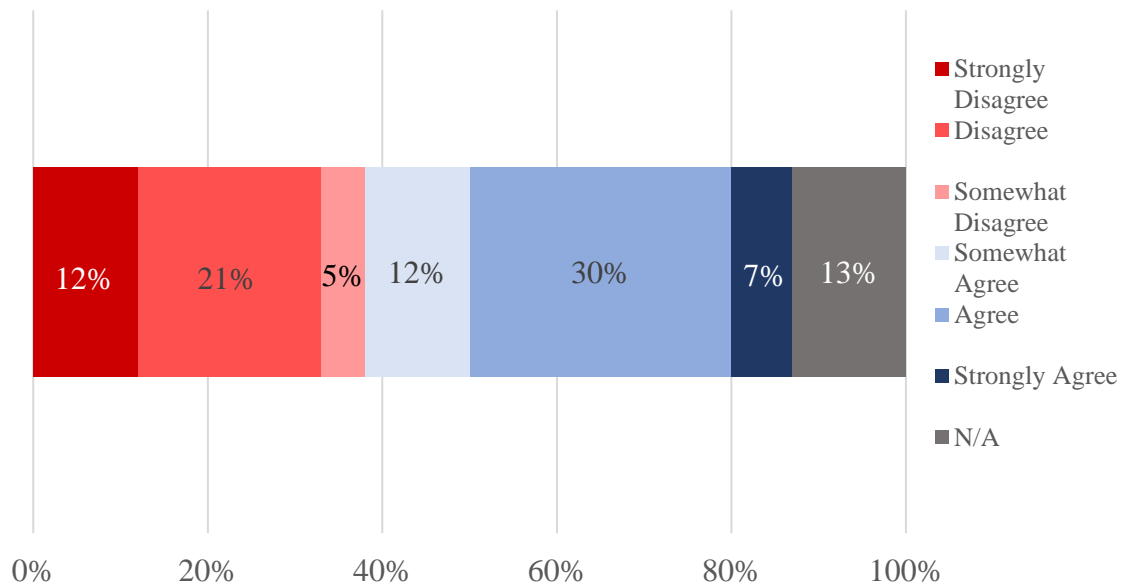


Figure 15: Responses of Equine Veterinarians (n=153) to the Statement “I Use Supplements to Provide Nutrients That Are Not Already Provided by Other Feedstuffs”

Respondents perceived horse owners to consult a variety of sources for information on supplements, with the popular perception being that horse owners consult other horse owners the most (30%), followed by the internet (26%), their trainers (14%), feed or supply stores (8%), horse magazines (7%), veterinarians (5%), supplement companies (4%), barn or farm owners (3%), farriers (3%), and nutritionists or consultants (1%). None of the respondents thought that horse owners consulted peer-reviewed scientific journals for information on supplements (Figure 16).

Opinions were much different when respondents were asked what sources of information horse owners actually should use. 80% believed that veterinarians should be the primary source of supplement information, followed by nutritionists or consultants (11%), peer-reviewed scientific journals (4%), barn or farm owners (1%), horse magazines (1%), the internet (1%), other horse owners (1%), and trainers (1%). None of the respondents believed that horse owners should get supplement information from farriers, feed or supply stores, or supplement companies (Figure 17).

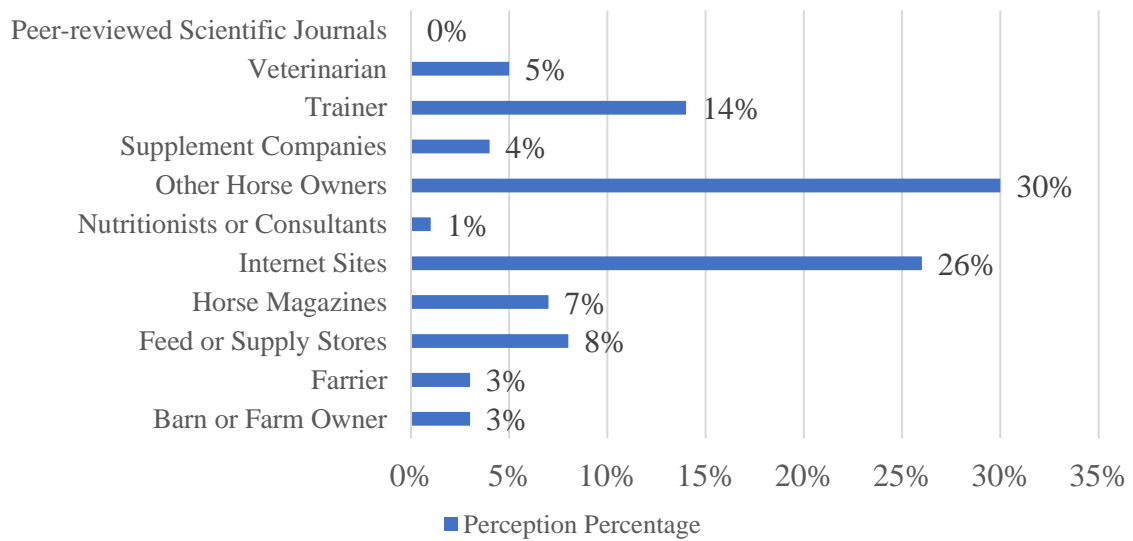


Figure 16: Resources Veterinarians Perceive Clients Consult First for Supplement Information

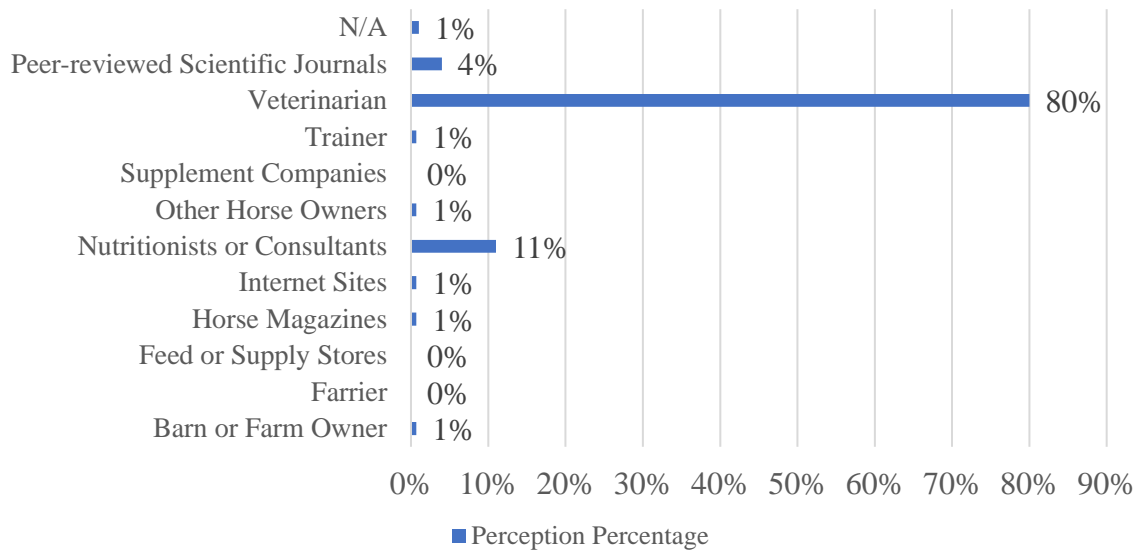


Figure 17: Resources Veterinarians Perceive Clients Should Consult First for Supplement Information

To gauge veterinarians' perceptions on horse owner supplement use, respondents were asked how many of their clients they perceived to feed supplements to their horses. 5% estimated 0 to 20% of their clients fed supplements, 12% estimated that 21 to 40% of their clients fed supplements, 27% estimated that 41 to 60% of their clients fed supplements, 38% estimated that 61 to 80% of their clients fed supplements, and 18% estimated that 81 to 100% of their clients fed supplements to their horses (Figure 18).

Respondents were also asked what percentage of their clients they perceived to be well educated on supplement use. The majority (62%) of respondents believed that only 0 to 20% were well educated on these products. 27% perceived 21 to 40% to be well educated, 10% perceived 41 to 60% of clients to be well educated, and 1% perceived 61 to 80% of clients to be well educated on supplement use. None of the respondents reported feeling that 81 to 100% of their clients were well educated on supplement use (Figure 19).

To further investigate the extent to which horse owners involve veterinarians in decisions about supplements, respondents were asked what percentage of their clients they perceive to consult them regarding the safety of supplements. 70% of respondents reported that 0 to 20% of clients consult them for this information, and only 19% reported that 21 to 40% consult them, followed by 8% reporting 41 to 60% consult them, 2% reporting 61 to 80% consult them, and 1% reporting that 81 to 100% of their clients consult them for this information (Figure 20).

Similarly, respondents were asked what percentage of their clients they perceive to consult them regarding the efficacy of supplements. 55% reported that 0 to 20% of

their clients consult them about this, 25% perceived that 21 to 40% of clients consult them, 16% perceived that 41 to 60% consult them about this, 2% perceived that 61 to 80% of clients consult them about this, and 2% perceived that 81 to 100% of their clients consult them regarding the efficacy of supplements (Figure 21). Lastly, veterinarians reported using peer-reviewed scientific journals the most when educating clients (73%) (Figure 22).

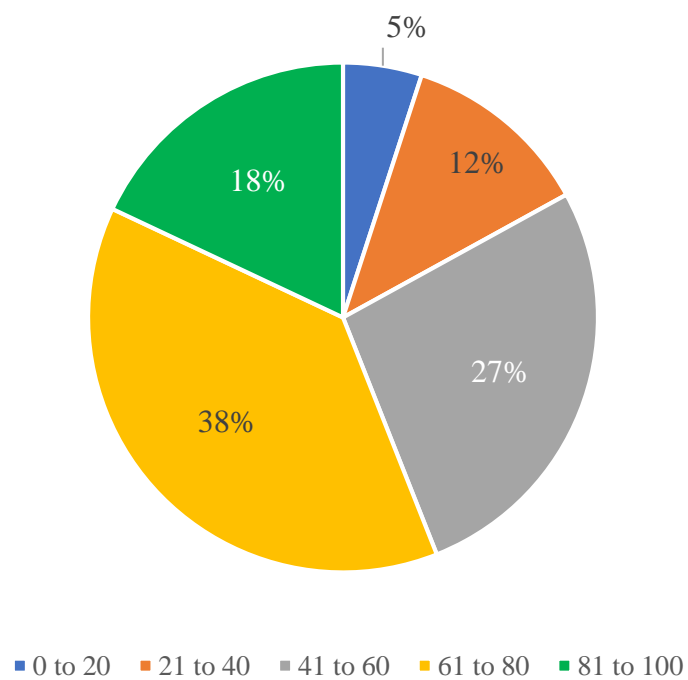


Figure 18: Percentage of Clients Perceived by Veterinarians to Feed Supplements to Their Horses

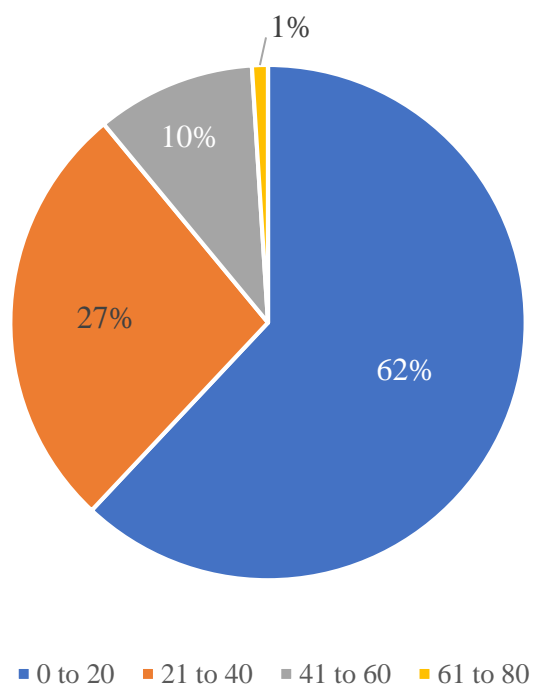


Figure 19: Percentage of Clients Perceived by Veterinarians to be Educated on Supplement Use

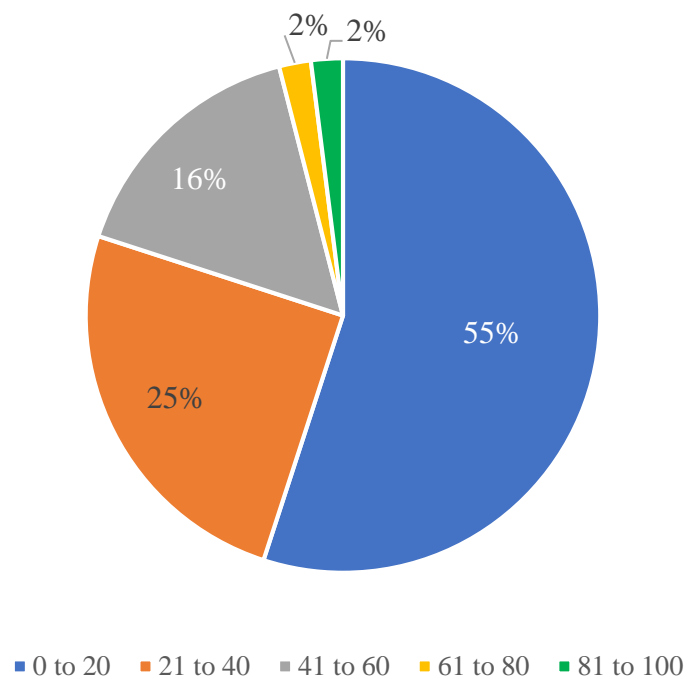


Figure 20: Percentage of Clients Perceived to Consult Veterinarians on the Safety of Supplements

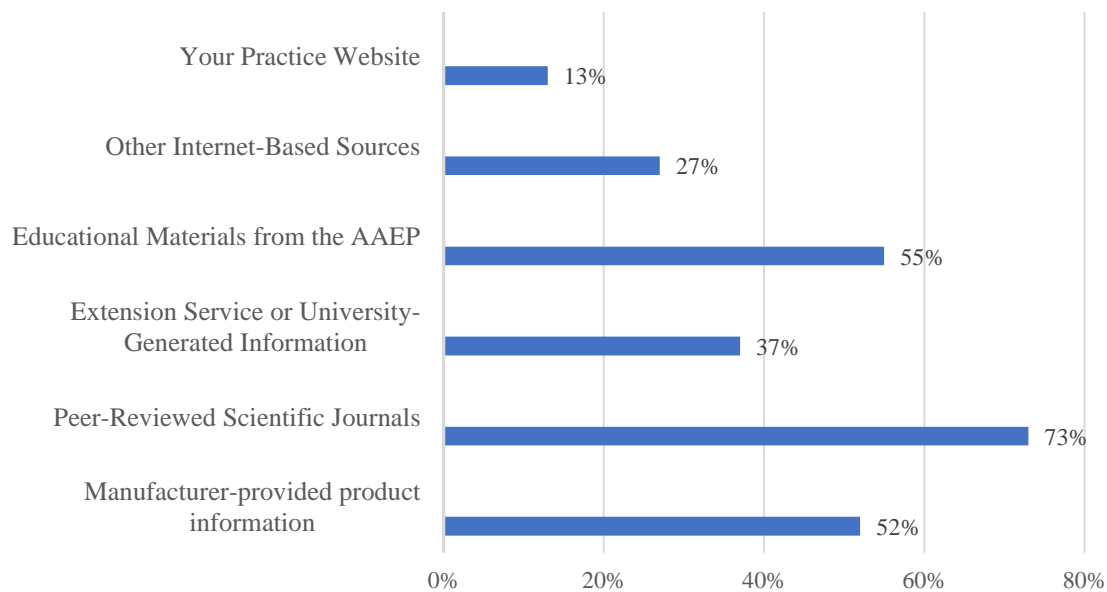


Figure 22: Resources Used by Veterinarians to Educate Clients on Supplement Use

Discussion

In total, the 153 respondents who met inclusion criteria represented a wide range of veterinary backgrounds to portray veterinarians as a population. Compared to other studies surveying veterinarians, this was a larger number than the 74 responses from Georgia veterinarians that Roberts and Murray (2013) received, and larger than the study by Parker et al. (2018), who received responses from 125 veterinarians in the Upper Midwest. Considering that this survey was distributed online through social media and respondents were not targeted from a specific region or country, it is impossible to know how well this survey represents a specific population. However, 93% of respondents reported living in the United States, and the larger number of respondents suggests that online surveys may be more convenient for veterinarians than those filled out on paper and returned through the mail system.

Understanding other characteristics about the veterinarian's practices can help identify potential trends in their perceptions on supplements. It is interesting that more respondents in this study were female (64%), compared to the more even proportion of genders (51% male, 49% female) in Georgia (Roberts and Murray, 2013). Both surveys saw the majority of veterinarians practicing for 20 or more years, and the horses typically seen by these veterinarians were used for recreational purposes. However, the majority of veterinarians surveyed by Roberts and Murray (2013) saw a mix of species, while 75% of respondents in this survey reported seeing primarily equine patients. This may be attributed to our use of the American Association of Equine Practitioners and other equine focused veterinary organizations for means of sharing the survey online.

Considering that 85% of respondents are members of the American Association of Equine Practitioners, this association seems to be a helpful networking tool to reach veterinarians and demonstrates its value for researching veterinarian perceptions in the future. There was no difference in opinions on supplement safety, efficacy, research, and the ability of supplements to prevent and treat problems in horses compared to whether the respondent is a member of the AAEP. This suggests that the veterinarians surveyed do not have differing opinions due to their association with the AAEP and its resources.

Comparing which types of supplements veterinarians recommend and what types they sell through their practice, joint supplements and gastric health supplements were most popular, respectively. There were higher percentages of supplements in general that were recommended than that were sold, indicating that the respondents surveyed may not necessarily be trying to convince their clients to buy supplements specifically from them, and suggesting that supplement sales may not be a prominent aspect of the veterinarians' business.

When compared to previous research on perceptions by horse owners (Swirsley et al., 2017), veterinarians are more likely to agree that supplements are safe to feed to horses (91% versus 50% of horse owners). The respondents in this study were also more confident in the usefulness of supplements to prevent (72%) and treat (76%) problems in horses, compared to horse owners (47% and 47%, respectively). This could indicate that veterinarians have seen more successful applications of dietary supplements. However, veterinarians were less confident than horse owners regarding whether the safety and efficacy of supplements is well researched and studied. This may be due to the fact that

veterinarians have a better understanding of equine research and a more realistic perspective on how much research has been done to understand dietary supplements in the horse.

Respondents were asked to consider what factors are important when evaluating the quality of an equine dietary supplement, and the majority agreed that manufacturer reputation, results of clinical trials, and ingredients are all important to consider when evaluating supplement quality. Of these three factors, the highest frequency response was that 49% of respondents “strongly agreed” that clinical trials are important when evaluating the quality of a supplement. This reinforces the idea that veterinarians value research in this field.

80% of the respondents reported owning a personal horse, and nearly half of those who owned personal horses fed at least one of those horse’s supplements. This proportion is less than what Swirsley et al. (2017) reported, where 84% of the horse owners surveyed reported feeding dietary supplements to at least one of their horses. Opinions on supplement use in the veterinarian’s own horses were consistent amongst themselves, with just over half of the respondents agreeing that they use supplements to prevent problems in their own horses, that they use supplements to treat problems in their own horses, that they use supplements to promote their horse’s overall health, and that they use supplements to provide nutrients that are not provided by other feedstuffs. It is likely that the half of respondents who reported feeding supplements are the same half who agreed to these questions.

In previous research, 43% of horse owners reported consulting their veterinarian as their first source of supplement information, followed by farriers, other horse owners, and nutritionists or consultants (Swirsley et al., 2017). However, this was contradicted by the current research, which found that only 5% of veterinarians actually perceive to be the first source of information for their clients about equine supplements. Instead, veterinarians perceived their clients to refer to other horse owners, the internet, and their trainer as the top sources of information, respectively.

It was also interesting to consider what veterinarians perceived should be the first source of supplement information for horse owners. Roberts and Murray (2013) surveyed veterinarians in Georgia, and found that 100% of respondents felt veterinarians or nutritionists were a very or somewhat important source of nutrition information (although this does not specifically ask about supplement information). However, 97% of respondents also felt that books or magazines were a very or somewhat important source of nutrition information, and 89% felt that the internet was a good source of information as well. This creates a conflicting message about whether veterinarians want to accept the role as an educator on equine nutrition.

In this study, 80% of veterinarians reported that veterinarians should be the first source of information horse owners consult for information about supplements. Some respondents felt that nutritionists or consultants should be the first source of information, but this proportion is much less than what was reported by Roberts and Murray (2013). These results may demonstrate a more authentic opinion of veterinarians from a broader population base. It may also suggest that while veterinarians think books or the internet

can be helpful for general equine nutrition information, that they are a more reliable source of information for supplements specifically.

The veterinarians surveyed in this study also confirmed that only a small percentage of their clients actually consult them regarding the safety or efficacy of supplements at all. These results, along with the source of information data, collectively demonstrate some miscommunication between veterinarians and horse owners, and demonstrate a need to improve that communication. When respondents in this survey were asked what resources they used to educate their clients about supplements, the most commonly cited tool was peer-reviewed scientific journals, followed by educational materials from the AAEP, and manufacturer-provided product information. This was interesting considering that in a practical sense, veterinarians seem unlikely to refer to scholarly journals and scientific research when trying to educate their clients. Not all horse owners may be able to understand the scientific articles, and veterinarians don't appear to have the time to explain these in-depth articles. Previous research by Parker et al. (2018) found that veterinarians preferred having access to regionally appropriate information provided to them by an equine nutritionist, preferably in a handout or factsheet format and preferably containing material that would suit a variety of education levels. These handouts or fact sheets would be a much more practical vehicle of information for the veterinarians to share with their clients, without requiring extra time for interpretation or leaving room for misinterpretation by the client.

The common response of veterinarians using peer-reviewed scientific journals as a resource for educating clients could indicate some level of social desirability bias,

where veterinarians report what they perceive society expects of them, rather than their true opinion. Further research looking into veterinarian's opinions on educational resources and their utilization of resources like extension agencies could aid the horse industry in improving the communication between veterinarians and horse owners.

Conclusion

Veterinarian perceptions about supplement use demonstrate a potential need for improved communication between veterinarians and horse owners on equine supplement use. This may suggest that although veterinarians embrace the role of educating horse owners on these topics, they lack the tools or resources to educate about equine supplements effectively.

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APPENDICES

APPENDIX A: IRB APPROVAL

IRB
INSTITUTIONAL REVIEW BOARD
 Office of Research Compliance,
 010A Sam Ingram Building,
 2269 Middle Tennessee Blvd
 Murfreesboro, TN 37129



IRBN007 – EXEMPTION DETERMINATION NOTICE

Wednesday, July 18, 2018

Investigator(s): Holly Spooner; Naomi Oliver; John Haffner; Rhonda Hoffman
 Investigator(s) Email(s): holly.spooner@mtsu.edu
 Department: ABAS; Horse Science Center

Study Title: Perceptions of veterinarians on the use of nutritional supplements in the horse industry
 Protocol ID: 18-1267

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXEMPT** review mechanism under 45 CFR 46.101(b)(2) within the research category (2) *Educational Tests*. A summary of the IRB action and other particulars in regard to this protocol application is tabulated as shown below:

IRB Action	EXEMPT from further IRB review***	
Date of expiration	NOT APPLICABLE	
Participant Size	300 [Three Hundred]	
Participant Pool	Adults 18+	
Mandatory Restrictions	1. Participants must be age 18+ 2. Informed consent must be obtained 3. Identifiable data may not be collected.	
Additional Restrictions	None	
Comments	None	
Amendments	Date	Post-Approval Amendments
	None	

***This exemption determination only allows above defined protocol from further IRB review such as continuing review. However, the following post-approval requirements still apply:

- Addition/removal of subject population should not be implemented without IRB approval
- Change in investigators must be notified and approved
- Modifications to procedures must be clearly articulated in an addendum request and the proposed changes must not be incorporated without an approval
- Be advised that the proposed change must comply within the requirements for exemption
- Changes to the research location must be approved – appropriate permission letter(s) from external institutions must accompany the addendum request form
- Changes to funding source must be notified via email (irb_submissions@mtsu.edu)

Institutional Review Board

Office of Compliance

Middle Tennessee State University

- The exemption does not expire as long as the protocol is in good standing
- Project completion must be reported via email (irb_submissions@mtsu.edu)
- Research-related injuries to the participants and other events must be reported within 48 hours of such events to compliance@mtsu.edu

The current MTSU IRB policies allow the investigators to make the following types of changes to this protocol without the need to report to the Office of Compliance, as long as the proposed changes do not result in the cancellation of the protocols eligibility for exemption:

- Editorial and minor administrative revisions to the consent form or other study documents
- Increasing/decreasing the participant size

The investigator(s) indicated in this notification should read and abide by all applicable post-approval conditions imposed with this approval. [Refer to the post-approval guidelines posted in the MTSU IRB's website](#). Any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918 within 48 hours of the incident.

All of the research-related records, which include signed consent forms, current & past investigator information, training certificates, survey instruments and other documents related to the study, must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data storage must be maintained for at least three (3) years after study completion. Subsequently, the researcher may destroy the data in a manner that maintains confidentiality and anonymity. IRB reserves the right to modify, change or cancel the terms of this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board
Middle Tennessee State University

Quick Links:

[Click here](#) for a detailed list of the post-approval responsibilities.
More information on exmpt procedures can be found [here](#).

APPENDIX B: SURVEY

1. Are you a veterinarian that practices on horses?
 - Yes
 - No

IF NO: Survey terminates with thank you message.

2. What is your gender?
 - Male
 - Female
3. How old are you?
 - Under 30
 - 31-50
 - 51 and over
4. Where do you reside?
 - United States of America
 - Other
5. How many years have you been practicing veterinary medicine?
 - 0-5 years
 - 6-10 years
 - 11-15 years
 - 16-20 years
 - 20+ years
6. Which of the following best represents your practice?
 - Primarily equine
 - Mixed practice (equine and other livestock)
 - Mixed practice (equine and small animal)
7. What is your approximate number of equine patients per week?
 - 1-20
 - 21-40
 - 41+

8. What is the primary use of the horses you typically work on?
 - Performance/Racing
 - Pleasure/Recreation

9. Are you a member of the American Association of Equine Practitioners (AAEP)?
 - Yes
 - No

10. Check all that apply- which types of supplements do you recommend to your clients?
 - Behavioral supplements
 - Joint supplements
 - Hoof supplements
 - Skin or coat supplements
 - Gastric health supplements
 - Performance and energy supplements

11. Check all that apply- which types of supplements do you sell through your practice?
 - Behavioral supplements
 - Joint supplements
 - Hoof supplements
 - Skin or coat supplements
 - Gastric health supplements
 - Performance and energy supplements

12. Opinions on safety and efficacy of supplements- (Strongly Disagree, Disagree, Somewhat Disagree, Somewhat Agree, Agree, Strongly Agree)

Supplements are safe to feed to horses.

The safety of supplements is well researched and studied.

Supplements are useful to help prevent problems in horses.

Supplements are useful to help treat problems in horses.

The effectiveness of supplements is well researched and studied.

13. Opinions on evaluating supplements

Manufacturer reputation is important in assessing the quality of supplements.

Results of clinical trials are important in assessing the quality of supplements.
Ingredients are important in assessing the quality of supplements.
Label claims are important in assessing the quality of supplements.

14. Do you own horses personally?

- Yes
- No

*If NO, will skip rest of personal horse ownership questions

15. How long have you owned horses?

- 0-4 years
- 5-9 years
- 10-14 years
- 15+ years

-Note- these questions refer to the horses under your own management/personal care, not horses seen in your practice.

16. Do you give supplements to the horses under your personal care?

- Yes
- No

17. How many of the horses under your care do you give supplements to?

- 0
- 1
- 2-4
- 5-9
- 10+

18. Opinions on supplement use for my personal horses- (Strongly Disagree, Disagree, Somewhat Disagree, Somewhat Agree, Agree, Strongly Agree)

I use supplements to prevent issues in my horse(s).

I use supplements to treat issues in my horse(s).

I use supplements to promote my horse's overall health.

I use supplements to provide nutrients that are not provided by other feedstuffs.

19. Which of the following do you perceive your clients consult first for supplement information?
- Veterinarian
 - Trainer
 - Farrier
 - Barn or farm owner
 - Horse magazines
 - Internet sites
 - Peer-reviewed scientific journals
 - Supplement companies
 - Feed or supply stores
 - Nutritionist or consultant
 - Other horse owners
20. Which of the following do you think your clients *should* consult first for supplement information?
- Veterinarian
 - Trainer
 - Farrier
 - Barn or farm owner
 - Horse magazines
 - Internet sites
 - Peer-reviewed scientific journals
 - Supplement companies
 - Feed or supply stores
 - Nutritionist or consultant
 - Other horse owners
21. What percentage of your clients do you perceive feed supplements to their horses?
- 0-20 percent
 - 21-40 percent
 - 41-60 percent
 - 61-80 percent
 - 81-100 percent

22. What percentage of your clients do you perceive are well-educated on supplement use?
- 0-20 percent
 - 21-40 percent
 - 41-60 percent
 - 61-80 percent
 - 81-100 percent
23. What percentage of your clients do you perceive consult you regarding the *safety* of supplements?
- 0-20 percent
 - 21-40 percent
 - 41-60 percent
 - 61-80 percent
 - 81-100 percent
24. What percentage of your clients do you perceive consult you regarding the *efficacy* of supplements?
- 0-20 percent
 - 21-40 percent
 - 41-60 percent
 - 61-80 percent
 - 81-100 percent
25. What resources do you use to educate your clients on supplement use? (choose any that apply)
- Manufacturer-provided product information
 - Peer-reviewed scientific journals
 - Extension service or University generated information
 - Educational materials from the AAEP
 - Other internet-based sources
 - Your practice website