

This is a peer-reviewed, accepted author manuscript of the following research article:
Lumbis, RH, Fontaine, SJ, Reilly, JJ & Yam, PS 2025, 'Perceptions of small animal nutrition: an exploration of education and self-reported proficiency among student veterinary professionals', *Journal of Veterinary Medical Education*.
<https://doi.org/10.3138/jyme-2025-0010>

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Perceptions of small animal nutrition: An exploration of education and self-reported proficiency among student veterinary professionals.

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Abstract

Nutrition is an essential knowledge area for student veterinary professionals,^{1,2} yet commonly cited as an underrepresented topic in veterinary and veterinary nurse curricula.³⁻⁵ Consequently, veterinary professionals may lack the knowledge, skills or confidence to counsel clients and provide nutrition-related patient care.⁶⁻⁸

This study forms the baseline stage of a longitudinal project comparing the nutrition knowledge and competence of first-year veterinary (VS) and veterinary nursing students (VNS) in the UK and Ireland. Participants were recruited by non-probability, convenience purposive sampling, by email invitation from educational providers. Data was collected between October 2023 and January 2024. Participation was voluntary and informed consent obtained.

135 VS and 186 VNS completed the online survey. Most (82%, n=211) expressed interest in learning about nutrition. Ability to educate owners and assess pets' physical condition and nutrition status was considered important by 97% (n=250) and 98% (n=253) respectively. Over three quarters of respondents (77%, n=178) believed that diet should be evaluated and discussed at every veterinary visit. Students had greater confidence in their ability to conduct a nutritional assessment on dogs and cats than exotic pets. Fewer students (36%, n=84) believed cooked diets to be healthier than raw, and perceived risks of raw outweighed benefits (38%, n=88). Half of respondents were unsure about diet choices. Most VS (77%, n=67) and VNS (87%, n=125) deemed vegetarian diets unsuitable for dogs and cats. Students enter their studies with preconceived ideas and potential misinformation about nutrition. Nutrition education must be adequately represented within curricula to protect animal health.

Key words

Veterinary education; veterinary curriculum; student veterinary nurse; veterinary nutrition; nutritional assessment; unconventional diet

Introduction

Current clinical guidelines cite nutrition as a primary intervention in veterinary care.⁹⁻¹² It is fundamental to longevity¹³ and disease prevention, with early intervention proving crucial to successful patient outcomes and disease management.¹⁴ In the developed world, the primary cause of veterinary mortality relates to obesity,^{15,16} common health sequelae of which include osteoarthritis, diabetes mellitus, hepatic lipidosis and hypertension,¹⁷ in addition to reduced quality of life and longevity.^{13,18} Diet is also implicated in many other common chronic conditions affecting pets in the UK, including neoplasia, cardiovascular, dental, and respiratory disease.^{14,19,20}

In veterinary medicine, nutrition is recognised as the fifth vital assessment of a standard physical examination for small animals, following the evaluation of temperature, pulse, respiration, and pain.^{10,11} The WSAVA guidelines¹¹ are the accepted standard of nutritional assessment and should form part of the minimum standard of care. This involves consideration of an animal's nutritional status, assessment of their diet, provision of specific dietary recommendations, and completion of a documented feeding plan for every pet at every consultation.^{10,11}

Worldwide veterinary associations and accreditation organisations have defined benchmarks for the education of veterinarians and veterinary nurses/technicians, including requirements for nutrition-related skills and competencies.²¹⁻³⁰ The ability to perform a nutritional assessment is part of the minimum standard of patient care and a core competency for newly qualified veterinarians and registered veterinary nurses in the UK and Ireland. Yet,

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despite freely available and accessible nutritional assessment guidelines, tools and resources, knowledge and/or the motivation to use these appears deficient within veterinary practice and it is an often overlooked and underdiscussed aspect of veterinary care.^{7,31,32} Nutrition is one identified area in which veterinary nurse utilisation could be increased³³ but, comparable to veterinarians, deficiencies have been reported in their knowledge and skills of nutrition subjects.^{4,5}

This study forms the initial stage (part I) of a longitudinal two-part project to compare the nutrition knowledge and competence of foundation and professional phase veterinary (VS) and veterinary nursing students (VNS). The primary aim was to establish the relevance and importance that foundation phase students place on nutrition-related education, patient care and owner advice. Secondary objectives were to determine any differences in the attitudes, confidence and knowledge of VS and VNS, and to compare survey responses according to socio-economic status (SES). An established body of evidence demonstrates marked socio-economic differences in dietary intake, food choices,^{34–38} nutritional knowledge,³⁹ compliance with dietary recommendations and incidence of obesity and chronic disease.⁴⁰ There is also considerable gender-specific differences, with lower functional nutrition knowledge, greater consumption of an unhealthy diet and increased likelihood of being overweight in men than women.^{39,41–43} Study participants were asked to identify their attitudes towards nutrition-related education, patient care and owner advice, in addition to their clinical experience, knowledge and competence.

Materials and methods

A cross-sectional study of UK and Irish VS and VNS was conducted.

Study participants

Eligible participants were VS or VNS, aged 18 years or over and entering their first year of study in 2023, in the UK or Republic of Ireland. No further exclusion criteria applied. Students were recruited through invitations sent to all veterinary schools in the UK and Ireland, all Irish-based training providers of further and higher education qualifications in veterinary nursing, all UK-based universities with full or provisional RCVS accreditation offering higher education qualifications in veterinary nursing, and all UK veterinary nursing further education awarding organisations.

The socioeconomic status (SES) was determined for students native to the UK and Ireland who provided a valid home postcode. Using well established classifications of indices of deprivation^{44–47} the top three deciles were considered high (least deprived) the bottom three low (most deprived) and the middle four, medium. The Pobal HP Deprivation Indices for Ireland⁴⁷ were combined in a similar way with affluence considered high, disadvantaged considered low, and marginally above or below average considered medium.

Using the available databases of education providers of veterinary and VN training in the UK and Ireland,^{48–51} information was requested regarding nutrition teaching at each institution. Details included dates of induction; when, during the programme, small animal nutrition teaching is delivered; the name and email address of lecturers facilitating this teaching and the name and email address of the course director or year leader. This information helped to ensure that communication during the recruitment phase was personalised and directed to the relevant personnel, and positively impacted survey response rate.⁵² Due to the number of approved delivery centres, and a lack of specific contact information for each, this process was not possible for UK further education VN training providers. Instead, all three UK awarding organisations were contacted and asked to distribute the questionnaire link to their RCVS-approved delivery centres offering further education qualifications in small or

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companion animal veterinary nursing. All three organisations responded, with two agreeing to circulate the link.

Participants were recruited by non-probability, convenience purposive sampling. A standard email was composed which ensured the provision of uniform information to all academic institutions and students. Where possible, this was personalised according to the names of the educators provided in response to the initial correspondence. To facilitate educators' advertisement of the study to students, emails were accompanied by a PowerPoint slide containing an anonymous questionnaire link via QR code and an explanation of the research. No incentive was offered to research participants.

Questionnaire design

An online survey was chosen because it facilitates the collection of a large sample size, provides better control of respondent selection and enables longitudinal comparisons to be made easily.⁵³ A 62-item online questionnaire (Appendix 1 online) was designed to collect data on VS and VNS' self-reported proficiency, knowledge, and attitudes towards small animal nutrition and the nutrition-related skills and competencies expected on day one of qualification.²²⁻²⁵ It comprised sections on: (a) demographics (age, gender, college/university, postcode); (b) pet ownership; (c) nutrition training and experience; (d) students' perceptions of the relevance and importance of nutrition-related education; and (e) students' self-perceived relevance of, and confidence in, nutrition-related patient care and pet owner advice. The questionnaire consisted of short answer questions, multiple-choice questions where participants could select one or more responses, structured question statements capturing perceptions on a 5-point Likert scale (where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree), and free response questions. The questionnaire was anonymous.

The novel questionnaire was created by the lead author to examine the study objectives that did not fit within the parameters of pre-existing surveys. For example, prior Northern American research, such as that by Kamleh et al⁵⁴ used a broader survey. They examined student veterinarians baseline nutrition-related perceptions and information-seeking behaviours and assessed areas such as the impact of a student's prior knowledge and existing perceptions on information assimilation in an educational setting. Reference was also made to medical research and measurement of the self-perceived competence of medical students,⁵⁵⁻⁵⁷ including use of the NUTRITION COMPETENCE QUESTIONNAIRE⁵⁸ and the General Nutrition Knowledge Questionnaire.^{59,60} This provided valuable data and a helpful basis for this study. During the survey development phase, methodological advice was sought from a University of Glasgow Lecturer in Research and Numerical Skills. Prior to administration, the questionnaire underwent two stages of pre-testing to confirm content validity and ensure that the final version was well-constructed, unambiguous, and capable of eliciting accurate and meaningful data. It was piloted on ten volunteers, who varied with respect to their age, gender, pet ownership status and veterinary experience. Survey fatigue can decrease response rate and quality of data produced, with survey length negatively associated with completion rate,⁶¹ therefore questionnaire length and respondent burden were important considerations. Feedback was obtained on the wording, interpretation and order of questions, the range of available responses, and completion time. This was used to further refine and enhance the questions, ensuring the questionnaire was concise, focused and respectful of respondents' time.

In the second stage, an online pre-test of the questionnaire was conducted with another small group of volunteers. All relevant comments that were likely to improve the quality of data were considered and incorporated into the final version of the questionnaire. Estimated time for completion was up to 15 minutes.

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Data collection

Following pre-testing, the questionnaire was distributed to VS and VNS via Qualtrics® (Provo, Utah) by email invitation from each education provider. This provided an interface for validated data entry and export to an external statistics package. To preserve anonymity, responses were gathered using an anonymous link and respondents' IP addresses and location data were not collected. If provided, personal contact information was processed separately from questionnaire responses. Survey data was collected between October 2023 and January 2024. Participation was voluntary and informed consent was obtained by clicking to 'agree' with consent statements prior to entering the questionnaire. From the information supplied, it is understood that students had not received any lectures by boarded ECVCN or ACVIM (nutrition) diplomates.

Statistical analysis

Responses were downloaded into Microsoft Excel and, where applicable, assigned numerical values for easier computation. Statistical analysis was performed using the IBM® SPSS® software, version 29.0.1.0(171). All data were analysed with descriptive statistics. Categorical data were reported as counts and proportions and analysed using Pearson's Chi-square test, or Fisher's exact test when greater than 20% of cells had expected frequencies under five. Statistical significance was set at $P < 0.05$. Free text responses were analysed using thematic analysis as described by Braun and Clarke.⁶² Not all respondents answered all questions, and data from unanswered questions were excluded from analysis.

Results

Characteristics of study participants

Responses were received from 135 VS and 186 VNS. Most (72%, $n=134$) VNS and less than half (44%, $n=60$) of VS were aged 20 or under. The sample was biased in favour of women with a respective 89% ($n=166$) and 82% ($n=111$) of VNS and VS identified as female. A minority 5% ($n=10$) of VNS and 15% ($n=20$) of VS identified as male. The distribution of responses according to education provider is shown in appendices 1 and 2. A significant association ($p < .001$) was evident between socioeconomic status and student group (table 1). Nearly half of VS had a high SES, whereas the majority of VNS had a medium SES. Nearly all students had responsibility for the food selection and management of one or more pets and many considered these to be family members (appendix 3).

(Place Table 1 here)

Attitudes towards nutrition-related education

Most students expressed an interest (82%, $n=211$) in learning about small animal nutrition. Fisher's Exact Test determined a significant association (two-tailed $p = .005$) between student type and confidence that their nutrition training will prepare them for work as a veterinary professional, with both VNS and VS strongly skewed towards agree and strongly agree.

Questionnaire responses to statements regarding perceptions of small animal nutrition and importance of nutrition-related education and care is provided in figure 1 and figure 2. Ability to educate owners and assess pets' physical condition and nutrition status was identified by 98% ($n=253$) of students as important, with a Pearson Chi-Square test revealing a statistically significant association ($p = < .001$). Nearly all students also believed it important

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to educate owners about good practice of small animal husbandry and feeding (97%, n=250), appropriate nutrition for a pet's species and life stage (98%, n=252), and healthy pet weight management (97%, n=251). A Pearson Chi-Square test revealed statistically significant associations between VS and perceived importance of developing the knowledge and skills to be able to correctly provide nutritional care and support in a timely manner ($p = <.001$), educate owners about the nutritional needs of dogs and cats with certain lifestyles and health challenges ($p = <.001$)

(Place Figures 1 and 2 here)

Confidence in nutrition-related patient care and owner advice

Nearly three quarters of VNS (72%, n=128) and VS (71%, n=89) had not completed, or couldn't remember completing, any prior nutrition training. Fisher's Exact Test determined a statistically significant association between students' prior nutrition training and their confidence in determining appropriate feeding and nutrition goals for a patient ($p=.007$), advising a dog or cat owner on good practice of husbandry and nutritional needs ($p=<.010$) and maintaining accurate clear and concise records regarding the nutrition-related care they provide to patients ($p=<.023$). Students who had received training were, on average, more confident. Statistically significant association was also found between the prior nutrition training of VS and their level of confidence in assessing the physical condition of dogs and cats ($p=<.001$), calculating the energy requirements of dogs and cats ($p=.002$) and providing appropriate and timely nutritional support ($p=<.001$).

Half of students (51%, n=113) had greater confidence in their ability to perform a clinical examination and assess the physical condition of dogs or cats, than exotic pets (15%, n=34). They were also more confident conducting elements of a nutritional assessment on dogs and cats (48%, n=106) than exotic pets (13%, n=29). Nearly three quarters felt able to assess the bodyweight of a dog or cat (71%, n=158) compared to an exotic pet (26%, n=58). Over 60% (n=137) of students, of which 64% (n=87) were VS and 57% (n=81) were VNS, correctly identified the description of an ideal feline body condition score.

Students had limited confidence in their ability to manage nutritional care (figure 3) and owner advice (figure 4). Only half felt confident providing nutrition-related care to patients (50%, n=111) and maintaining accurate, clear and concise records of nutrition-related advice and recommendations provided to clients (49%, n=109). Half of students (50%, n=112) were more confident advising dog and cat owners on good practice of husbandry and feeding, compared to 30% (n=67) when advising exotic pet owners. Whilst 62% (n=137) of students felt confident communicating with the owner of an overweight pet about their pet's body condition, students felt most confident advising dog owners (62%, n=137) about weight loss strategies, compared to cat (56%, n=125) and rabbit owners (26%, n=57). VNS felt more confident managing and maintaining assisted feeding through hand feeding (71%, n=100) than oral hydration (44%, n=62) or tube feeding (20%, n=27).

(Place Figures 3 and 4 here)

Knowledge, relevance and importance of nutrition-related patient care and owner advice

Students had greater self-perceived knowledge about nutrition-related patient care of dogs, cats and rabbits, and least knowledge of fish and birds (Figure 5). No significant association was detected between self-perceived knowledge and student type, but students with responsibility for feeding three or more pets had a greater likelihood of higher self-perceived nutrition knowledge of dogs ($p=.001$) and cats ($p=.006$). Over three quarters of students (77%, n=178) believed that diet and nutrition should be evaluated and discussed at every

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veterinary visit ($p=.002$). Nearly all students (93%, $n=213$) believed that pet owners should make evidence-based dietary decisions and that they should use evidence-based information when educating owners about nutrition (98%, $n=226$). Yet only half (53%, $n=138$) felt sufficiently knowledgeable to access current, reliable and evidence-based nutrition-related information.

Over a third of students believed commercially-produced cooked diets to be healthier than raw (36%, $n=84$, $p<.001$), with 51% ($n=117$) unsure. Students from medium and high SES class were statistically more likely to be unsure ($p<.001$). A similar number (38%, $n=88$) perceived risks of raw feeding to outweigh benefits, with 46% ($n=105$) undecided. The three most cited risks were disease/pathogen risk, malnutrition and health/welfare risks (figure 6). A third of students (33%, $n=75$) were ill-informed about by-product ingredients and considered these to be unsuitable for human consumption and capable of harming pets ($p=.044$), while 55% ($n=127$) were unsure. Most VS (80%, $n=70$) and VNS (92%, $n=131$) considered vegetarian diets to be unsuitable for dogs and cats. Only 4% ($n=9$) of students believed vegetarian diets to be nutritionally adequate and 7% ($n=16$) recognised it as potentially adequate for dogs, but not cats.

(Place Figures 5 and 6 here)

Nutrition-related clinical experience

Prior to starting university, the nutrition tasks most observed and/or completed by students in small animal practice were the administration of food via a bowl and assessment of body condition score. Least experience was gained in muscle condition scoring, the placement and use of feeding tubes, and the calculation of energy requirements (figure 7). Both student groups were most likely to have fed hospitalised dogs, cats, rabbits and small mammals and least likely to have fed fish, invertebrates and amphibians. Over a quarter (26%, $n=41$) of VNS and 13.7% ($n=14$) of VS had not fed, or couldn't remember feeding, any commonly kept UK small animal pet species. Both student groups were more likely to have observed a client discussing their pet's diet choice and feeding management, body weight and condition with a veterinarian rather than a veterinary nurse or receptionist.

(Place Figure 7 here)

Discussion

Veterinary professionals require adequate and accurate knowledge, skills and attitudes to integrate nutrition-related care and education into routine clinical practice. A significant and important finding of this study is the nutrition-related misconceptions of foundation phase students. The pet food industry is mired in misinformation and propaganda, creating a challenge for caregivers to recognise nutritional fact from fiction.⁶³ Consequently, suboptimal diet choices are being made, resulting in harm to pets and caregivers, and emphasising the need for educators of student veterinary professionals to refute preconceived myths.

Study participants recognised the critical role that optimal diet and nutritional assessment has on the health and wellbeing of animals and therefore the educational importance of this topic, both to them and to caregivers. Comparable to the findings of Kamleh et al,⁵⁴ respondents highly rated the need to develop knowledge and skills to provide fundamental nutrition-related patient care and owner advice. Most VS and VNS were confident that their training would prepare them for future work. This is interesting because it is at odds with recent research. UK veterinary and veterinary nursing programmes are accredited by the RCVS according to strict standards and a specific set of graduate outcomes,^{23,24} hence students should have comparable standards attained across different universities and VN

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training providers. However, the number of hours of nutrition teaching and the knowledge, skills and expertise of nutrition educators varies.³ Nutrition education within veterinary undergraduate curricula is reportedly inadequate in both quantity and quality. In 1996, a perceived lack of training in nutrition was reflected in graduates' reports of feeling insufficiently prepared for the provision of nutrition-related care and counselling in clinical practice.⁶⁴ In 2005, Acor² acknowledged expansion of the knowledge and application of small animal nutrition over the previous two decades and reported a 300% increase in both wellness and therapeutic nutrition products. Over a decade later, despite veterinary nutrition being ranked as very important, a European study³ found that a limited number (50% or less) of veterinary schools employed at least one veterinary nutrition diplomate and 41% of veterinary school academics were either not at all satisfied or not very satisfied with the nutritional skills and performance of their graduates. In a more recent online survey of general practitioners, 57.1% (n=201) reported they received "none" or "very little" formal instruction in small animal nutrition.⁶⁵ Similar findings are evident within veterinary nursing curricula. A recent UK-based study recognised nutrition as a topic that insufficiently prepared respondents for their role as a registered VN.⁸ Students will be surveyed again during their penultimate year of study to compare the perceptions of foundation and professional phase students regarding the adequacy of their nutrition training.

Similar to Dunne et al,⁶⁶ animal experience had been gained, primarily, on an informal basis with owned pets. Those owning multiple pets had greater self-perceived nutrition-related knowledge and skills. However, the influence of cognitive bias in nutrition and dietary decision-making cannot be discounted, particularly the Dunning-Kruger effect whereby individuals with limited or no knowledge, skill and expertise overestimate their own cognitive ability and competence.⁶⁷ Students had greater confidence in their ability to assess the physical condition and nutritional status of dogs and cats, than exotic pets. Like first-year veterinary students surveyed by Ostović et al,⁶⁸ self-perceived knowledge of fish, birds and amphibians was limited. Nutritional diseases are prevalent in exotic pets and frequently identified during veterinary consultations.⁶⁹⁻⁷¹ A lack of veterinary knowledge is an acknowledged concern of exotic pet ownership⁷¹ and so comparing students' perceptions in their professional phase of study will be valuable.

Work experience prior to application to veterinary school has been a long-standing prerequisite for all UK universities⁷² and is usually an entry requirement for prospective VNS. While awareness of nutritional assessment is apparent,⁷³ it is often neglected and is seldom completed in full, or discussed with caregivers, at every veterinary visit.^{7,31,74-80} It is therefore unsurprising that not all students in this study recalled observing or assisting with all components of a nutritional assessment as part of their work experience. Study respondents were more likely to have observed clients discussing aspects of a nutritional assessment with a veterinarian than any other member of the veterinary healthcare team. While veterinarians are considered leading authorities on pet nutrition and healthcare, all veterinary healthcare team members with whom the client interacts have fundamental involvement in providing nutrition advice, care, support and recommendations. Nutrition is an aspect of care that can be directed by the veterinarian and implemented by VNs, with the help of support staff, all of whom can act as nutritional counsellors and advocates.^{33,81,82} Vivian et al⁸ identified nutrition as an area for VN employers and educators to address. VN-led clinics can be invaluable in supporting clinical practice,⁸³ particularly in providing preventative nutrition^{33,84-86} and discussing the often-neglected topic of nutrition for healthy animals.^{82,87} However, in an earlier study to determine how UK registered VNs are currently utilised in practice, over 15% of respondents were not involved in nurse clinics, although 95% considered nurse clinics relevant to their role.⁵ Through the provision of nursing clinics, nutrition can be embedded within curricula which would also ensure greater development and maintenance of client trust and respect in VN advice.⁸

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Strengths and limitations of present study

Our survey was unique in that it explored veterinary nursing, as well as veterinary students' perceptions of nutrition-related education, patient care and owner advice, enabling a direct comparison of each professional group. It also referenced the day one competencies and skills required by veterinarians and VNs practising in the UK and Ireland.^{22–25} Pilot testing of the survey increased internal validity of the research study. Measurement of test-retest reliability would have been a valuable way of assessing the external reliability of the survey.^{88–90} This was not possible due to anonymised responses but could have been conducted as part of the initial pilot phase.

The overall response rate to this survey was low, yet comparable to other similar surveys^{66,91–93} which raises the issue of how to seek student opinion, whilst avoiding survey fatigue.⁹⁴ It further poses the challenge of how educational providers can support survey-based research, whilst shielding students from excessive survey requests. Survey respondents represent only a small percentage of UK and Irish VS and VNS. Whilst this reduces the generalisability of the results, the value of small-scale surveys and their ability to produce an exploratory sample should not be overlooked.⁹⁵ Results revealed a gender bias in student recruitment to veterinary and VN programmes of study, with greater female respondents which reflects the continuing 'feminisation' of the veterinary profession.^{96,97} SES could not be determined for international students. However, given the significant expense associated with UK-based study for foreign nationals, it is fair to speculate they would not be in the most deprived quartile.

Online surveys are increasingly used in educational research⁹⁸ and have many associated benefits, largely related to efficiency and convenience, and their potential to collect a large amount of data.⁹⁹ Yet acknowledged limitations include a lower response rate compared to other types of surveys,^{100,101} response bias¹⁰² and conclusions that are undermined by self-reported data. The necessary, but potentially undesirable, use of convenience sampling and self-selected respondents in this study resulted in selection bias which could have influenced the data collected. Individuals with a greater interest in, or strong opinions about, the survey topic are more likely to respond.^{99,103,104} Since nutrition is perceived as an under-represented topic in the veterinary and veterinary nursing curricula, it is also possible that students assumed that the survey was designed to increase nutrition content, and therefore tailored their answers accordingly.^{102,104}

Conclusion

The global rise of diet-related non-communicable diseases, combined with the increased popularity of alternative and unconventional diets and greater access to unsubstantiated information (e.g. internet articles and social media 'experts'), means it is imperative that the veterinary healthcare team are competent and confident in providing fundamental, evidence-based nutrition advice. Findings of this study indicate that first year student veterinary professionals perceive small animal nutrition to be important to their education and to their future role. Students enter their studies with preconceived ideas and potential misinformation about nutrition. It is therefore essential that nutrition education is adequately represented within curricula to protect animal and human health. Further research will be conducted during students' professional phase (penultimate year) of study. It will be interesting to compare knowledge and attitudes and identify any advancements in nutrition experience.

Acknowledgments

The authors would like to thank the veterinary schools and veterinary nursing education providers for their help in disseminating the questionnaire; all the first-year veterinary and veterinary nursing students who participated in the study and Dr Euan Bennett for statistical advice.

The data supporting the findings reported in this paper are openly available from the University of Glasgow Enlighten publications repository at [insert DOI when available].

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This paper has been produced as part of the first author's doctoral degree which is being funded by the University of Glasgow, Small Animal Hospital Fund (The Ronald Miller Foundation).

Conflict of interest

The authors declare no conflict of interest.

Ethical considerations

The study design and questionnaire were reviewed by the College of Medical, Veterinary & Life Sciences Ethics Committee (reference number 200230001).

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Tables

Table 1: Students' socio-economic status (SES) according to home postcode. SES couldn't be determined for international students and those with unrecognisable UK or Irish postcodes.

	Socio-economic status			
	High / least deprived	Medium	Low / most deprived	Data not available
VNS	n=61	n=77	n=37	n=11
VS	n=42	n=33	n=10	n=50

Figure captions

Figure 1: Students' self-perceived importance of developing nutrition-related knowledge and skills. The values represent the percentage who strongly agreed (SA) or agreed (A) with, or who were unsure (U) about, each statement (VS n=100; VNS n=158).

Figure 2: Students' attitudes towards small animal nutrition and education. The values represent the percentage who strongly agreed (SA), agreed (A), unsure (U), disagreed (D) or strongly disagreed (SD) with each statement (VS n=100; VNS n=158).

Figure 3: The confidence of student veterinary professionals in providing nutrition-related patient care. The values represent the percentage who strongly agreed (SA), agreed (A), undecided (U), disagreed (D) or strongly disagreed (SD) with each statement (VS n=82; VNS n=140).

Figure 4: The confidence of student veterinary professionals in providing nutrition-related owner advice. The values represent the percentage who strongly agreed (SA), agreed (A), undecided (U), disagreed (D) or strongly disagreed (SD) with each statement (VS n=82; VNS n=140).

Figure 5: Student veterinary professionals' self-perceived knowledge of their pet's nutrition.

Figure 6: Perceived risks of feeding a raw diet to dogs and cats as identified by student veterinary professionals.

Figure 7: Nutrition tasks that student veterinary professionals have conducted or assisted with when working or gaining experience with small animals in a veterinary practice.

Supplementary information / Appendix

1: The number of responses from veterinary students according to veterinary school (n=135).

2: The number of responses from veterinary nursing students according to training establishment (n=186).

3: The percentage of student veterinary professionals who consider their pets to be family members.