

The Challenges and Issues of Undergraduate Student Retention and Attainment in UK Veterinary Medical Education

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Abstract

Student retention and attainment has recently been identified as a key area of development in veterinary medical education enquiry. Woodfield's (2014) research on retention and attainment across the UK disciplines yielded some unique information about the challenges and issues of students who study veterinary medicine and related subjects. This literature review aims to expand upon Woodfield's findings and explain important issues about retention and attainment across veterinary medicine. Overall, the subject of retention and attainment in undergraduate veterinary medical education needs a great deal more empirical attention as there are a paucity of data on issues key to the veterinary profession, such as the retention and attainment of mature and widening access students, and the effects of students being placed at remote locations during their studies. Our findings also cover some unsurprising issues such as the profession is and continues to be dominated by women but it is principally lead by men, the under-representation of Black and Minority Ethnic (BME) students in veterinary medicine and the effects of content overload in the veterinary medical curriculum. Based on data gathered by Woodfield (2014) and our investigation of the scholarly and grey literatures, we offer an overview of gaps in current knowledge and recommendations for further research.

Key words: undergraduate, retention, attainment

Retention and attainment across veterinary medicine

In her report, Woodfield (2014) offers specific information on veterinary medical education¹ (summarised in Table 1). These issues provided the impetus for this paper and form the basis of its structure. Table 2 summarises Woodfield's (2014) findings on the profile of UK veterinary students.

Of the veterinary students described in Woodfield's (2014) report, 390 students left without their intended veterinary degree. In the UK, veterinary programs are typically 5- or 6-year undergraduate degrees leading to a Level 7 qualification. Therefore, students failing to

¹ Includes (D1) Pre-clinical veterinary medicine, (D2) Clinical veterinary medicine and dentistry, (D3) Animal science and (D9) Others in veterinary sciences, agriculture and related subjects from the HEA sub-disciplinary subject areas under 'Veterinary Medicine'

38 complete the whole program, but completing at least 3 years, are eligible to be awarded an
39 alternative undergraduate degree (at Level 6 of the national qualifications framework), such
40 as a BSc. Of the 390 students who left without their intended veterinary degree, 104 students
41 were awarded an alternative degree. The reasons for this are outlined in Table 3.

42 **Curriculum, culture and custom in veterinary medicine**

43 In this section, we discuss and explain the main findings from Woodfield's (2014) report
44 retention and attainment in veterinary medical education. We also explore additional issues
45 related to curriculum, culture, and custom that are unique to veterinary medicine and were
46 not investigated in Woodfield's report, such as early career choice and coping with content
47 overload.

48 *International feminisation of the profession*

49 Table 1 shows that women in veterinary medicine were 13-14% more likely to gain an upper-
50 degree² than men. Table 2 shows that the same proportion of male and female students (4%)
51 left without receiving a degree, however, a much greater proportion of female students (67%)
52 achieved upper degrees than male students (53%). While the retention and attainment of
53 female students does not appear to be an immediate problem in veterinary medical education
54 there are factors that dictate leadership and motivation becoming core components of the
55 curriculum: the changing demographic of the profession, together with the known gender
56 differences in attitudes towards leadership and management (Barsh and Yee 2011; Schweitzer
57 *et al.* 2012). The imbalance between female and male achievement of an upper degree is
58 addressed later in this article.

59 Woodfield's (2014) finding that veterinary medicine is among the most female-dominant areas
60 of UK higher education (HE) is no surprise. Woodfield's (2014) figure of 79% female
61 veterinary students is closely aligned with the Vet Futures (2014) figure of 77% female
62 students. The feminisation of the profession is a Western phenomenon and an increasing
63 trend. There is abundant evidence to support this – from the UK (Vet Futures 2014; RCVS
64 2014) and the US (AVMA 2015). In the UK, Vet Futures (2014) illustrates that while the
65 veterinary profession is dominated by women (57%, $n = 11,248$) and while women's leadership
66 positions within the profession have improved over time, statistics from Vet Futures illustrate
67 that women still fall short of leading and guiding the profession.

68 The consequence of this is a profession that is led by a male minority. Even though 40% of
69 RCVS specialists are women, this is still a far cry from the 57% of women who make up the
70 profession. As suggested by Henry and Jackson (2015), providing inspiration and motivation
71 for women to take leadership roles in the profession must start during their undergraduate
72 education, as evidenced by the different employment preferences of the genders, which has
73 been documented after graduation in a report by the American Veterinary Medical
74 Association (AVMA), and in 'Veterinary Students' by Armitage-Chan and Castro (unpublished
75 data). The AVMA (2015) demonstrated the difference in employment preferences between
76 men and women to show that women – particularly five years after graduation – want to
77 work fewer hours per week than men. How leaders in the profession choose to manage these
78 differences to ensure the best people are hired (regardless of their employment preferences)
79 will be a key determinant of the profession's sustainability.

² An upper-degree is typically defined as a First-class degree (average mark $\geq 70\%$) or a 2:1 degree (average mark 60-70%). All other degree classifications (i.e. 2:2, 3rd and Fail) are considered 'lower degrees',

80 In terms of the curriculum, Taylor and Robinson (2009) argue that an increase in the number
81 of female veterinary students requires a shift in focus to better balance female-centred ways
82 of knowing (e.g. care and responsibility) and male-centred ways of knowing (e.g. justice and
83 understanding rights and rules). This will ensure that the pedagogy and mentoring adopted
84 are appropriate to the learning needs for the student cohort. Increasing focus on leadership
85 and motivation during education will ensure that women are prepared and enthusiastic to
86 lead a profession in which they dominate.

87 In terms of institutional role models, Robst *et al.* (1998) concluded that female teaching staff
88 positively contribute to female student retention in STEM subjects, but it is essential that these
89 staff actually interact with students on a formal and informal basis. However, this finding has
90 since been challenged by authors such as Griffith (2010) and Price (2010) who present
91 evidence that female students in STEM subjects are unlikely to persist with their tertiary
92 studies if they are taught by women.

93 Since the profession is and continues to be dominated by women but it is principally led by
94 men, it is necessary to include leadership training in the curriculum with an emphasis on
95 understanding the motivational preferences of women in the workplace. We suggest that the
96 organisation's structure is an important criteria for developing female students and
97 encouraging them to persist with their tertiary education.

98 *Students from Black and Ethnic Minority backgrounds*

99 Table 2 shows an indisputable skew away from Black and Minority Ethnic (BME) students
100 within UK veterinary medical education in that 87% of students are from a white background
101 (among the highest of the disciplines in the HE sector). The proportion is similar for BME
102 students leaving without a degree. While under-presentation is clearly an issue in UK
103 veterinary medical education, the issue appears to be based in attainment rather than
104 retention. Authors such as Grayson (1998), Hanner (2009) and Chang *et al.* (2014) have
105 recognised the problem of BME under-representation in the veterinary medical field and
106 beyond. However, it has only been Sanders and Rose-Adams (2014) who have most recently
107 attempted to address the problem of attainment. While Sanders and Rose-Adams' (2014)
108 work reviews generic literature on BME student attainment, their recommendations to close
109 the attainment gap between BME and White students are perfectly replicable across
110 disciplines. These are summarised from Sanders and Rose-Adams (2014) as follows:

- 111 1. BME staff in higher education – while there is no mention of a statistically significant
112 relationship between BME staff and BME student attainment, points are made about
113 the under-representation of BME staff in HE faculties, the under-representation of
114 BME staff in HE senior management and the poor retention of BME staff in HE faculties.
- 115 2. Sense of belonging – is defined by Goodenow as “Students’ sense of being accepted,
116 valued, included, and encouraged by others (teacher and peers) in the academic
117 classroom setting and of feeling oneself to be an important part of the life and activity
118 of the class. More than simple perceived liking or warmth, it also involves support and
119 respect for personal autonomy and for the student as an individual” (1993 p. 25).
120 Sanders and Rose-Adams (2014) recommended that institutions develop strategies for
121 developing a sense of belonging among their BME students; their ideas include
122 developing role models and increasing numbers of BME students. From an analysis of
123 effective approaches to student engagement and belonging, Thomas (2012a) suggests
124 that student belonging is achieved through “supportive peer relations, meaningful
125 interaction between staff and students, developing knowledge, confidence and identity

126 as successful HE learners and an HE experience relevant to students' interests and
127 future goals" (p. 7).

128 3. Language and academic support – academic literacy and linguistic competence were
129 identified as critical factors. As such, institutions that add value to their educational
130 service by offering support to students in literacy will go some way to addressing the
131 attainment gap of BME students. Thomas (2012b) shows that personal tutors and peer
132 mentoring are successful approaches for academic development and supporting.
133 Interestingly, she also argues that mainstream support should be the default approach
134 and targeted solutions are only offered in particular circumstances when general
135 approach does not work.

136 4. The importance of student and tutor expectations – BME students tend to have lower
137 expectations, resilience and self-agency of themselves compared to white students.
138 Thomas (2012b) found that giving students the opportunity to share their concerns is
139 an effective avenue for them to realise that their worries about studying are shared by
140 others. Similarly, tutors also have a low expectation of BME students. As such, a
141 culture of achievement needs to be embedded in curricula. Singh (2011) recognises
142 the important role tutors have on improving expectations of British Medical
143 Association (BMA) students and the suggests that “through mechanisms such as peer
144 review, appraisal, personal development and module evaluation, [academic staff]
145 should reflect on their own practices and examine if and how they may be consciously
146 and unconsciously impacting student attainment” (p. 48).

147 To conclude, there is an under-representation of BME students in veterinary medicine. The
148 issue is associated with attainment rather than retention but we also suggest is associated
149 with recruitment as well. Fortunately, there are several strategies available to address this
150 issue.

151 *Distance from home and student isolation*

152 As described in Table 1, veterinary students are more likely to withdraw from their course if
153 their university is close to their previous place of residence. Perhaps because of the small
154 number of institutions offering degrees in veterinary medicine (and therefore most students
155 will need to travel greater than 30 miles from their previous home address in order to attend
156 university), few students have the opportunity to choose to live close to home. Students'
157 options are further limited by the selection-driven rather than recruitment-driven admissions
158 model in veterinary medicine: there are fewer places available than there are suitably qualified
159 students, and therefore competition for places is fierce and universities are able to select
160 students without having to recruit them. This means few students are in a position to select
161 their institution; even if they would preferentially choose to live close to their parental home,
162 this is unlikely to be an option, and students tend to accept any position they are offered.

163 There are limited data evaluating the effect of distance from home on retention and
164 attainment. When examining general retention data, the effect of distance from home appears
165 to be mixed. A positive effect on retention was associated with proximity to home (Williams
166 and Luo 2010); though complicating factors also influence this relationship, such as the
167 students' urban or rural background (James 1999). However, these reports originated in the
168 US and Australia, rather than the UK, and neither included veterinary students. Cost of living
169 is increasingly influencing UK students' decision-making regarding university location (Brown
170 *et al.* 2009) and, therefore, it is reasonable to assume that future veterinary students may
171 actively select the institution closest to home, and the finding that these students may be at

172 higher risk of withdrawal is therefore concerning. Of course, there may be various reasons
173 for the observed finding, and closeness to home may be a proxy for other disadvantaging
174 characteristics. This further emphasises the need for more detailed evaluation of this area.

175 Veterinary institutions are increasing their provision of distance-learning initiatives (Dhein
176 2007; Short 2002). While this offers students flexibility in their learning, the finding that the
177 use of distance learning is associated with a lower student retention rate compared to
178 traditional on-site learning is of concern (Simpson 2007). Concerns raised regarding online
179 and distance learning in veterinary education include feelings of isolation from instructors and
180 peers, lack of learning support and difficulty in teaching complex concepts (Ertmer and Nour
181 2007). Data regarding the uptake of distance-learning opportunities by veterinary students,
182 and the impact this has on retention or attainment, is lacking. Pickles *et al.* (2011) investigated
183 potential barriers to use of student support services in veterinary students. They
184 demonstrated that distance to student support services is a factor in veterinary students
185 seeking this support, thereby providing some discipline-specific evidence that those students
186 electing to make greater use of distance learning opportunities rather than attending campus
187 may be less likely to access learning support or other counselling services. Of additional
188 particular concern in veterinary education is that student support services (whether learning
189 support or student mental health services) may be centralised within the university and may
190 therefore be some distance from the veterinary field station. The Royal Veterinary College
191 has found (through discussions at examination boards) that higher than expected numbers of
192 failing students make extensive use of distance learning opportunities rather than attending
193 campus. Unfortunately this is currently based only on unpublished anecdotal evidence from
194 small numbers of failing students, and further work is needed to explore this finding.

195 The effect of 'distance from home' on student retention and attainment has not been
196 investigated in veterinary medicine. There are few veterinary schools, and admission is
197 competitive, thus for most of the population students will not be able to access a university
198 close to home. To date there is no evidence that distance is a factor influencing veterinary
199 school choice in the UK. Increasing costs of living and of tuition may prompt future students
200 to access the course from the parental home rather than attending campus, particularly if the
201 parental home is sufficiently close to make occasional commuting feasible. This may place a
202 greater barrier on students accessing learning and mental health support services, and may
203 explain Woodfield's (2014) finding that veterinary students whose institution is close to their
204 prior address are more likely to withdraw. Finally, veterinary institutions are increasing their
205 provision of distance-learning opportunities. If this discourages students from attending
206 campus, there may be an impact on feelings of isolation, competency in complex curriculum
207 areas, and access to learning support. Further data regarding this aspect of student behaviour
208 is needed in order to establish how remote learning should be implemented in veterinary
209 education, and whether this is a factor in retention and attainment.

210 *'Upper degree' attainment: support for mature age and male students*

211 Table I indicates that, in the review of student retention and attainment, neither gender (male
212 student achievement) nor retention/attainment of mature students were deemed an area of
213 concern for veterinary education. This finding is in agreement with the wider literature, with
214 several veterinary-specific studies finding no effect of gender on overall course performance
215 (Hudson *et al.* 2011; Van der Walt and Pickworth 2007; Muzyamba *et al.* 2012; Foster *et al.*
216 2010). UK veterinary courses tend not to award degree classes, therefore, 'upper degree'
217 attainment is difficult to evaluate in this field. However, prior academic performance
218 (achievement in A-level and GCSE subjects) appears to increase the likelihood of passing the

219 end of course final assessments in Veterinary Medicine (Muzyamba *et al.* 2012). Van der Walt
220 and Pickworth (2007) investigated the effect on final exam performance of various personality
221 traits in veterinary students; emotional stability, and being conscientious, socially adept and
222 self-disciplined were associated with higher performance, and being imaginative, self-sufficient
223 and anxious were associated with lower performance.

224 While there is no evidence within veterinary medicine that male or mature age students are
225 at a disadvantage in final exam or overall course performance, degree attainment may be
226 associated with school academic achievement and certain personality attributes, including
227 propensity for collaborative working. Student support initiatives may therefore be usefully
228 focused on students with lower school scores, and those demonstrating a preference for
229 individual learning.

230 *Career choice and its effect on retention and attainment*

231 Woodfield's (2014) results suggest that retention among veterinary students is among the
232 best of the disciplines considered (i.e. 95% total continuing or successfully completing studies).
233 For example, retention of mature students, male students and part-time students were not
234 issues and veterinary medicine was one of the very few disciplines for which no exclusions
235 were recorded. As a matter of interest, Figure 1 shows Woodfield's (2014) reasons for
236 students leaving veterinary medicine with no award or a lower award than intended.
237 Attainment of an 'upper degree' for students of veterinary medicine was noted as matching
238 the sector average (65%). In terms of retention however, Mikkonen and Ruohoniemi's (2011)
239 research found that "The common aim of becoming a veterinarian kept students committed
240 even though they were not always interested in the content of their studies" (p. 302). While
241 retention is an under-studied research area, we propose that there are some very powerful
242 issues at work that are specific to the discipline of veterinary medicine – and disciplines
243 associated with the understanding and care of animals – which explain the particularly good
244 retention levels; these are detailed in individual sections below.

245 *Early career choice*

246 There is much evidence to suggest that the decision to become a veterinary surgeon is made
247 at a very early age (Heath *et al.* 2006; Fraser *et al.* 2008). Tomlin *et al.* (2010a, p. 744) found
248 that the statement "[It's] something that I always wanted to do" was among the top three
249 reasons for both women and men wanting to become veterinary surgeons. As such, unlike
250 careers in disciplines such as engineering, accountancy and law where decisions are probably
251 made much later in life, students who choose to study veterinary medicine possess deeply
252 held inner beliefs about succeeding due to their ambitions being so long-term. Further to this,
253 Serpell (2005) suggests that parents are more important than "experiences with animals" in
254 shaping students' career choices and attitudes towards veterinary medicine. The fear of
255 disappointing one's parents could give further credence to the notion of long-term inner
256 motivations accounting for high retention levels.

257 While long-term ambitions and support from parents provide a very positive and unique
258 explanation for student retention in veterinary medicine, Dale *et al.* (2010) highlight a cause
259 for concern. These authors argue that veterinary students can fall short of recognising career
260 opportunities beyond clinical veterinary medicine. Marshall (1981), uses the term 'early
261 emergers' to describe young, multi-talented people who:

262 decide on a career preference at an early age, make commitments towards its pursuit
263 long before leaving high school, and appear to follow this singular route throughout
264 their total career development. (Marshall 1981, p. 305)

265 She warns of how early emergers can suppress personal development, creative learning and
266 risk-taking behaviour. The long-term consequence being that this type of student uniquely
267 needs to deal with identification problems, the fear of failure, the multi-talents and pressures
268 that come from being able to competently turn their hand to a broad range of tasks, and
269 various other challenges to career development. While Marshall (1981) recommends that
270 trusted mentors can alleviate these problems, we argue that the role models of veterinary
271 students (e.g. academic clinicians and practitioners leading extra-mural studies) are cast from
272 the same mould. As such, we propose that student support opportunities, in terms of
273 retention and attainment, come from a virtuous circle of identical beliefs and therefore
274 intellectual isolation.

275 Vocational choice and the human–animal bond

276 Martin *et al.* (2003) propose that the human social bond, cited as “a mutual, affective,
277 emotional attachment between two individuals that is relatively long lasting and survives
278 temporary separation” (p. 67), is transferrable to relationships between human and animals
279 and is a known reason for becoming a vet (Martin *et al.* 2003; Tomlin *et al.* 2010b), as is having
280 previous experience with animals (Heath 2006; Serpell 2005; Tomlin *et al.* 2010a; Ilgen *et al.*
281 2003). Veterinary students who ultimately wish to work with production animals have less of
282 an association with the human–animal bond than students who aspire to companion-animal
283 care (Martin *et al.* 2003). However, growing up on a farm is a major contributing factor to the
284 selection of a career with livestock (Tomlin *et al.* 2010a; Heath *et al.* 2006; Ilgen *et al.* 2003).
285 Reflecting on the work of Martin *et al.* (2003), the importance of the human–animal bond in
286 career choice is evident in the prominence of UK vets caring exclusively for companion
287 animals, or in a mixed practice.

288 While there is no evidence from the veterinary medical literature to suggest that this is the
289 reason why students either stay at veterinary school or aim to achieve an ‘upper degree’, we
290 conclude from evidence like that presented by Tomlin *et al.* (2010a), that the human–animal
291 bond is certainly a complementary reason to life-long ambition in students staying at university
292 and needs further investigation. Furthermore, Martin *et al.* (2003) suggest that the human–
293 animal bond seems to decrease through students’ secondary school years and after their first
294 year at veterinary school. Their research is inconclusive about why this occurs but the authors
295 suggest that this may be due to (1) the science-based, non-clinical nature of the first years of
296 veterinary curricula, (2) the students’ realisation of the difficult emotional issues they will
297 encounter as vets (e.g. euthanasia and cases of abuse) and (3) the possibility that:

298 those pre-vet students interested in the [human–animal bond] self-select out of
299 veterinary programs. Or, alternatively, is there some characteristic of students
300 interested in the [human–animal bond] that interferes with their acceptance into
301 veterinary programs? (Martin *et al.* 2003, p. 71)

302 These are three hypothesised, but untested, explanations for the human–animal bond
303 decreasing with student maturity. Clearly, there is a need for further investigation of this
304 matter.

305 Student resilience and motivation to learn

306 Mikkonen and Ruohoniemi (2011) discuss the fact that students are prepared to work
307 particularly long hours to fulfil their aspiration to become veterinarians. These authors draw
308 the conclusion that this is because the students are a particularly motivated demographic.
309 However, there is substantial evidence of the particularly stressful nature of veterinary
310 education (Reisbig 2012; Hafen 2013; Laakkonen and Nevgi 2014). This, coupled with
311 Marshall's (1981) list of the negative characteristics of 'early emergers' and her comments on
312 their fear of failure, paints a fairly vulnerable picture of veterinary students. Mossop (2014)
313 describes the highly specialised and 'high stakes' nature of the veterinary students' assessment,
314 whereby students are trained to meet the challenging expectations of the Royal College of
315 Veterinary Surgeons. This involves gaining a high level of competence to diagnose and treat
316 all animals while working independently and adhering to the rigorous standards of the
317 profession. Despite these demands, the two previous sections have provided evidence for
318 two unique reasons why vet students possess motivation and resilience for completing their
319 education: (1) early career choice, and (2) the human–animal bond. Further explanation can
320 be found in the literature on students' motivation and resilience.

321 Mikkonen and Ruohoniemi (2011) found that the most successful veterinary students are
322 particularly good at quickly adapting their learning styles to cope with curriculum variety. They
323 are also effective at searching for new study practices in an effort to understand difficult
324 concepts and then resume their study without delays suggesting yet another reason for good
325 student retention. Walker *et al.* (2006, p. 251) define resilience as "the ability to recover
326 rapidly from difficult situations as well as [having] the capacity to endure ongoing hardship in
327 every conceivable way." Even though all students in the health disciplines have to cope with
328 hardships they have "a personal and cultural strategy for surviving and even transcending
329 adversity ... [due to] characteristics such as extroversion, openness, agreeableness,
330 conscientiousness and coping levels [that] influence posttraumatic growth" (McAllister and
331 McKinnon 2009, p. 375). Walker *et al.* (2006) and McAllister and McKinnon (2009) argue that
332 resilience can be taught, so curricula can be designed to build resilience into those students
333 who enter higher education and are lacking in this skill.

334 Authors such as Crosling *et al.* (2009), Walker *et al.* (2006) and McAllister and McKinnon
335 (2009) suggest that the environment of small-group, student-lead teaching that is based upon
336 reflection-on-practice (that is so characteristic of veterinary education) may explain student
337 retention. Furthermore, an environment in which students have a clear vision of their future
338 (McAllister and McKinnon, 2009) and enjoy close working relationships with people of critical
339 roles in identity formation (Walker *et al.* 2006) will foster student resilience. Again, the hands-
340 on nature of veterinary teaching (e.g. student rotations in-practice) and assessment (e.g.
341 objective structured clinical/practical examinations) facilitates such an environment.

342 We conclude that high retention of veterinary students can be explained by their career
343 choice being made from a very early age, the vocational–nature of the discipline and the
344 human-animal bond that is unique to the profession. So despite the numerous hardships and
345 challenges experienced by veterinary students, they have particularly high levels of motivation
346 and resilience that helps them persist with their education. We found that resilience can be
347 taught and the hands-on, small-group nature of UK veterinary curricula provides a solid
348 foundation on which resilience can be built and developed. Furthermore, the clinical nature
349 of veterinary curricula means that students receive mentorship from scholars with whom they
350 can identify and fulfill roles that have relevance to their future.

351 *International student issues*

352 Woodfield (2014) states that 91% of veterinary medicine students are pre-HE domicile UK,
353 with 2% from the EU and 7% from non-EU nations. This is largely representative of the
354 situation at the UK's largest veterinary medicine school: the Royal Veterinary College (RVC).
355 Figure 2 shows the RVC's student cohort for the past five academic years. As Woodfield
356 (2014) suggests, the cohort is strongly over-represented by UK students (87%). Woodfield's
357 (2014) data shows that 9% of Veterinary Medicine students were pre-HE domiciled outside
358 the UK but it does not specify the countries of origin (EU and non-EU data provided). Figure
359 2 shows that the RVC's international student cohort is made up of students from North
360 America with a further 4% of students coming from other non-EU countries.

361 The US Department of Education has accredited all seven universities offering undergraduate
362 veterinary education in the UK, allowing their home students to be eligible for a student loan
363 (FAFSA 2015). However, there are a lot of regulatory procedures to be tackled for students
364 wishing to take part in the loans programme as the rules are framed, understandably, with US
365 institutions in mind and often cause problems for UK students. The latest issue is that
366 institutions foreign to the US must be accredited by a body that is in turn accredited by the
367 Department of Education; the RCVS has had to recently undertake this process and approval
368 is still pending. Strictly speaking, if approval is not granted then no UK department of
369 veterinary medicine accredited to take US students can process loans anymore (i.e. RVC,
370 Edinburgh and Glasgow). While officials have indicated that approval will be forthcoming,
371 should UK veterinary schools lose students from the US due to the discontinuation of the
372 loans programme, the result could be a substantial loss of diversity in the student population
373 and a loss of revenue. Two per cent of Non-EU veterinary students left without their degree
374 ($n = 12$), while 6% ($n = 11$) of EU students and 4% ($n = 367$) of UK veterinary medicine
375 withdrew. It is acknowledged that retention and attainment of international students is not of
376 great concern. However, changes in foreign education policy could jeopardise the small
377 international profile of Veterinary Medicine students in the UK.

378 *Learning strategies for coping with content overload*

379 Students in veterinary medical programs are frequently reported to be at risk of content
380 overload (Pelzer *et al.* 2014). "A proliferation of knowledge in all scientific fields and an
381 increase in public expectations of the profession" (May 2008, p. 573) has resulted in enormous
382 growth in the volume of information that could be delivered to the students, "just in case they
383 may one day need to use it" (p. 577). Efforts to reduce course content are therefore discussed
384 in the literature, including the incorporation of a tracking or elective system, whereby core
385 content is reduced by moving some material out of the compulsory section of the curriculum,
386 and allowing students to selectively take this material according to their species and ultimate
387 career interests (Halliwell 2006). Students recognise the high course content and workload
388 of the veterinary course, which results in stress and anxiety. Williams *et al.* (2005) reported
389 that academic stressors were the more frequent causes of stress than any other source; 85%
390 of students described the workload of the veterinary programme as a common source of
391 stress, resulting in feelings of tiredness and fatigue (50% of students), unintentional weight
392 change (20%), trouble sleeping (33%) and health concerns (33%). Even at the initial stages of
393 the veterinary course, students report anxiety about the intensity of the programme, the
394 amount of material they are expected to learn, and their own time management and study
395 skills (Sutton 2007).

396 As reported in general for other subject areas, students frequently adopt surface learning
397 strategies to cope with this content overload. Although the workload is ostensibly the same

398 for all students (if defined by the volume needed to learn), this is of course not the case if
399 different study abilities and prior knowledge are considered. Veterinary students with
400 previous university experience encounter less stress when faced with the veterinary course
401 workload (Laakkonen and Nevgi 2014). Ryan *et al.* (2004) identified that students with less
402 prior relevant knowledge, those who felt their prior knowledge was inadequate, and those
403 who were less able to extract important points from their reading, were more likely to
404 employ a surface approach to learning, with a resulting negative impact on their grades.
405 Interestingly, students who had to travel a long distance to class were also more likely to
406 adopt a surface approach; this is of particular interest for those students who elect to live
407 away from university accommodation (for example with parents), and students for whom
408 there is no on-site (or near-site) accommodation available, as previously discussed. This group
409 also identified that students who perceived the workload to be high were more likely to adopt
410 a surface approach to learning (learn by memorising content within bounded sections of
411 the course). Veterinary students who have difficulty distinguishing key concepts from
412 supporting material, and those who perceive their study efforts do not lead to success were
413 more likely to perceive that they are overloaded (Mikkonen and Ruohoniemi 2011). In this
414 study, students who described themselves as slow or weak learners, and who were unable to
415 select essential concepts for study (and hence attempted to learn everything), took longer to
416 complete the course, and attained lower assessment grades. They reported that they had
417 found it necessary to learn the material by rote, and had not attempted to find different or
418 new ways to study. A fear of failure was also associated with a surface approach to learning,
419 with students concentrating on easy subject matter, avoiding difficult topics and finding it
420 difficult to work on areas they found less interesting (Laakkonen and Nevgi 2014).

421 The strategies employed by students who successfully manage high course content typically
422 involve earlier-obtained study skills. The reliance on students previously acquiring the study
423 skills necessary to succeed in the course is of concern because of the implication this has for
424 students who are not equipped with these skills. Gelberg and Gelberg (2005) highlight that
425 the volume of content veterinary students are expected to learn, and the pace at which they
426 are expected to do so, means time management problems and study skills deficits are not
427 necessarily detected during earlier education, and thus students may not be aware that they
428 need to seek this type of assistance. Furthermore, the high grades necessary for veterinary
429 school admission have led to some assuming that study skills support is not necessary for
430 these students (Ruohoniemi *et al.* 2010). Students who cope well with the course load have
431 better learning strategies and time management skills, are able to use computers and library
432 resources effectively, and are able to use a variety of approaches to learning (Mikkonen and
433 Ruohoniemi 2011; Ryan *et al.* 2004), have a better understanding of course assessments and
434 use knowledge of these to assess their own level of understanding (Ruohoniemi *et al.* 2010),
435 are able to select key areas in the course upon which to focus and prioritise their studies
436 (Mikkonen and Ruohoniemi 2011), and integrated different areas of their course during their
437 learning (Ryan *et al.* 2004).

438 Given the evidence for differing student abilities in managing an overloaded course content,
439 institutional interventions and teaching strategies that encourage deep learning have also been
440 investigated. Courses that encouraged reading around the subject (not simply by providing
441 this reading, but providing opportunity and motivation to support this) were more successful
442 in developing deep learning in their students (Chigerwe *et al.* 2011). When examining practical
443 sessions within the course, these could be used to drive deep approaches to learning course
444 content if students were able to use the practical environment as a means of understanding
445 the wider subject area, if the practical motivated the students to learn more about the subject

446 (e.g. it was related to a clinical scenario), and when students were encouraged to ask questions
447 (Ryan *et al.* 2009).

448 The provision of 'opt-in' study support is frequently made available for students who are
449 struggling academically, however, students may not approach support staff for fear of being
450 seen as incompetent. Williams *et al.* (2005) reported that 86% of students only occasionally
451 or never asked for help from academic staff, and 87% rarely or never used counselling
452 provided by non-academics. An alternative approach is to employ teaching methods that
453 provide this support through the curriculum; an example of such a strategy is a clinical case,
454 group problem-solving exercise that was designed not only to develop clinical problem solving
455 skills, but also to assist with collaborative learning strategies (Khosa *et al.* 2010).

456 From this investigation, we therefore suggest that teaching strategies encouraging deep
457 learning approaches in the face of a high content load also include opportunities to engage in
458 self-directed learning (e.g., selection of and reading reference material). Educators should also
459 highlight where different program components integrate, and provide transparent
460 assessments and frequent feedback so students can align their efforts with course and
461 assessment outcomes.

462 *Support strategies for 'Gateway'/widening access programme students*

463 The final issue relating to retention and attainment of veterinary students involves those from
464 non-traditional academic backgrounds, typically those with lower-grade senior school
465 qualifications, qualifications other than A-levels, and those for whom neither parent attended
466 university. Veterinary medicine is under-represented as a degree choice for such students.
467 Hoelscher *et al.* (2008) demonstrated that the likelihood of a student with vocational
468 education and training entering veterinary science was 25 times lower than for a student with
469 traditional academic qualifications. Widening access programme students are therefore likely
470 to experience feelings of isolation when entering veterinary education. All of the UK
471 veterinary schools have widening participation policies (Robinson 2007), however, only the
472 Royal Veterinary College (RVC) provides its own access course (the University of Nottingham
473 has a link with the Certificate in Health Science at Lincoln University, which serves this
474 purpose). Some schools relax not only their academic entry criteria for widening access
475 students, but also the requirements for pre-entry work experience (Robinson 2007).

476 Payne-Davis *et al.* (2008) described the widening participation access course ('Gateway')
477 instituted at the RVC. Student support was deemed to be particularly important to this
478 course, and therefore weekly academic and monthly pastoral tutorials were included in this
479 access course, as well as regular interaction with the course director, and support provided
480 in the event of failing in-course assessments. Although similar tutorial provision exists in other
481 courses at this institution, this extent of tutorial support was higher than is typically provided.
482 However, despite the provision of financial support in terms of a bursary, financial concerns
483 were deemed by the authors to remain a threat to persistence on the veterinary medicine
484 programme; some students (numbers not provided) also left the course because of feelings
485 of isolation.

486 At the same institution, Muzyamba *et al.* (2012) provided an indication of the academic
487 attainment of 'Gateway' students. Following entry to the five-year veterinary medicine course,
488 students accessing via the access course had lower final year exam scores at the end of first
489 and second year, but demonstrated no difference to other students in the end of third year
490 exams. Data was not available for year four or five exam performance. Payne-Davis *et al.*
491 (2008) also noted that some widening access students achieved at high levels, obtaining merit

492 and distinction-level grades. Comparative data between widening participation and traditional
493 entry student attainment are not available.

494 There are no other reports of institutional initiatives developed specifically for widening
495 access students or those entering from full-time work, within veterinary education. The
496 educational literature frequently demonstrates the need for student academic and pastoral
497 support in this area; Hafen *et al.* (2008) report a high incidence with signs of depression in
498 first year veterinary students (one-third of students), and Pickles *et al.* (2012) report a
499 perception that veterinary students have an increased need for counselling support compared
500 to other students. Rather than assuming that widening access students are not supported, it
501 is therefore more likely that this support is provided through initiatives established for
502 veterinary students in general. However, due to the lack of literature in this area, it is not
503 known to what extent such support is accessed, or whether the specific needs of widening
504 access students (relating to feelings of isolation and lack of belonging due to differences with
505 'traditional' higher education students) are addressed. Since 98% of veterinary students in the
506 UK are trained in pre-1992 higher education institutions, typically associated with high
507 percentages of white, middle class students, the feelings of isolation and non-belonging are at
508 risk of being particularly significant in the absence of intervention.

509 Although some institutions publish their policies for recruiting and supporting students from
510 non-traditional backgrounds, it is difficult to make generalisations because of the scarcity of
511 information published in this area. Retention and attainment information for students on the
512 RVC widening access course is published in small quantities, but insufficient cohorts have run
513 to course completion at this time. To add complexity to this issue, the higher education
514 institutions offering veterinary medicine qualifications tend to be traditional, pre-1992
515 universities, where issues of isolation may be the most prevalent for non-traditional access
516 students. It is therefore pertinent to remain aware of the potential for retention and
517 attainment issues, and ensure institutions have appropriate steps in place to recognise
518 students needing support, and ensure that the support that is provided incorporates the
519 specific needs of this student population.

520 **Further challenges and issues for investigation**

521 There are several key themes that have emerged as discipline-specific to retention and
522 attainment within UK veterinary medical education: coping with content overload, the long-
523 held inner beliefs about a career in veterinary medicine and the informal support structures
524 that are offered by members of faculty. The over-arching finding of this enquiry is that
525 retention and attainment in veterinary medicine needs a lot more research attention with
526 some specific gaps being immediately obvious.

527 The advent of educational technologies that facilitate learning outside the classroom has been
528 advantageous in providing non-traditional methods of information delivery. However, more
529 information is needed on the use of distance learning technologies by failing students. More
530 precisely, whether distance-learning technologies are contributing to negative student
531 behaviours and feelings of isolation due to their inherent nature of social disconnect. On a
532 related matter, more information is needed on the uptake of distance learning opportunities
533 of veterinary students in general as this has not been investigated.

534 Table 2 shows that students of non-white ethnicity categories made up 0-2% of total
535 veterinary medicine students in 2010-11. It was also found that attainment and recruitment,
536 rather than retention, is a problem among those few BME veterinary students. The literature

537 provided some clues about how this can be addressed (e.g. student support in terms of
538 language and academic support) but discipline-specific research needs to be conducted on
539 how the issue of BME attainment can be better managed in veterinary medical education.

540 Woodfield (2014) presented data to suggest that retention and attainment in veterinary
541 medicine is generally not as much of an issue as in other disciplines. This paper aimed to
542 explain the various dimensions that contribute to Woodfield's finding. One area that emerged
543 as particularly important and unique as a possible reason for the high retention rate in
544 Veterinary Medicine is the human–animal bond. While there is evidence to imply this
545 relationship, further empirical testing needs to be conducted to explore the relationship in
546 more depth.

547 There is a great deal of precise knowledge still lacking about retention and attainment in
548 undergraduate veterinary medical education, but this enquiry has gone some way to explaining
549 and expanding upon Woodfield's (2014) findings. This research has presented some gaps in
550 the current knowledge and we have identified starting points for future research. We propose
551 the following research questions for further enquiry:

- 552 - How can leadership be truly embedded as part of the core curriculum to develop
553 female students?
- 554 - How can the few BME veterinary medical students be better supported in terms of
555 their sense of belonging, language support, and academic support?
- 556 - What mechanisms could allow other disciplines to benefit from the resilience of
557 veterinary students?
- 558 - What support initiatives could be usefully focused on students with lower school
559 scores and those demonstrating a preference for individual learning rather than
560 competency in collaborative learning skills?
- 561 - How can deep learning approaches be embedded into veterinary curricula and address
562 content overload?
- 563 - What further data need to be collected and analysed to monitor the retention and
564 attainment of non-traditional access students in veterinary medicine beyond the
565 limited and incomplete data available for a single cohort of students from the RVC?
- 566 - What distance-learning opportunities exist in the veterinary curriculum and what are
567 the rates of uptake? Does distance learning have a positive or negative effect on
568 student retention and attainment?

569

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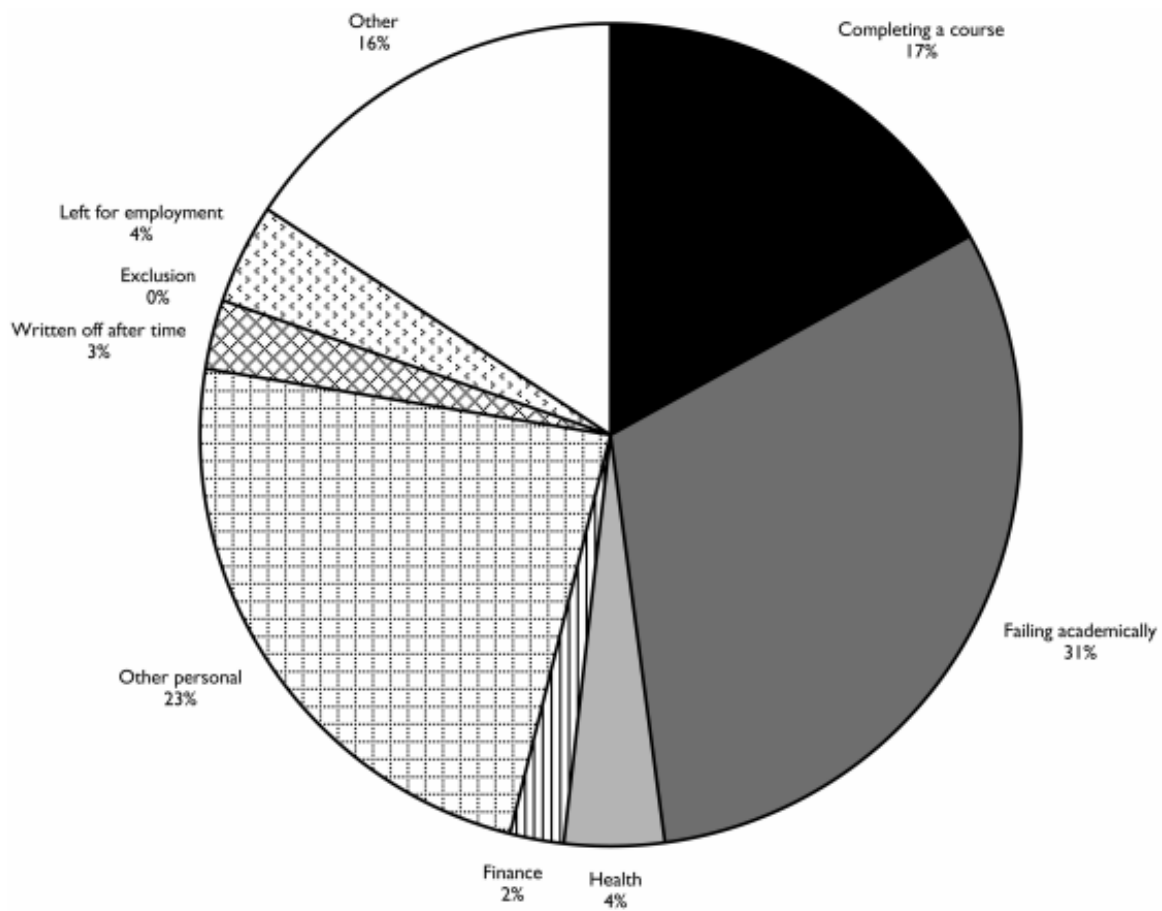
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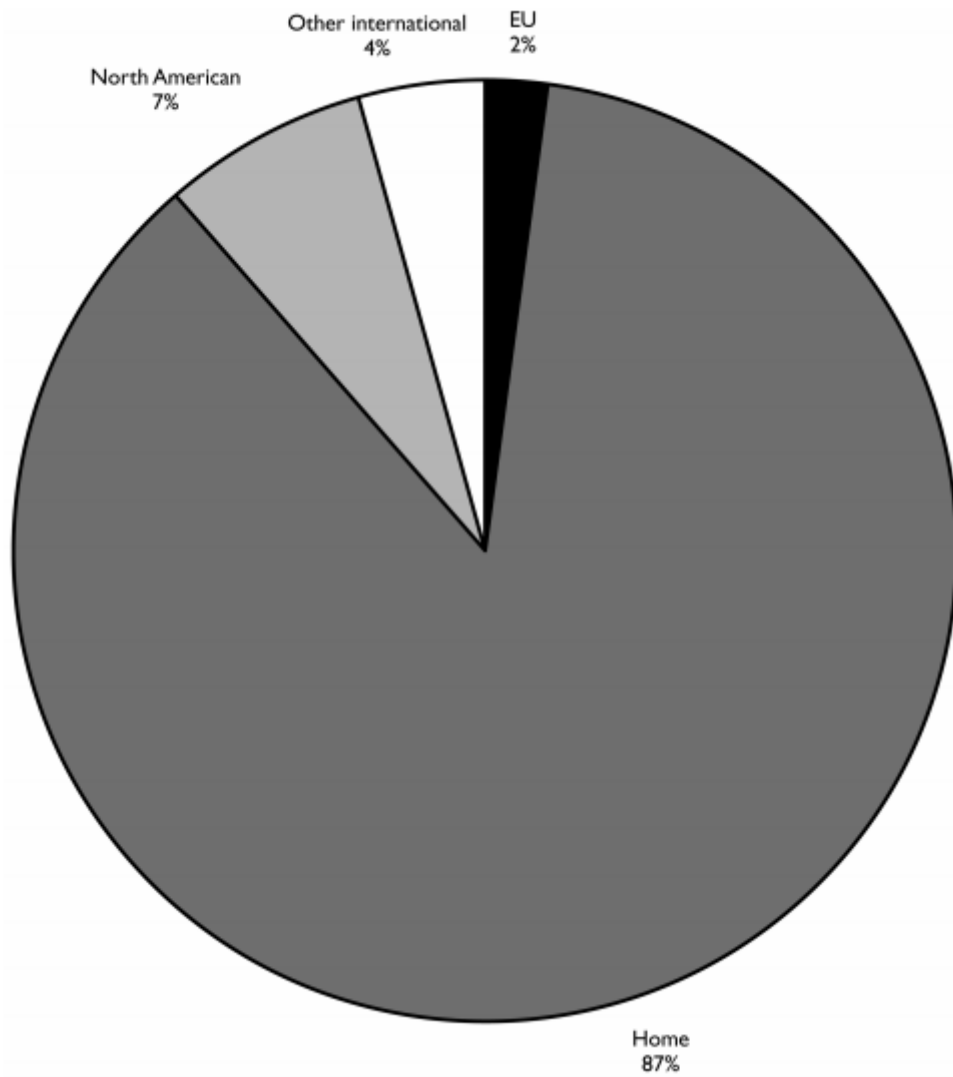
731 Figure 1. Reasons for students leaving veterinary medicine with no award or a lower award
732 than intended



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735 Figure 2. The international nature of the RVC student cohort: 2010–2011 to 2014–2015
736 (source: RVC internal data)



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739 Table I. : Undergraduate retention and attainment relevant to veterinary medical education
 740 (note that veterinary students accounted for 0.6% [n ¼ 9,135] of the sample population)

Retention issue	Summary of retention issue specific to veterinary medical education
Mature students	Mature students across the sector are more likely to withdraw compared to traditionalaged students, but this was not the case in veterinary medicine.
Male students	Retention of male students was not an issue in veterinary medicine (compared to other disciplines examined).
Students living within the EU before starting university	Students living in non-European countries before their studies were less likely to leave their programs (albeit a very small number: 2%, n ¼ 12) than students living in the UK before their studies (4%, n ¼ 367), whereas 6% (n ¼ 11) of students from the EU left without their degree.
Distance from home	Veterinary students who attended a university within 30 miles of their pre-HE address were more likely to withdraw. This is in contrast to the finding across the sector, where selection of a university close to home had a positive effect on retention.
Exclusion	No veterinary students were recorded to have left HE due to exclusion.
Attainment issue	Summary of attainment issue specific to veterinary medical education
Gender attainment gap	Women in veterinary medicine were 13%–14% more likely to gain an upper degree than men.

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743 Table 2. Profile of veterinary students

	Total veterinary students (n= 9,135)		Leavers without a degree (n=390)		Attainment of an upper degree (n = 575)	
	%	N	%	N	%	N
UK veterinary students						
Age						
Traditional	71	6,465	5	290	63	458
Mature	29	2,626	4	100	70	117
Gender						
Men	21	1,951	4	76	53	78
Women	79	7,184	4	314	67	497
Socio-economic class (SEC)						
One and two	32	2,944	3	90	66	188
Other SEC	26	2,376	6	133	64	210
Unknown	42	3,815	4	167	64	177
Parent HE						
Yes	33	3,045	3	105	71	202
No	25	2,308	6	143	67	203
Unknown	41	3,782	4	142	56	170
Ethnicity						
Black or black British Caribbean	0	12	8	1	0	0
Black or black British African	0	9	0	0	0	0
Other black background	0	1	0	0	100	1
Asian or British—Indian	0	37	0	0	33	1
Asian or British—Pakistan	0	5	0	0	0	5
Asian or British—Bangladeshi	0	7	0	0	100	7
Chinese	0	14	0	0	50	2
Other Asian background	0	14	7	1	0	0
Other ethnic background	2	159	6	9	57	13
White	87	7,931	4	350	65	521
Unknown	10	946	3	29	66	37

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749 Table 3. Veterinary students who left with no award or a lower award than intended

Criteria	% (% of all disciplines examined in 2010-11)	n
Completing a program	17 (20)	56
Failing academically	31 (29)	101
Health	4 (2)	13
Finance	2 (2)	7
Other personal reasons	24 (22)	78
Written off after time	3 (5)	9
Exclusion	0 (4)	0
Left for employment	4 (2)	13
Other	16 (4)	52

750