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1 **Educators' perspectives on animal welfare and ethics in the Australian and New Zealand**
2 **veterinary curricula.**

3

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35 **Abstract**

36

37 The current study was designed to explore the importance veterinary science educators in
38 Australian and New Zealand universities assign to animal welfare and ethics (AWE) topics as
39 Day One/initial competences for new graduates. An online questionnaire was deployed in
40 parallel to an equivalent study of veterinary science students at these educators' schools.
41 Responses were received from 142 educators (51% females n=72 and 49% males n=70),
42 representing an overall participation rate of 25%. Questions were clustered according to seven
43 areas of veterinary employment: General Practice; Production Animals; Companion Animals;
44 Wild Animals; Aquatic Animals; Animals Kept for Scientific Purposes; and Animals Used in
45 Sport and Recreation. The most highly rated topics for each of these clusters were: *professional*
46 *ethics* in General Practice; *euthanasia* in Companion Animals; *strategies to address painful*
47 *husbandry procedures* in Production Animals; *Veterinarians' duties to wild animals* in
48 Animals in the Wild; *aquatic animal health and welfare issues* in Aquatic Animals; *competence*
49 *in the 3Rs (replacement, refinement and reduction)* in Animals kept for Scientific Purposes and
50 *responsibilities of ownership* in Sport and Recreation. Female educators rated many of the
51 topics as significantly more important than did their male counterparts. Educators teaching one
52 or more ethics-related subjects were less likely to rate *neutering* and *euthanasia* as important
53 than those not teaching these subjects. The educators' focus on practical issues clashes with a
54 perceived need for veterinarians to actively embrace animal ethics. Overall, the perspectives of
55 these educators should be carefully considered as they are likely to influence student attitudes.

56

57 Keywords; animal welfare; ethics; sentience; One Welfare

58

59

60 **Introduction**

61

62 Veterinary curricula reflect societal use of animals and public interest in their welfare, and can
63 have a lasting influence on veterinarians' attitudes to animal welfare issues (1) (2) (3). Beyond
64 the formal curricular content, the so-called hidden curricula (including how they are structured
65 and delivered and the priority given to different topics) may all influence the next generation
66 of veterinary students' regard for AWE. Most veterinary educators agree that animal welfare
67 is moderately or very relevant to each of their individual subjects (4). Some veterinary schools

68 make a conscious effort to bring animal welfare to the forefront and to play a proactive role in
69 its discussion by society (5).

70 The inclusion of animal welfare and ethics (AWE) into veterinary curricula is important for
71 several reasons. First, there is growing public interest in AWE (5) (6). Second, there is an
72 increasing impetus from the profession for veterinarians to become leaders in AWE (7), partly
73 because evidence regarding animal sentience means AWE cannot be ignored and also that,
74 arguably, standards of veterinary care are raised by increased awareness of AWE (8). Finally,
75 veterinary programs require accreditation, and accreditation bodies such as the Royal College
76 of Veterinary Surgeons (RCVS) require AWE related skills (9).

77 Beyond simply including AWE in veterinary curricula, there is a strong argument for
78 prioritising it. After all, veterinarians are professionals with the “*ethical responsibility to use*
79 *their scientific knowledge and skills for the benefit of animal welfare*” (10). It has been noted
80 that animal welfare is an issue requiring the veterinary profession to contribute to the debate
81 about animals in ways that would have been unthinkable even ten years ago (11). Speaking up
82 for animals is about to become a core expectation of the veterinary profession, not a “mere
83 side-serving from the brave and detached” (McGreevy, cited by (11)).

84

85 ***Attitudes of educators to teaching Animal Welfare and Ethics***

86

87 A growing body of research shows attitudes to animal welfare by veterinarians and veterinary
88 students vary and are associated with background, gender, and stage of study (12) (13) (14),
89 (15) (16) (17) (18-21). Arguably, the teaching of animal ethics in veterinary schools is lagging
90 behind the teaching of animal welfare science. Educators teaching veterinary science are also
91 likely to vary in their attitudes to animal welfare, and it is unknown how these variations may
92 affect attitudes and learning in students. For example, studies show that veterinarians may use
93 inadequate pain control in animals (12) (13), and that male veterinarians were less likely than
94 female colleagues to provide adequate analgesia to their patients (12). Thus, feminisation of
95 the veterinary teaching profession (22) may be expected to shift the profession to use adequate
96 analgesia routinely. Additionally, some veterinary educators find themselves in universities
97 where teaching takes place in the overall context of a faculty that is committed to ethical
98 teaching and to maintaining a proactive and public profile on animal welfare issues (5). Under
99 such circumstances, it is reasonable to expect that educators will have an influence over student

100 attitudes. By the same token, educators who are dismissive of animal welfare concerns may
101 have a negative influence on the way students prioritise concern for animal welfare. Heleski et
102 al. (23) explored the attitudes of veterinary educators toward farm animal welfare and argued
103 that veterinarians have enormous influence on how farm animals are treated and proposed that
104 graduate attitudes would be influenced by veterinary educators.

105
106 Izmirli and Phillips (3) noted that variation in the attitudes of veterinary educators may be
107 influencing students' attitudes to animal welfare, and reported variation in educator's attitudes
108 in different countries. In addition, they found evidence that, even within the same faculty, those
109 teaching clinical subjects had different attitudes to those teaching basic science on topics such
110 as hormonal desexing (neutering) and the use of animals in experiments. Their study raises the
111 possibility that, even within the same course, students may be being exposed to varying and,
112 perhaps even, contrasting opinions on animal welfare. The way in which this influences the
113 development of attitudes to animal welfare in veterinary students is currently unknown. In the
114 current study, we examine, among other things, whether educators teaching different parts of
115 the curriculum differ in their rating of AWE topics.

116
117 A first step in understanding the possible influence of veterinary educators' attitudes to animal
118 welfare on student attitudes, is to investigate the current attitudes of veterinary educators. To
119 achieve this, a survey was undertaken as part of an Australian Government Office for Learning
120 and Teaching (OLT) project to develop a shared online AWE teaching resource for veterinary
121 schools in Australia and New Zealand. The aim of the survey was to examine the relative
122 importance veterinary educators place on AWE topics for so-called Day One competences of
123 graduates and to determine if gender and teaching focus affect these ratings.

124

125 **Materials and Method**

126

127 *Study Participants*

128 Veterinary science educators at the eight universities in Australia and New Zealand that deliver
129 a veterinary science degree were invited to participate in the survey in early 2015. The study
130 received Human Research Ethics Committee approval from the University of Sydney
131 (Approval number: 2014/739).

132

133 ***The Questionnaire***

134 Educators were asked to indicate their opinions on the importance of various AWE topics on
135 veterinary graduates' Day One competences, and also to identify their teaching focus. The
136 questionnaire was constructed using the survey system SurveyMonkey™
137 (www.surveymonkey.com) and made available online between February and March 2015. A
138 link to the questionnaire was sent to veterinary educators at each of the eight participating
139 universities in a series of three emails asking them to respond to the survey.

140

141 The questionnaire comprised 12 questions. Respondents were first asked to consent to
142 participate before answering three demographic questions (university, gender, and stage of
143 course taught) that were single answer multiple choice. The next question asked participants to
144 identify the subjects they taught using a drop-down list from which they were permitted to
145 select multiple answers.

146

147 The survey then outlined what the RCVS Day One Competences were and defined what skills
148 and knowledge (competence) Australian and New Zealand veterinary students should expect
149 to have as Day One graduates. The seven questions that followed were assigned to relevant
150 areas of veterinary employment: General Practice; Production Animals; Companion Animals;
151 Wild Animals; Aquatic Animals; Animals Kept for Scientific Purposes; and Animals Used in
152 Sport and Recreation. Each question had a number of sub-sections that referred to AWE topics
153 relevant to each area of veterinary employment (e.g., slaughter and pre-slaughter inspections
154 arose under production animals). Each question asked respondents to use a ten-point Likert
155 scale, from extremely important (1) to least important (10), to indicate how important an
156 understanding of each topic is for veterinarians as a Day One competence. Such questions
157 permitted only one answer. The complete questionnaire is available on request from the
158 primary author. These seven questions were the same as those in the questionnaire designed to
159 explore the career preferences of veterinary graduates enrolled in veterinary science programs
160 in Australia and New Zealand (24) (25); (26).

161

162 ***Data Management***

163 The data were checked for errors, cleaned, and entered into the program R for ordinal logistic
164 regression analysis. The university employing each educator and the stage of veterinary course
165 taught were ignored, as the number of respondents (n=142) did not allow analysis of these

166 variables. For this analysis, the distribution (pattern) of scores for female educators was
167 compared to that for male educators (the factor name in the output was *Gender*).

168
169 Additionally, of the 49 items, four were identified as having a distinct ethics focus.
170 Accordingly, a 0/1 factor (*Ethics Subject*) was created and used in the analysis to determine
171 whether teaching one or more of these subjects influenced the scores that respondents assigned
172 to the 49 items. The plots in this report are based on the percentages of *all* scores.

173

174 **Results**

175

176 Of the 550 academic staff members (including clinical, teaching and research staff) who were
177 emailed, 142 participated in the survey, representing an overall participation rate of 25%. There
178 were 72 (51%) female and 70 (49%) male participants. A detailed analysis of the scores given
179 to each item statement is presented in the sections below. However, a general overview of the
180 following tables (1-7) indicates educators thought there were very important statements in all
181 topics, with the exception of General Practice (for which the lowest score was 3.56).

182

183 General Practice

184

185 Educators rated the 10 General Practice topics as shown in Table 1. *Professional ethics* (the
186 ethical responsibilities of a veterinarian), *euthanasia*, and *triage* (having a systematic protocol
187 to establish urgency and severity and differentiate between emergencies and routine cases)
188 were rated as the three most important topics for veterinary graduates to understand on Day
189 One. Understanding *the development of animal welfare science* and *perspectives on welfare*
190 were rated as the least important topics for Day One competences (see Table 1).

191

Table 1. Analysis and rankings of General Practice topics assigned by educators (n=142) at Australian and New Zealand veterinary schools. *Ethics subject* was a factor used in the analysis to identify respondents who taught subjects with a strong ethics focus.



Topics	Overall Ranking Position (1 = highest)	Mean Rating	P values for factors	
			Gender df=1	Ethics subject df=1
Professional ethics (ethical responsibilities of a veterinarian)	1	3.56	0.536	0.678
Euthanasia	2	4.09	0.097	0.421
Triage (systematic protocol to establish urgency and severity and differentiate between emergencies and routine cases)	3	4.36	0.676	0.669
Laws and regulations regarding animal welfare	4	4.71	0.968	0.595
Reasons why animal welfare matters	5	5.27	0.593	0.349
Science versus values (the merits of an evidence based approach versus one's own values in making decisions)	6	5.55	0.606	0.112
Applied animal ethics	7	5.78	0.046*	0.225
Human-animal bond (e.g. strength, emotional attachment)	8	6.07	0.656	0.944
Perspectives on welfare (e.g. international/trade, consumer, marketer, regulator)	9	7.28	0.383	0.371
The development of animal welfare science	10	8.34	0.016**	0.229

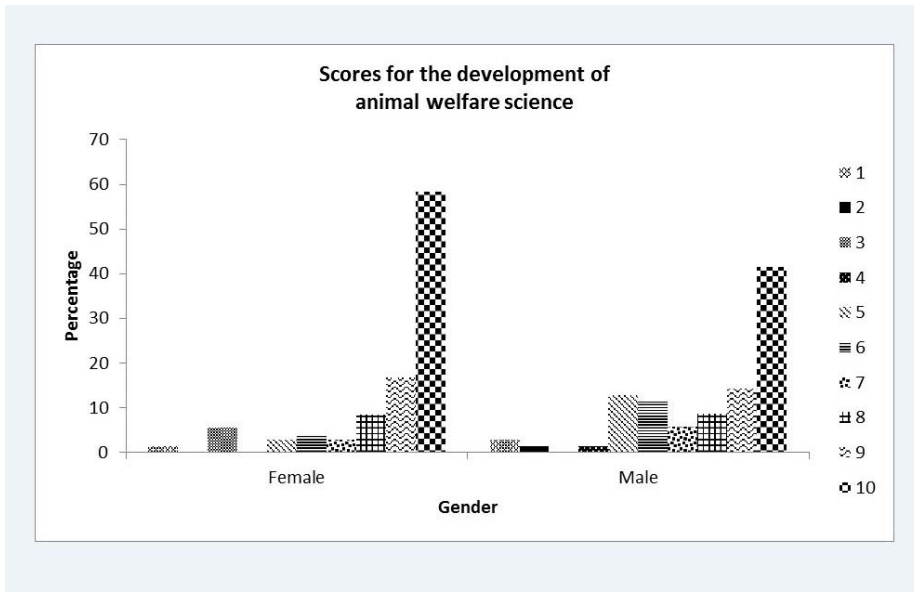
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193 [Place Table 1 here](#)

194 Associations of gender (*Gender*) and subjects taught (*Ethics Subject*) with the rating of topics

195 The rating of an understanding of *the development of animal welfare science* was significantly
 196 influenced by *Gender*, with far more female than male educators rating this variable as least
 197 important (P=0.016, Table 1, Figure 1a). The opposite pattern emerged for understanding
 198 *applied animal ethics*, which was rated more important by female than male educators
 199 (P=0.046, Table 1, Figure 1b).

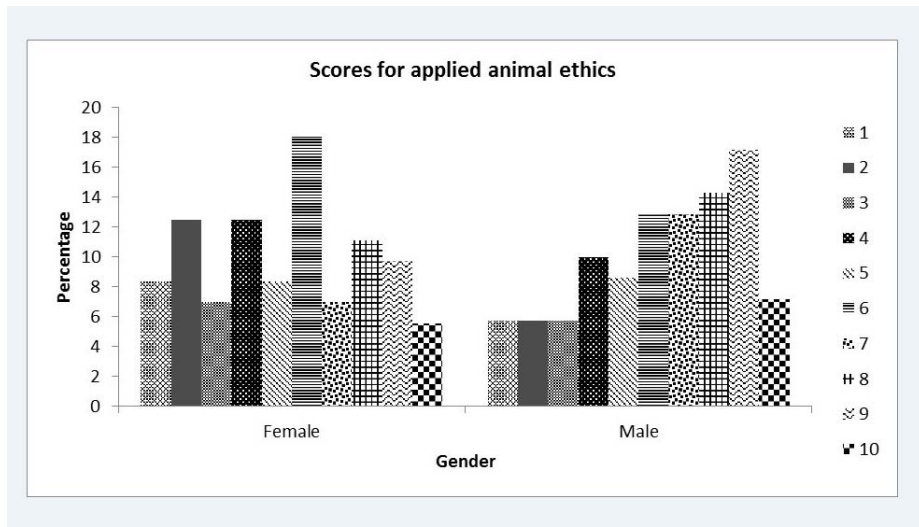
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201

202 **Figure 1a: Gender differences in percentage scores (n=72 females; n=70 males) for the**
 203 **topic of *the development of animal welfare science*, with 1=extremely important and**
 204 **10=least important.**

205



206

207

208 **Figure 1b: Gender differences in percentage scores (n=72 females; n=70 males) for the**
 209 **topic of *applied animal ethics*, with 1=extremely important and 10=least important.**

210

211 Production Animals

212 Educators rated the eight Production Animal topics in Question 7 as shown in Table 2.
 213 *Strategies to address painful husbandry procedures, euthanasia, and the ethics of sustainable*
 214 *production* were rated as the three most important topics in which veterinary graduates should
 215 be competent on Day One working with Production Animals. Understanding of the *social,*
 216 *economic, and cultural drivers of welfare outcomes, and slaughter and pre-slaughter*
 217 *inspections* were rated the least important topics for Day One competences in this area.

218

Table 2. Analysis and ratings of Production Animal topics assigned by educators (n=142) at Australian and New Zealand veterinary schools. *Ethics Subject* was a factor used in the analysis to identify respondents who taught subjects with a strong ethics focus.

Topics	Overall Ranking Position (1 = highest)	Mean Rating	P values for factors	
			Gender df=1	Ethics Subject df=1
Strategies to address painful husbandry procedures	1	2.70	0.954	0.923
Euthanasia	2	3.61	0.688	0.812
Ethics of sustainable production (food security, welfare issues)	3	3.98	0.610	0.253
Distress associated with road, sea, and air transport	4	4.65	0.288	0.922
Human-animal interactions and impacts on animals	5	4.72	0.009***	0.649
Intensive versus extensive production systems	6	4.73	0.694	0.764
Social, economic, and cultural drivers of welfare outcomes	7	5.20	0.069	0.262
Slaughter and pre-slaughter inspections	8	5.25	0.480	0.936

219 _____ Place

220 [Table 2 here](#)

221

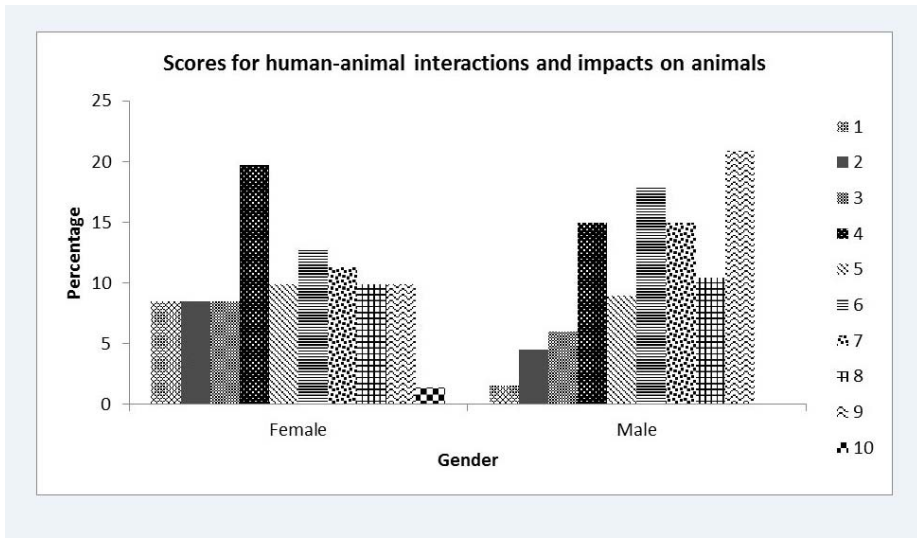
222

223 Associations of gender (*Gender*) and subjects taught (*Ethics Subject*) with the rating of topics

224 There was a significant association with *Gender* in relation to how educators rated the

225 importance of these topics in that *human-animal interactions and impacts on animals* was rated

226 as more important by female educators than by male educators(P=0.009, Table 2, Figure 2).
 227 There was no association of subject taught by educators and their rating of topics.



228
 229 **Figure 2: Gender differences in percentage scores (n=72 females; n=70 males) for the**
 230 **topic of *human-animal interactions and impacts on animals*, with 1=extremely important**
 231 **and 10=least important.**

232
 233 Companion Animals

234 Educators rated the nine Companion Animal topics in Question 8 as shown in Table 3.
 235 *Euthanasia, companion animal husbandry and neutering* were rated as the three most important
 236 topics for Day One competence in this area, with *behaviour and training* being rated a close
 237 4th. Understanding *over-servicing* and *cosmetic surgery* were rated as the least important topics
 238 for Day One competences (Table 3).

239

Table 3. Analysis and ratings of Companion Animal topics assigned by educators (n=142) at Australian and New Zealand veterinary schools. *Ethics Subject* was a factor used in the analysis to identify respondents who taught subjects with a strong ethics focus.

Topics	Overall Ranking Position (1 = highest)	Mean Rating	P values for factors	
			Gender df=1	Ethics Subject df=1
Euthanasia	1	2.92	0.244	0.278
Companion animal husbandry	2	3.29	0.001***	0.468
Neutering	3	3.36	0.530	0.050*
Behaviour and training	4	3.42	0.043*	0.112
Animal abuse/hoarding	5	5.42	0.212	0.309
Breeding	6	5.79	0.618	0.438
Shelter medicine	7	6.39	0.002**	0.359
Over-servicing	8	6.85	0.629	0.741
Cosmetic surgery	9	7.98	0.404	0.903

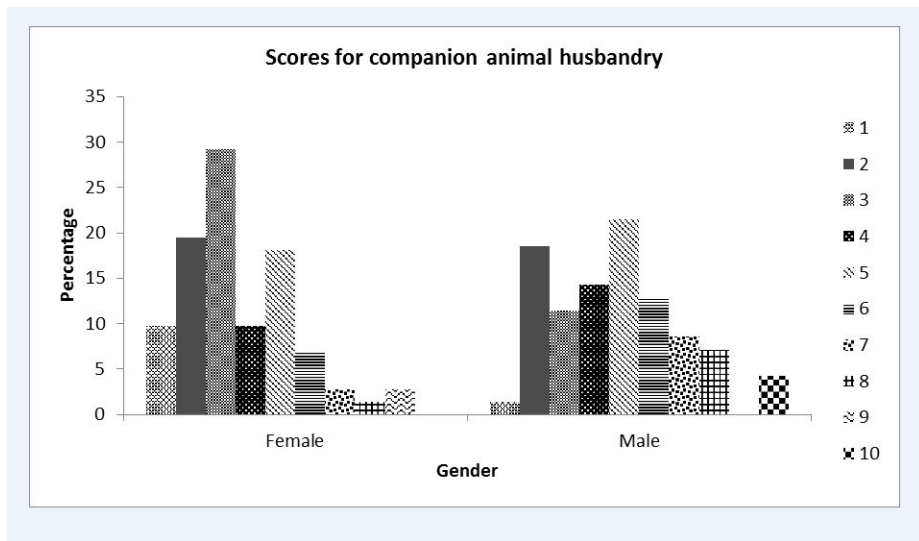
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241 [Place Table 3 here](#)

242

243 Associations of gender (*Gender*) and subjects taught (*Ethics Subject*) with the rating of topics
 244 *Gender* showed a significant association with how educators rated *companion animal*
 245 *husbandry* (P=0.001, Table 3) *shelter medicine* (P=0.002, Table 3), and *behaviour and training*
 246 (P=0.043, Table 3), with far more female educators rating *companion animal husbandry* and
 247 *shelter medicine* as more important than their male counterparts did (Figures 3a and 3b). The

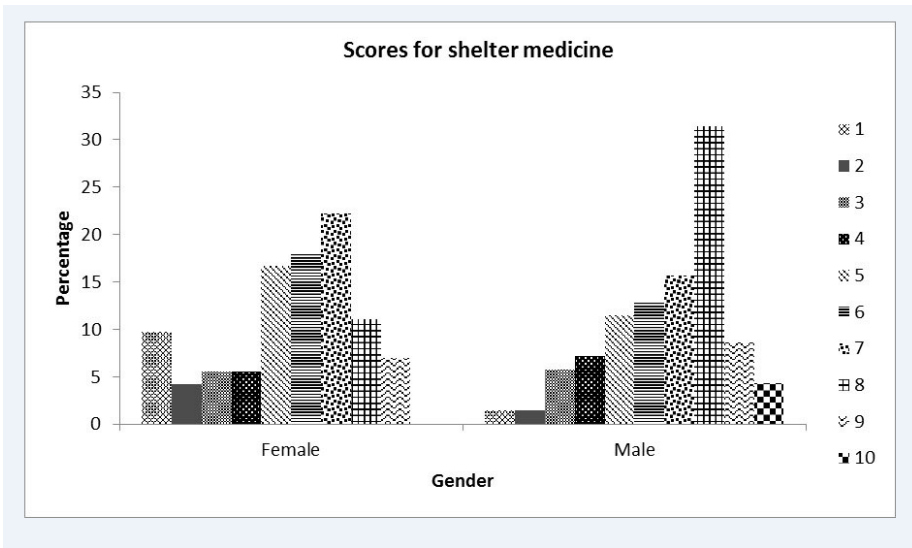
248 opposite pattern emerged for *behaviour and training*, which was rated as more important by
 249 male than female educators (Figure 3c). An association with subjects taught (*Ethics Subject*),
 250 was significant for *neutering* ($P=0.050$, Table 3) in that educators teaching one or more ethics-
 251 related subjects were likely to rate *neutering* as less important than others did (Figure 3d).
 252



253
 254 **Figure 3a: Gender differences in percentage scores (n=72 females; n=70 males) for the**
 255 **topic of *companion animal husbandry*, with 1=extremely important and 10=least**
 256 **important.**

257

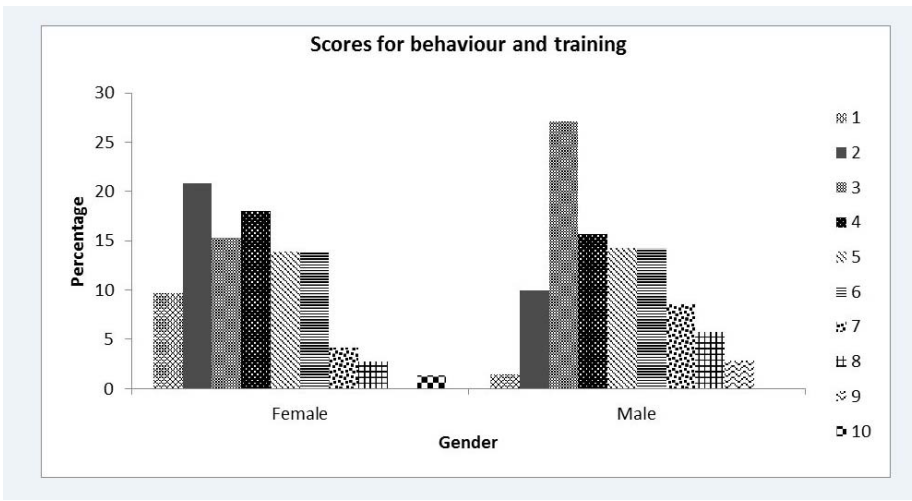
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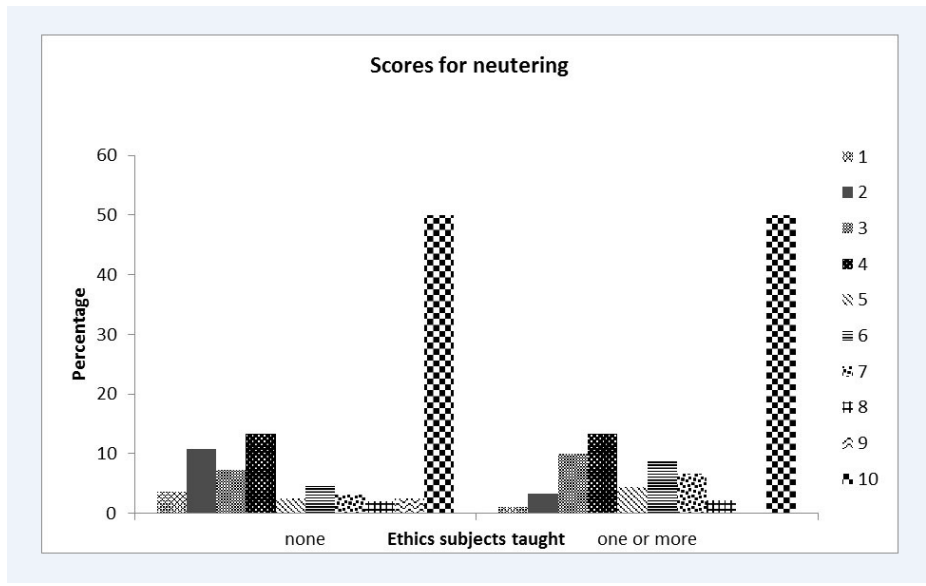
260 **Figure 3b: Gender differences in percentage scores (n=72 females; n=70 males) for the**
261 **topic of *shelter medicine*, with 1=extremely important and 10=least important.**

262



263

264 **Figure 3c: Gender differences in percentage scores (n=72 females; n=70 males) for the**
265 **topic of *behaviour and training*, with 1=extremely important and 10=least important.**



266
 267 **Figure 3d: Effect of subjects taught (*Ethics Subject*) on percentage scores for the topic of**
 268 ***neutering*, with 1=extremely important and 10=least important.**

269
 270 Animals in the Wild

271 Educators rated the six Animals in the Wild topics in Question 9 as shown in Table 4.
 272 *Veterinarians' duties to wild animals* and *euthanasia* were rated as the two most important
 273 topics for Day One competence in this area, while understanding *tensions between animal*
 274 *welfare and environmental concerns*, and *methods and justification for wild animal use* were
 275 rated as the least important topics (Table 4).

276

Table 4. Analysis and ratings of Animals in the Wild topics assigned by educators (n=142) at Australian and New Zealand veterinary schools. *Ethics Subject* was a factor used in the analysis to identify respondents who taught subjects with a strong ethics focus.

Topics	Overall Ranking Position (1 = highest)	Mean Rating	P values for factors	
			Gender df=1	Ethics Subject df=1
Veterinarian's duties to wild animals	1	2.26	0.000****	0.253
Euthanasia	2	2.79	0.168	0.192
Disaster preparedness	3	4.19	0.161	0.672
The nature and state of semi-owned animals	4	4.24	0.064	0.070
Tensions between animal welfare and environmental concerns	5	4.35	0.019*	0.565
Methods and justification for their uses (e.g. hunting, wildlife parks)	6	4.52	0.234	0.264

277

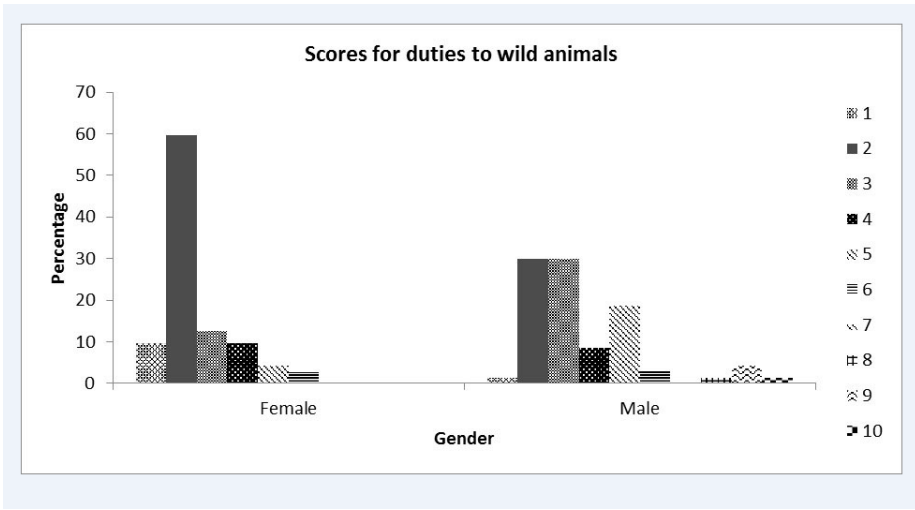
278 [Place Table 4 here](#)

279

280 Associations of gender (*Gender*) and subjects taught (*Ethics Subject*) with the rating of topics

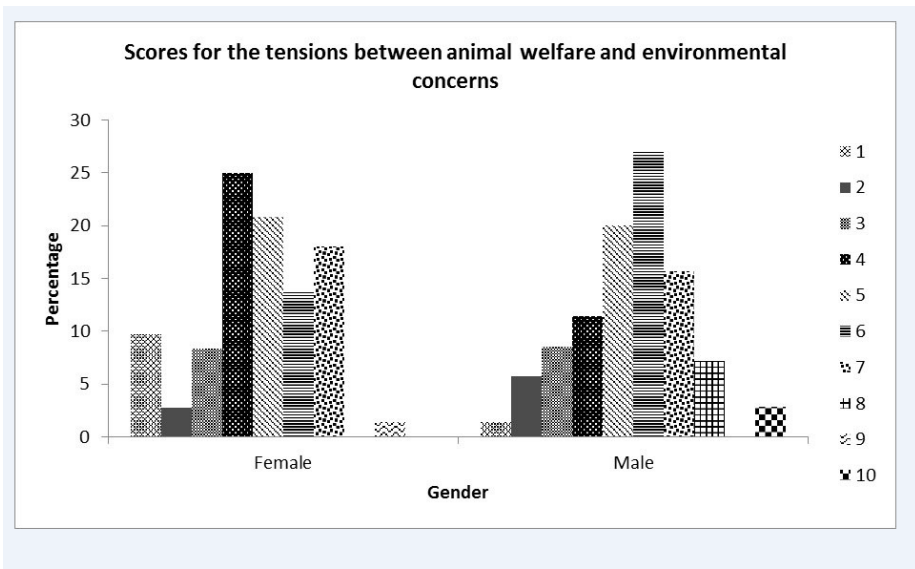
281 There was a significant association between *Gender* and how educators rated the importance
 282 of *veterinarians' duties to wild animals* (P=.000, Table 4) and *tensions between animal welfare*
 283 *and environmental concerns* (P=.019, Table 4). A higher proportion of female educators rated
 284 these topics as more important than their male colleagues did (Figures 4a and 4b). There was
 285 no association of subject taught with respondents' ratings of topics.

286



287
 288 **Figure 4a: Gender differences in percentage scores (n=72 females; n=70 males) for the**
 289 **topic of *duties to wild animals*, with 1=extremely important and 10=least important.**

290



291
 292 **Figure 4b: Gender differences in percentage scores (n=72 females; n=70 males) for the**
 293 **topic of *tensions between animal welfare and environmental concerns*, with 1=extremely**
 294 **important and 10=least important.**

295

296

297 Aquatic Animals

298 Educators rated the five Aquatic Animals topics in Question 10 as shown in Table 5. *Aquatic*
299 *animal health and welfare issues* and *husbandry techniques for farmed fish* were rated as the
300 two most important Day One competences in this area, while understanding the *pain and*
301 *distress associated with fishing practices* and *euthanasia* were rated as the least important
302 topics (Table 5).

303

Table 5. Analysis and ratings of Aquatic Animals topics assigned by educators (n=142) at Australian and New Zealand veterinary schools. *Ethics Subject* was a factor used in the analysis to identify respondents who taught subjects with a strong ethics focus.

Topics	Overall Ranking Position (1 = highest)	Mean Rating	P values for factors	
			Gender df =1	Ethics Subject df =1
Aquatic animal health and welfare issues	1	2.41	0.044*	0.461
Husbandry techniques of farmed fish	2	2.86	0.490	0.613
Use of antibiotics	3	3.27	0.455	0.142
Fishing (pain and distress associated with standard angling and trawling practices)	4	3.50	0.001***	0.859
Euthanasia	5	4.41	0.574	0.036*

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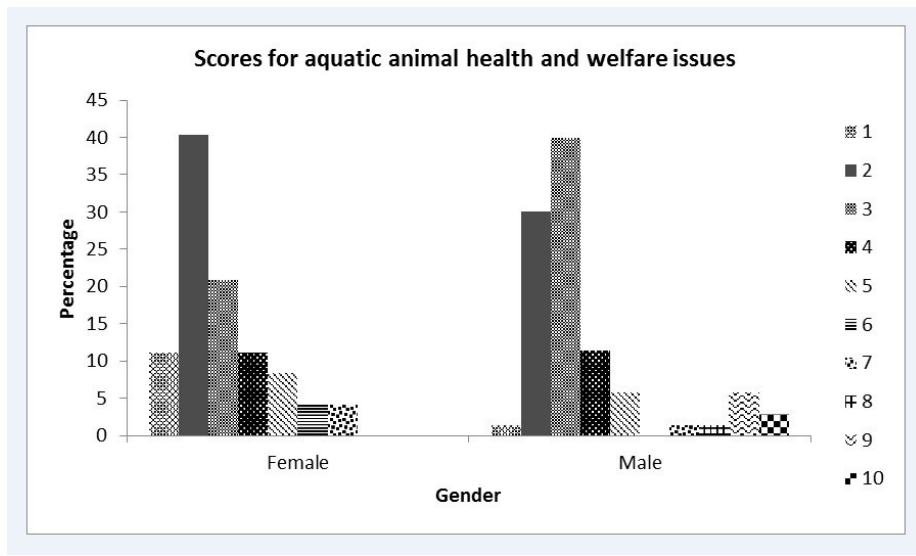
305 Place Table 5 here

306

307 Associations of gender (*Gender*) and subjects taught (*Ethics Subject*) with the rating of topics

308 There were significant associations between *Gender* and how educators rated the importance
 309 of *aquatic animal health and welfare issues* (P=.044, Table 5) and *fishing (pain and distress*
 310 *associated with standard angling and trawling practices)* (P=.001, Table 5), with female
 311 educators rating these topics as more important than their males colleagues did (Figures 5a,
 312 5b). There was also a significant effect of subjects taught (*Ethics Subject*), in that educators
 313 teaching one or more ethics related subjects were likely to rate *euthanasia* as less important
 314 (Figure 5c).

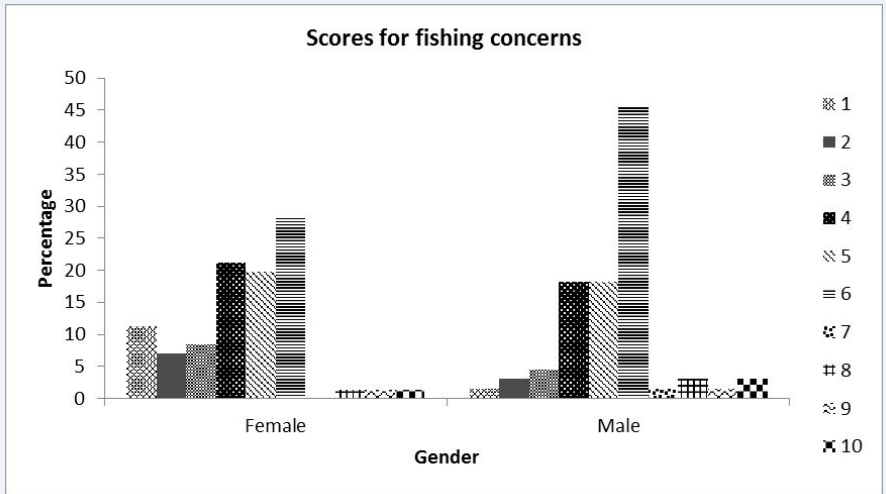
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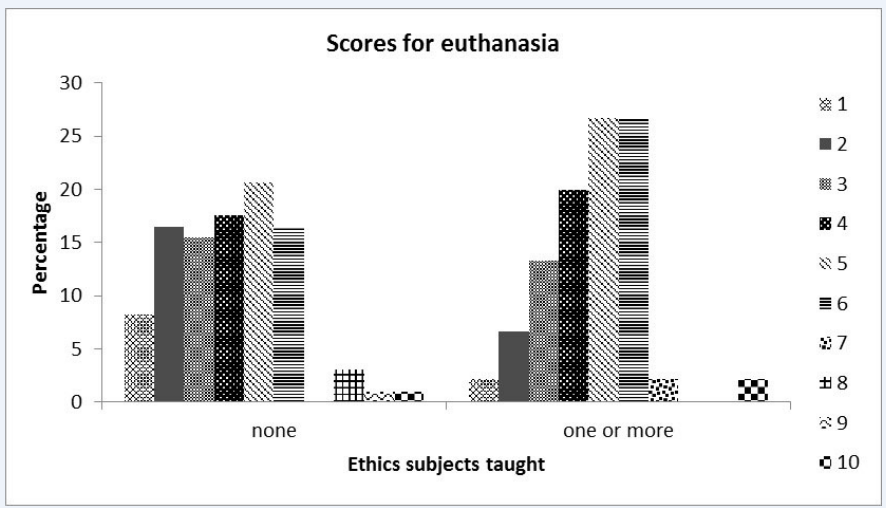
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317 **Figure 5a: Gender differences in percentage scores (n=72 females; n=70 males) for the**
 318 **topic of *aquatic animal health and welfare issues*, with 1=extremely important and**
 319 **10=least important.**

320



321
 322 **Figure 5b: Gender differences in percentage scores (n=72 females; n=70 males) for the**
 323 **topic of fishing (pain and distress associated with standard angling and trawling practices),**
 324 **with 1=extremely important and 10=least important.**



326
 327 **Figure 5c: Effect of subjects taught (Ethics subject) on percentage scores for the topic of**
 328 **euthanasia, with 1=extremely important and 10=least important.**

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329

330

331 Animals Kept for Scientific Purposes

332 Educators rated the six topics for Animals Kept for Scientific Purposes in Question 11 as shown
333 in Table 6. Day One competence in the 3Rs (*replacement, refinement, and reduction*) and
334 *humane endpoints* were rated as the two most important topics in this area. Understanding *what*
335 *constitutes a research animal* and *conscientious objections* were rated as the least important
336 Day One competences (Table 6).

337

Table 6. Analysis and ratings of Animals Kept for Scientific Purposes topics assigned by educators (n=142) at Australian and New Zealand veterinary schools. *Ethics Subject* was a factor used in the analysis to identify respondents who taught subjects with a strong ethics focus.

Topics	Overall Ranking Position (1 = highest)	Mean Rating	P values for factors	
			Gender df=1	Ethics Subject df=1
3Rs (replacement, refinement, and reduction)	1	2.93	0.357	0.762
Humane endpoints	2	3.06	0.172	0.955
AEC procedures and requirements	3	3.19	0.954	0.675
Euthanasia	4	3.31	0.213	0.694
What is a research animal?	5	3.84	0.029*	0.053
Conscientious objections	6	5.28	0.028*	0.718

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339 [Place Table 6 here](#)

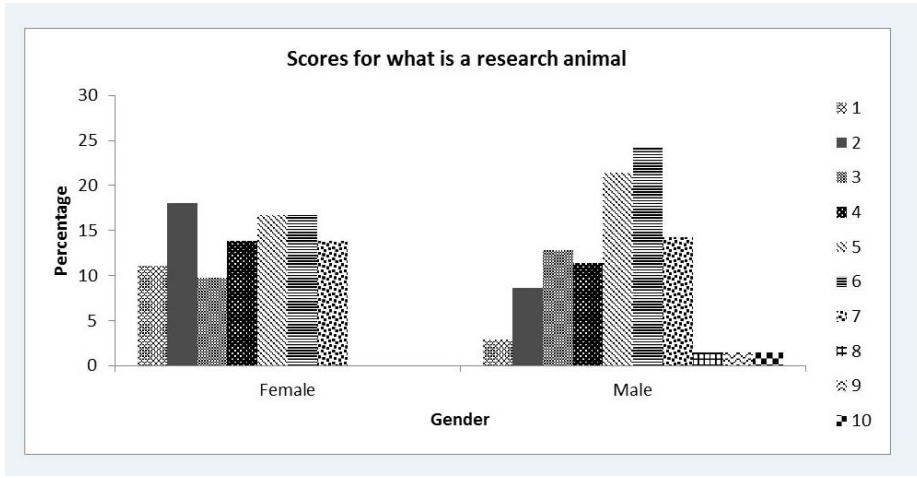
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341 Associations of gender (*Gender*) and subjects taught (*Ethics Subject*) with the rating of topics

342 The effect of *Gender* on how educators rated the importance of these topics was significant for
343 understanding *what constitutes a research animal* (P=0.029, Table 6) and *conscientious*
344 *objections* (P=0.028, Table 6), with female educators rating these topics as more important than
345 their males colleagues did (Figures 6a, 6b).

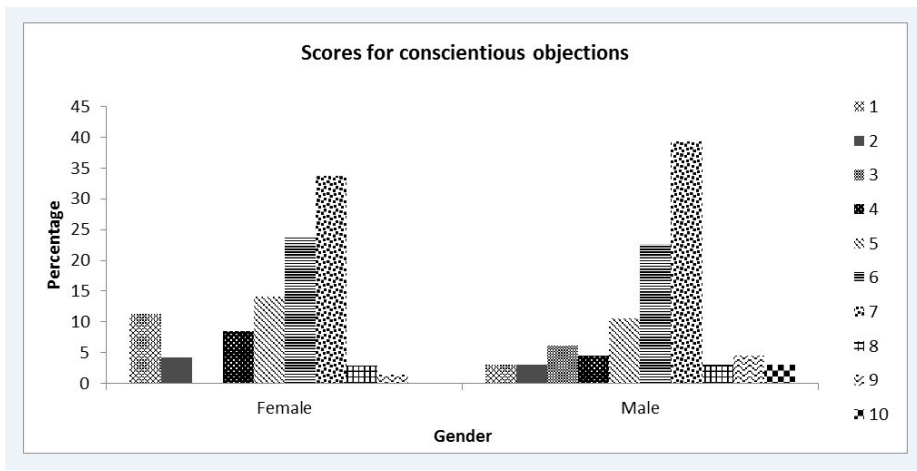
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Figure 6a: Gender differences in percentage scores (n=72 females; n=70 males) for the topic of *what is a research animal*, with 1=extremely important and 10=least important.



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Figure 6b: Gender differences in percentage scores (n=72 females; n=70 males) for the topic of *conscientious objections*, with 1=extremely important and 10=least important.

357

358 Animals Used in Sport and Recreation

359 Educators rated the five topics relating to Animals Used in Sport and Recreation in Question
360 12 as shown in Table 7. The *responsibilities of ownership* and the effects of *pushing of animals*
361 *to their physical and behavioural limits* were rated as the most important topics for Day One
362 competences in this area, while understanding *behaviour, selection, and training for sport and*
363 *recreation displays* and *educating the public* were rated as the least important topics (Table 7).
364

Table 7. Analysis and ratings of Animals Used in Sport and Recreation topics assigned by educators (n=142) at Australian and New Zealand veterinary schools. Ethics Subject was a factor used in the analysis to identify respondents who taught subjects with a strong ethics focus.

Topics	Overall Ranking Position (1 = highest)	Mean Rating	P values for factors	
			Gender df=1	Ethics Subject df=1
Ownership/ responsibility	1	2.53	0.582	0.404
Pushing animals to physiological/ behavioural limits	2	2.77	0.002**	0.508
Euthanasia	3	3.09	0.501	0.106
Behaviour, selection, and training for sport and recreation displays	4	3.77	0.112	0.675
Educating the public	5	3.83	0.493	0.560

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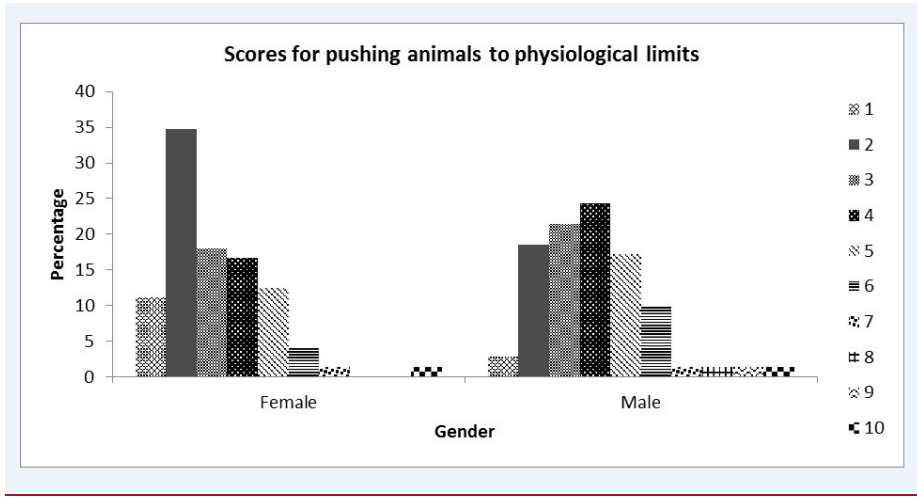
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368 Associations of gender (Gender) and subjects taught (Ethics Subject) with the rating of topics
369 There was a significant association between *Gender* and how educators rated the importance
370 of understanding these topics as Day One competences, with female educators rating *pushing*

371 *animals to their physiological / behavioural limits* as more important than their males
372 colleagues did (P=.002, Table 7, Figure 7).
373

374
375



376

377 **Figure 7: Gender differences in percentage scores (n=72 females; n=70 males) for the**
378 **topic of *pushing animals to their physiological / behavioural limits*, with 1=extremely**
379 **important and 10=least important.**

380

381 Discussion

382 This study provides valuable insights into how veterinary educators rate the importance of
383 various AWE topics as Day One competences for veterinary graduates. For some topics, the
384 assigned ratings showed associations with the educator's gender and whether they taught
385 subjects with a strong focus on ethics. For example, far more female than male educators rated
386 *the development of animal welfare science* as least important. Such associations among the
387 current findings must be treated with some caution given the small sample size and the lack of
388 any data on the gender distribution in educators throughout the schools we sampled.
389 Nevertheless, the current findings serve to remind us that our predispositions to favour certain
390 topics may reflect our gender and familiarity with particular subjects. As the relative
391 importance of AWE looks set to rise (7), veterinary schools need to decide how to prioritise
392 various elements of the AWE curriculum.

393

394 *General Practice*

395 When considering General Practice, veterinary educators rated *professional ethics, euthanasia*
396 and *triage* as the most important Day One competences. These topics reflect the risk of Day
397 One graduates being presented with dilemmas and scenarios that demand complex scientific,
398 ethical, and communication skills. Plainly, ethical dilemmas are common in veterinary practice
399 (27). A recent UK study revealed that the training of veterinary students in ethical decision-
400 making was inadequate and that the shortfall in this aspect of veterinary education contributed
401 to workplace stress (28). Given that several studies have suggested that female veterinarians
402 may be at greater risk of stress than their male colleagues (29) (28) (30), the ongoing
403 feminisation of the veterinary profession should underline the need for more and better training
404 in ethical decision-making.

405

406 In contrast, understanding *perspectives on welfare* and the *development of animal welfare*
407 *science* were rated as least important by veterinary educators as Day One competences. The
408 low rating of the latter topic is of concern, given veterinarians are routinely expected to make
409 critical AWE decisions, based on science and community expectations. However, it is possible
410 that the phrasing of this topic gave educators the impression they were assessing the merits of
411 a theoretical understanding of *perspectives on welfare* or the *development of animal welfare*
412 *science* rather than the benefits of a scientific approach to welfare. These results are similar to
413 those from a parallel survey of students (26).

414

415 *Production Animals*

416 *Strategies to address painful husbandry procedures, euthanasia* and the *ethics of sustainable*
417 *production* were rated as the three most important Day One competences in the area of
418 Production Animals. Controlling pain and ending life are core to the expertise of those in the
419 production sector so their importance is unsurprising. That said, there is some evidence that
420 veterinary practitioners vary in their opinions towards production animal welfare (31). Given
421 the current world focus on climate change, food biosecurity, and the welfare of production
422 animals, especially in intensive systems, it is also not surprising that veterinary educators rated
423 an understanding of *the ethics of sustainable production* highly as a Day One competence. As
424 the subjects that educators taught had no significant bearing on the priority given to this topic,
425 we can assume that support for this view was shared across the different areas of teaching.
426 Understanding of the *social, economic and cultural drivers of welfare outcomes*, and *slaughter*

427 *and pre-slaughter inspections* were rated as the least important topics for Day One
428 competences. It may be that educators think these are important topics but not as priorities for
429 Day One competences. This should be investigated further.

430

431 *Companion Animals*

432 The results of this survey suggest that veterinary educators in Australia and New Zealand
433 prioritise AWE topics that directly relate to the wellbeing of individual patients and their
434 owners rather than ones that may seem more esoteric or abstract, e.g. which involve broader
435 social structures or poor professional conduct. Routine matters and procedures such as
436 *euthanasia, good husbandry, neutering, and behaviour and training* were rated highly as Day
437 One competences. These ratings reflect the everyday need for veterinarians to be conversant
438 in these topics in order to give good advice to clients. *Over servicing, cosmetic surgery* and
439 *shelter medicine* were rated as least important as Day One competences, as also found in a
440 parallel student survey (25). This may suggest that students mirror the views of the educators
441 teaching them, but any attempt to ascribe causality will require further investigation.

442

443 *Animals in the Wild*

444 *Veterinarians' duties to wild animals* and *euthanasia* were rated as the two most important Day
445 One competences for graduates working with animals in the wild. Graduates may be called
446 upon by law enforcement officers to administer assistance to wild animals in public situations
447 or to euthanase injured wild animals. The need to act with confidence in these circumstances
448 is reflected in the current ratings. Understanding *tensions between animal welfare and*
449 *environmental concerns*, and *methods and justification for wild animal uses* were rated as the
450 least important Day One competences. This may be because these topics suggest a theoretical
451 or philosophical approach and as such may have been regarded by educators as having little
452 relevance to Day One graduates. These findings mirror those of a parallel survey of veterinary
453 students (32). It appears that topics that demand theoretical or philosophical approach in the
454 classroom may be avoided in preference given to topics that relate directly to practical skills.
455 If theoretical or philosophical material is assessed, then they will have less uptake than practical
456 skills because students know clients will not judge them on their ability to discuss the finer
457 points of an ethics debate. In contrast, if students cannot perform routine procedures, they will
458 neither pass their exams nor get a job. Given the calls for veterinarians to engage more actively

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459 in animal ethics debate, this finding may trigger further review of faculties' commitment to the
460 teaching of animal ethics.

461

462 *Aquatic Animals*

463 All Aquatic Animal topics were rated as being of high to moderately high importance as Day
464 One competences, with *Aquatic animal health and welfare issues* and *husbandry techniques*
465 *for farmed fish* rated as the two most important topics. The overall ratings suggest that
466 educators saw the fish farming industry, with the concomitant use of antibiotics, as being more
467 relevant to new graduates than the angling or trawling industries. This suggests the need for
468 more work in this area for veterinarians.

469

470 Understanding the *pain and distress associated with fishing practices* and *euthanasia* were
471 seen as the least important topics as Day One competences. -This is somewhat surprising given
472 the contentious nature of these topics. There was significant association between Gender and
473 how educators rated the importance of *aquatic animal health and welfare issues* and for *fishing*
474 procedures as Day One competences with female educators rating these topics as more
475 important than their male colleagues did. Similar findings were reported when the
476 questionnaire was completed by veterinary students (24), (unpublished data). Additionally,
477 educators teaching one or more ethics related subjects were likely to rate *euthanasia* as less
478 important. This rating is rather surprising, given that the humane killing of animals is a core
479 veterinary duty, and that vets must be able to counsel owners around the decision to euthanase
480 and then administer this procedure effectively and safely. It may be that most educators have
481 not been exposed to the euthanasia of pet or ornamental fish because so few clients present
482 moribund fish to veterinarians for this procedure. The lack of demand for veterinary
483 administered euthanasia in these animals could be a reflection of a perceived lack of skills in
484 fish health among veterinarians or the reality that many ornamental fish are inexpensive to
485 replace (33).

486

487

488 *Animals Kept for Scientific Purposes*

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489 All topics relating to *Animals Kept for Scientific Purposes* were rated by educators as being of
490 high to medium importance as Day One competences, and in this regard were similar to the
491 parallel student survey (unpublished data).

492

493 Competence in the 3Rs (replacement, refinement and reduction) and *humane endpoints* were
494 rated as the two most important Day One competences for graduates working in this area. Our
495 results suggest that educators and veterinary students recognise the anticipated importance of
496 these issues immediately upon graduation. These considerations are central to teaching around
497 the practice of animal ethics committees in Australia and New Zealand. It is worth noting
498 that there are innovations that will reduce the use of animals in veterinary teaching (e.g., (34)
499 and calls to expand the 3Rs to the 4Rs to include rehabilitation (of animals after their use) (35).
500 Future studies that revisit the current research questions may reveal how these innovations are
501 being received by veterinary educators.

502

503 Understanding *what constitutes a research animal* and *conscientious objections* were rated as
504 the least important Day One competences in this area. The effect of *Gender* on how educators
505 rated the importance of these topics was significant for *what constitutes a research animal* and
506 *conscientious objections*, with female educators rating these as more important than their male
507 colleagues did. It is unclear whether these findings reflect a gender bias in the proportion of
508 veterinary science educators who have sat on institutional animal ethics committees and
509 therefore appreciate the impact of these apparent subtleties.

510

511 *Animals Used in Sport and Recreation*

512 The *responsibilities of ownership* and the *pushing of animals to their physical and behavioural*
513 *limits* were rated by educators as the most important topics for Day One competences in the
514 area of Animals used in Sport and Recreation. There was a significant association between
515 Gender and how educators rated these topics, with female educators rating *pushing animals to*
516 *their physiological / behavioural limits* as more important than their male colleagues did. This
517 finding aligns with previous studies that have shown better female awareness of not causing
518 animals to suffer (14).

519

520 Educators rated the *responsibilities of ownership* as the most important issue confronted by
521 newly graduated veterinarians. In contrast, the students who completed the questionnaire were

522 not strongly concerned about this issue (unpublished data). It is not clear what may be driving
523 this apparent difference. The concept of responsibility of ownership comes with age and
524 perhaps students cannot be expected to understand this.

525

526 *Euthanasia* rated in the middle. Euthanasing animals used for work, sport, recreation and
527 display may occur in public under extreme circumstances but is more commonly the result of
528 extended consultation with owners. The euthanasia of healthy animals can be a challenge for
529 veterinarians (36) but retirement homes for animals from work, sport, recreation and display
530 roles can be hard to find (37). If old age or injury or mean that animals can no longer perform
531 the roles for which they are kept, then euthanasia is a common course of action (37). Fewer
532 emotional considerations seem to pertain than, for example, in the contexts of companion
533 animals. So, veterinary educators must help students to understand that commercial pressures
534 often drive owners' requests for euthanasia of healthy work, sport, recreation and display
535 animals.

536

537 **Conclusions**

538

539 The rating of these topics by educators was very similar to those by undergraduate veterinary
540 science students who completed the same questionnaire (24-26, 32). The educators' focus on
541 practical issues and avoidance of esoteric issues clashes with a perceived need for veterinarians
542 to embrace animal ethics more actively. Overall, results are in keeping with previous research
543 that suggests that women are more likely to show empathy towards some animals than men,
544 and men were less concerned with questions of animal welfare.

545

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547

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551

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553 **References**

554 1. Crook A. The CVMA animal abuse position--how we got here. *Can Vet J.* 2000;41(8):631-5.

555 2. Friend TH. Teaching animal welfare in the land grant universities. *J Anim Sci.* 1990;68(10):3462-7.

556 3. Izmirlı S, Phillips CJ. Attitudes of Australian and Turkish veterinary faculty toward animal welfare. *J*

557 *Vet Med Educ.* 2012;39(2):200-7.

558 4. Hewson CJ, Baranyiová E, Broom DM, Cockram MS, Galindo F, Hanlon AJ, et al. Approaches to

559 teaching animal welfare at 13 veterinary schools worldwide. *J Vet Med Educ.* 2005;32(4):422-37.

560 5. McGreevy PD, Dixon RJ. Teaching animal welfare at the University of Sydney's Faculty of Veterinary

561 Science. *J Vet Med Educ.* 2005;32(4):442-6.

562 6. Stafford K. *Animal Welfare in New Zealand*. Palmerston North: New Zealand Society of Animal

563 Production; 2013.

564 7. BVA. Vets speaking up for animal

565 welfare: BVA animal welfare strategy. 2016 [Available from:

566 https://www.bva.co.uk/uploadedFiles/Content/News_campaigns_and_policies/Policies/Ethics_and_welfare/BVA-animal-welfare-strategy-feb-2016.pdf.

567

568 8. Broom DM. Animal welfare education: development and prospects. *J Vet Med Educ.* 2005;32(4):438-

569 41.

570 9. RCVS. RCVS Day one competences 2014 [Available from: [https://www.rcvs.org.uk/document-](https://www.rcvs.org.uk/document-library/day-one-competences/)

571 [library/day-one-competences/](https://www.rcvs.org.uk/document-library/day-one-competences/).

572 10. FVE, EAEVE. FVE & EAEVE. Report on European -veterinary -education -in

573 -animal -welfare -science, ethics -and

574 law. 2013 [Available from:

575 http://www.fve.org/uploads/publications/docs/full_report_aw_curriculum_adopted.pdf.

576

577 11. Fawcett A. Veterinary associations prioritise animal welfare. *The Veterinarian.* 2016.

578 12. Dohoo SE, Dohoo IR. Factors influencing the postoperative use of analgesics in dogs and cats by

579 Canadian veterinarians. *Can Vet J.* 1996;37(9):552-6.

580 13. Dohoo SE, Dohoo IR. Postoperative use of analgesics in dogs and cats by Canadian veterinarians. *Can*

581 *Vet J.* 1996;37(9):546-51.

582 14. Paul ES, Podberscek AL. Veterinary education and students' attitudes towards animal welfare. *Vet Rec.*

583 2000;146(10):269-72.

584 15. Levine ED, Mills DS, Houpt KA. Attitudes of veterinary students at one US college toward factors

585 relating to farm animal welfare. *J Vet Med Educ.* 2005;32(4):481-90.

586 16. Serpell JA. Factors influencing veterinary students career choices and attitudes to animals. *J Vet Med*

587 *Educ.* 2005;32(4):491-6.

588 17. Pollard-Williams S, Doyle RE, Freire R. The influence of workplace learning on attitudes toward

589 animal welfare in veterinary students. *J Vet Med Educ.* 2014;41(3):253-7.

590 18. Verrinder JM, Phillips CJ. Development of a moral judgment measure for veterinary education. *J Vet*

591 *Med Educ.* 2014;41(3):258-64.

592 19. Verrinder JM, Phillips CJ. Identifying veterinary students' capacity for moral behavior concerning

593 animal ethics issues. *J Vet Med Educ.* 2014;41(4):358-70.

594 20. Verrinder JM, Phillips CJ. Assessing Veterinary and Animal Science Students' Moral Judgment

595 Development on Animal Ethics Issues. *J Vet Med Educ.* 2015;42(3):206-16.

596 21. Verrinder JM, Ostini R, Phillips CJ. Differences in Moral Judgment on Animal and Human Ethics

597 Issues between University Students in Animal-Related, Human Medical and Arts Programs. *PLoS One.*

598 2016;11(3):e0149308.

599 22. Robinson D, Williams M, Buzzeo J. *RCVS survey of the veterinary professions 2014 synthesis report*. UK: Institute of Employment Studies; 2014.

600 23. Heleski CR, Mertig AG, Zanella AJ. Results of a national survey of US veterinary college faculty

601 regarding attitudes toward farm animal welfare. *J Am Vet Med Assoc.* 2005;226(9):1538-46.

602 24. Cornish AR, Caspar GL, Collins T, Degeling C, Fawcett A, Fisher AD, et al. Career Preferences and

603 Opinions on Animal Welfare and Ethics: A Survey of Veterinary Students in Australia and New

604 Zealand. *J Vet Med Educ.* 2016;43(3):310-20.

605 25. Degeling C, Fawcett A, Collins T, Hazel S, Johnson J, Lloyd J, et al. Students' opinions on welfare and

606 ethics issues for companion animals in

607 Australian and New Zealand veterinary schools. *Australian Veterinary*

608 *Journal* In press.

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- 609 26. Freire R, Phillips CJ, Verrinder JM, Collins T, Degeling C, Fawcett A, et al. The Importance of Animal
610 Welfare Science and Ethics to Veterinary Students in Australia and New Zealand. *J Vet Med Educ.*
611 2016;1-9.
- 612 27. Johnson J, Collins T, Degeling C, Fawcett A, Fisher AD, Freire R, et al. The First Shared Online
613 Curriculum Resources for Veterinary Undergraduate Learning and Teaching in Animal Welfare and
614 Ethics in Australia and New Zealand. *Animals (Basel).* 2015;5(2):395-406.
- 615 28. Batchelor CE, McKeegan DE. Survey of the frequency and perceived stressfulness of ethical dilemmas
616 encountered in UK veterinary practice. *Vet Rec.* 2012;170(1):19.
- 617 29. Gardner DH, Hini D. Work-related stress in the veterinary profession in New Zealand. *N Z Vet J.*
618 2006;54(3):119-24.
- 619 30. Platt B, Hawton K, Simkin S, Mellanby RJ. Suicidal behaviour and psychosocial problems in
620 veterinary surgeons: a systematic review. *Soc Psychiatry Psychiatr Epidemiol.* 2012;47(2):223-40.
- 621 31. Heise H, Kemper N, Theuvsen L. [The attitude of German veterinarians towards farm animal welfare:
622 results of a cluster analysis]. *Berl Munch Tierarztl Wochenschr.* 2016;129(5-6):225-33.
- 623 32. Stafford K, Collins T, Degeling C, Freire R, Hazel S, Johnson J, et al. Veterinary students' opinions
624 on their required
625 competence in dealing with welfare and ethics issues pertaining to wild animals. *Journal of Zoo and Wildlife*
626 *Medicine.* In press.
- 627 33. Walster C, Rasidi E, Saint-Erne N, Loh R. The welfare of ornamental fish in the home aquarium.
628 *Companion Animal.* 2015;20(5):302-6.
- 629 34. Gopinath D, McGreevy PD, Zuber RM, Klupiec C, Baguley J, Barrs VR. Developments in
630 undergraduate teaching of small-animal soft-tissue surgical skills at the University of Sydney. *J Vet*
631 *Med Educ.* 2012;39(1):21-9.
- 632 35. Badyal DK, Desai C. Animal use in pharmacology education and research: the changing scenario.
633 *Indian J Pharmacol.* 2014;46(3):257-65.
- 634 36. Tran L, Crane MF, Phillips JK. The distinct role of performing euthanasia on depression and suicide in
635 veterinarians. *J Occup Health Psychol.* 2014;19(2):123-32.
- 636 37. Thomson PC, Hayek AR, Jones B, Evans DL, McGreevy PD. Number, causes and destinations of
637 horses leaving the Australian Thoroughbred and Standardbred racing industries. *Aust Vet J.*
638 2014;92(8):303-11.
- 639 ▲

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