The BEME Collaboration

BEVME Review

(Best Evidence in Veterinary Medical Education)

"Which non-technical veterinary graduate attributes are important? Consensus and evidence"

Revised Proposal and Review Protocol
v1.2

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1. Title
Which non-technical veterinary graduate attributes are important? Consensus and evidence.

Review Team:
Martin Cake (Group Leader)
Veterinary & Biomedical Sciences, Murdoch University, Australia.
Susan Rhind
The Royal (Dick) School of Veterinary Studies, University of Edinburgh, United Kingdom.
Sarah Baillie
School of Veterinary Sciences, University of Bristol, United Kingdom
Alison Blaxter
School of Veterinary Sciences, University of Bristol, United Kingdom
Fiona Brown
Medicine and Veterinary Medicine Libraries, University of Edinburgh, United Kingdom.
Marshall Dozier
Medicine and Veterinary Medicine Libraries, University of Edinburgh, United Kingdom.

Contact Details:
Dr Martin Cake
School of Veterinary & Biomedical Sciences
Murdoch University
South St., Murdoch WA 6150
Australia
mcake@murdoch.edu.au

Version History

Version	Date	Details
1.0	2/11/2011	First protocol submitted to BEME, after initial team meeting and scoping/pilot studies.
1.1	12/2012	Protocol revised in response to reviewers, and following a 'test case' review of a single competence (business skills) to trial methodology.

2. Background
Graduate attribute or competence frameworks are becoming increasingly important in veterinary education. Several influential international bodies have introduced core competence standards into accreditation procedures. Notably, the UK's Royal College of Veterinary Surgeons (RCVS) and the European Association of Establishments for Veterinary Education (EAEVE) 'Day One Skills' and 'Year One Skills' frameworks[1], and the recently released North American Veterinary Medical Education Consortium (NAVMEC) 'Roadmap' report[2] include comprehensive yet somewhat different lists of core graduate-level competences. As in human medicine, there has been a recent shift towards the progressive inclusion of non-technical or professional competences, in addition to more traditional outcomes of discipline-based knowledge and technical skills. However, the level of evidence or justification for the inclusion of various competences in such lists varies and further clarification and research is required.

Survey studies have rated or ranked veterinary graduate attributes by various stakeholder groups, most recently by two members of the review team[3]. Consensus among stakeholder groups

provides supportive evidence of the importance of particular competences. However, it has also become clear that some non-technical competences deemed to be essential by expert or accrediting bodies are rated as less important by other stakeholder groups. Mismatches in perceived importance signify major challenges for those involved in veterinary education, particularly when justifying the inclusion of competences in overcrowded curricula. Furthermore, there is little published empirical evidence supporting the inclusion of non-technical competences in veterinary competence frameworks. While many veterinary competences are intuitively *thought* to be important, few are known to have a measurable association with any tangible professional outcome. The challenge of addressing comprehensive and unprioritised lists of 'essential' competences, and recent shifts in the nature of the included competences[2], adds a substantial and growing burden to curricula of veterinary colleges worldwide.

To the best of our knowledge, there have been no previous systematic reviews of evidence supporting the inclusion of non-technical competences in undergraduate veterinary curricula. Our aim is to review, evaluate and summarise the available evidence, in order to inform both undergraduate curriculum design and institutional- and accreditation-level competence frameworks, and to promote 'best-evidence' approaches to the education of veterinary graduates for successful transition to the workplace.

3. Review question & objectives
Our review will address the question:
    Which non-technical competences are important to the success of graduate veterinarians?
predominantly along two lines of inquiry:
    a. ***consensus*** of stakeholder opinion (i.e. *perceived* importance)
    b. ***evidence*** of an effect on defined graduate-level outcomes

Keywords:
veterinary, graduate attributes, non-technical competences, professional competences, transition to practice.

Definitions:
Non-technical competences: for this purpose defined by exclusion as those competences that are not discipline-specific technical knowledge or technical skills. Partial synonyms include generic skills, soft skills, core skills, life skills, or professional skills, though 'non-technical' skills or competences are the most frequently used terms in veterinary education.
Success: an open definition is used of any measurable favourable professional outcome, or any favourable personal outcome likely to be influenced by veterinary employment.
Graduate veterinarian: veterinary graduate in their first few years of work as a veterinarian.

While evidence will be considered in the context of importance to a new veterinary graduate, the principal end user of the review is intended to be undergraduate veterinary educators. Thus the guiding objectives of the review are:
    - to provide an evidential sense of priority rank to currently unranked lists of competences, in order to guide decision-making where there are competing demands for curriculum time or resources
    - to distil and publish the available evidence and source bibliography into a summarised, user-ready format for re-use in undergraduate education and educational research

- where perception and evidence are conflicting, to flag such conflict as a potential barrier for education and area for future research.

The review follows the (largely constructivist) epistemological position that:
1. Some attributes are relatively more important to graduate success than others *(a premise notably absent from published competence frameworks)*;
2. In assessing the importance of an attribute, quality outcomes-based evidence is more valid than stakeholder opinion;
3. However:

a) stakeholder opinion may directly or indirectly influence graduate outcomes (*e.g.* employer perceptions will influence employability)

b) most self-evaluated outcome measures for 'success' are subject to bias from personal perception; and

c) stakeholder opinion is likely to be, at least in part, based on experiential evidence;

therefore perception and evidence cannot be disentangled *(refer Figure 1)*, or causality determined;
4. Thus in the absence of substantive outcomes-based evidence, consensus of opinion among multiple stakeholders is useful knowledge, because:

a) it provides surrogate or indirect evidence of the likely 'true' importance of an attribute; and

b) perceptions are to some extent self-fulfilling through their influence on outcomes.

It is expected that objective, experimental intervention studies will be minimal or absent from the reviewed literature, and instead most 'empirical' evidence will derive from quantitative association of a competence with favourable graduate outcomes. Thus causality (rather than association), and therefore efficacy of intervention, may be difficult to establish, and will remain implied only.
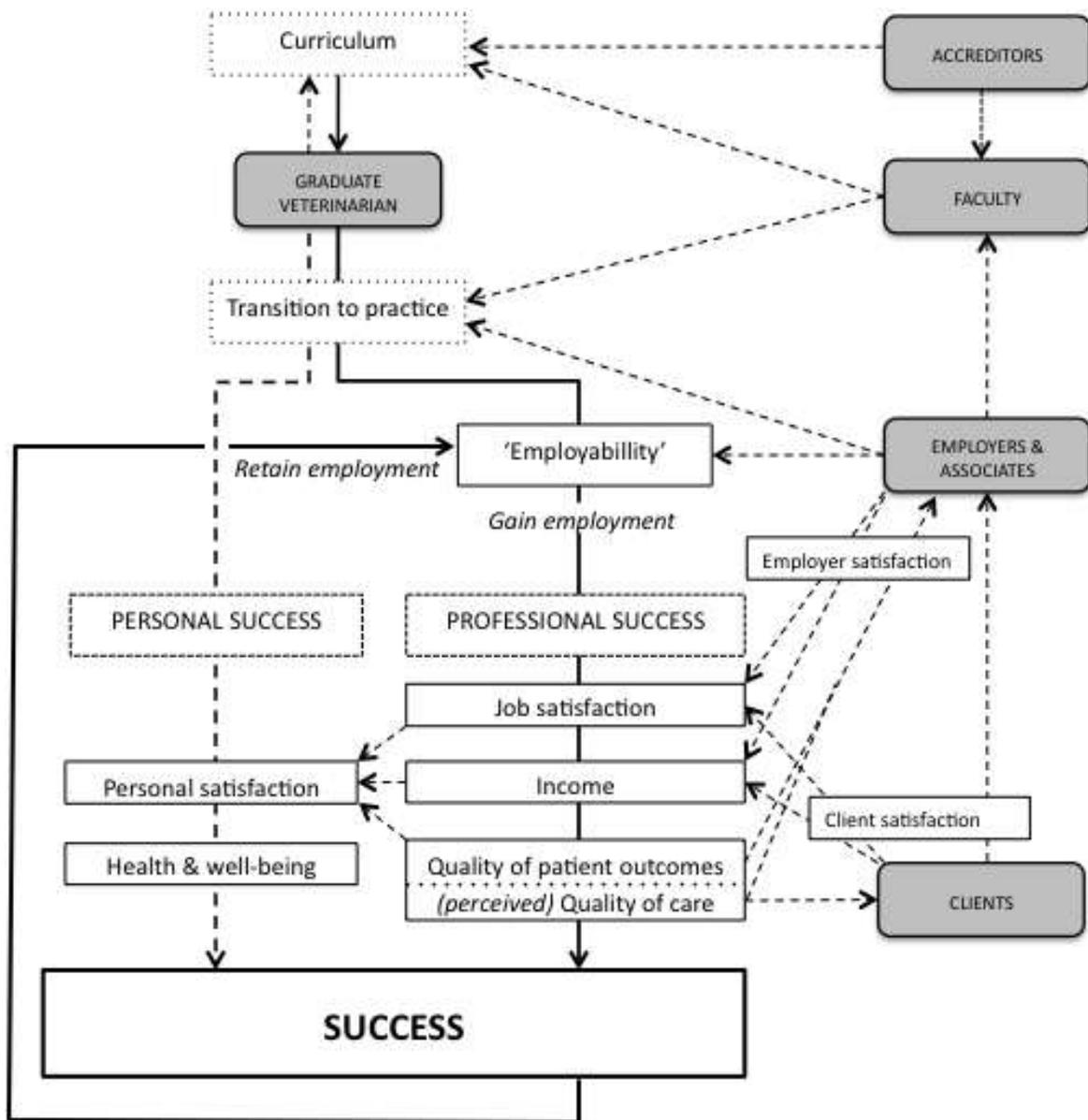
Figure 1: Concept map showing the influence of stakeholder perceptions (broken arrows) on graduate outcomes associated with success (square boxes). Since perceptions influence outcomes and vice versa, it is difficult to disentangle perception and evidence or to establish causality.

4. Search sources and strategies

The review team will develop a list of non-technical attributes by iterative aggregation of known published lists of veterinary competences from accrediting and expert bodies e.g. RCVS/EAEVE 'Day 1' Skills, NAVMEC. The list will be expanded and refined, through an iterative process and group discussions, to develop a list of discrete graduate attributes (and associated synonyms and keywords) to facilitate both the database search, and subsequent mapping of the extracted evidence. The veterinary literature will be searched by the information scientists at the University of Edinburgh. The search will not be time-limited (i.e. no earliest date set), and veterinary/veterinarian (truncated to veterinar$) will be a required word. A combination of

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electronic databases (similar to the list in the previous BEVME review[4]), hand searches (principally *Journal of Veterinary Medical Education*) and ancestral searches (via cited references) will be undertaken. Grey literature will be included where possible, for example commissioned industry reports published in the public domain.

5. Study selection criteria

Inclusion/exclusion criteria are summarized in Fig. 2. The process will categorise sources on the basis of providing any of the following levels of evidence: expert-level opinion from non-empirical studies; consensus-based veterinary competence frameworks; perceived importance as rated by stakeholder cohorts; or empirical evidence of an effect on graduate-level outcomes.
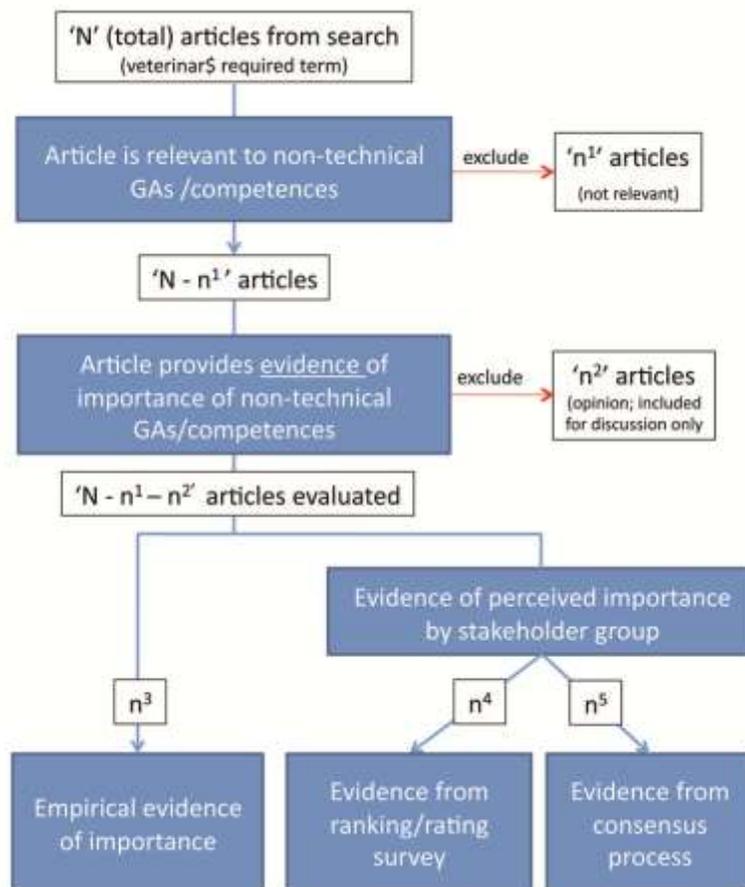

Figure 2: Inclusion and exclusion criteria for evidence relating to non-technical veterinary graduate attributes (GAs) or competences

Evidence will be considered and evaluated in relation to any outcomes veterinary professional outcomes, or personal outcomes likely to be influenced by veterinary employment: employability, transition to practice, quality of patient care or patient outcomes, health & safety, satisfaction, or income. However, the review's focus will be graduate-level outcomes (i.e. first few years in practice) where a distinction between 'graduate attributes' versus broader 'veterinary attributes' can be made.

Exclusion criteria will include:

- Opinion papers lacking original evidence, however influential or highly-cited. These will be excluded from the review of evidence, but highly cited examples may be referenced in the discussion as examples of 'expert opinion' where appropriate.
- Graduate attribute/competence lists applying to a specific veterinary college, even if formed by a consensus process, with the exception of those formally published as case studies in the academic literature. It is necessary to exclude these sources as nearly all veterinary colleges maintain such a list, yet few are in the public domain as grey literature.
- Papers outside of the veterinary discipline. Although there would no doubt be much to inform the review from the human medical education literature, to attempt its inclusion at a meaningful level would render this review unmanageable. Reference to human medical education will be limited to discussion only, with respect to (1) comparison to any similar systematic reviews (2) identifying human medical sources frequently cited in the veterinary literature, and (3) reference where relevant to well-established medical competence frameworks (eg. Tomorrow's Doctors, CanMEDS).

Other than the above examples, studies will not be excluded on the basis of methodology.

6. Procedure for extracting data
The proposed data sheet for extraction is attached as Appendix 1. Sources will initially be evaluated and coded by a single reviewer (MC); subsequently all sources in the 'empirical evidence' category (n^3 in Fig. 1), any items flagged for uncertainty, plus a random sample of 20% in other categories will be separately evaluated by a second reviewer (SB, SMR or AB) to determine inter-rater reliability. In cases of continuing uncertainty, a third reviewer (SB , SMR or AB) will be used to resolve dispute.

Key data captured in addition to standard BEME methodology include: country of origin (to identify possible regional differences); type of evidence; career stage (e.g. new graduate, recent graduate, senior veterinarian); quantifying relative importance of attribute(s) (see Section 7 below); and the stakeholder group(s) consulted / providing evidence (e.g. junior undergraduates, senior undergraduates, recent graduates (>3 yrs), veterinarians, veterinary employers, faculty, professional or expert bodies, or clients).

7. Synthesis of extracted evidence
i) Initially, frequency counts of assimilated data will be used to judge the size and nature of the reviewed evidence.

ii) Data from the three categories of evidence (see Fig. 1) will be analysed separately, namely:
- **Consensus-based competence lists** will be compared in both their composition and structure, including differences in wording or definitions applied. This will complete the iterative process described in Section 4 above, establishing a 'master' consensus list of sufficiently discrete and appropriately 'grained' competences for the purposes of mapping other evidence.
- **Ranking/rating-type studies** will be tabulated against this master list to enable a semi-quantitative meta-analysis of the relative importance of each attribute. For this purpose, attributes will be coded by the following relative scale: 1= clearly very important, e.g. top 10% of a ranked list; 2= comparatively greater importance, e.g. top 1/3rd of a ranked list; 3= somewhat important, e.g. middle-ranked or ranking not clear; 4= comparatively lesser importance, e.g. bottom 1/3rd; 5= clearly less important or not important, e.g. clearly bottom of a ranked list or less than 50% agree it is important. Major mismatches in perceived

importance between stakeholder groups or gender will be determined, with particular attention to within-study comparisons where multiple cohorts are surveyed. Additional attributes (beyond the 'master' list) will be identified and their importance evaluated.

- **Empirical evidence studies** will be analysed primarily according to the type and strength of evidence they provide, and fitted to a modified Kirkpatrick's hierarchy of program outcomes.

iii) Aggregated findings will be synthesized in the form of a structured narrative referencing the stated review question and aims. Particular focus will be given to the concept of *consensus,* versus potential mismatch between different cohorts (stakeholder group, gender, regional differences), and mismatch between *perceptions* and *evidence*. As described above, limited discussion of these findings relative to both published opinion, and selected comparisons with the human medical literature, will be used to provide broader context to these findings.

iv) An overall assessment of the quality of evidence in the field will be determined, together with practical implications for curriculum and program design, and suggested priorities for future research.

8. Project timetable
This project was conceived in July 2011 and initial pilot/scoping studies performed Aug-Nov 2011. The projected timeline for completion and work to date is as follows:

Dec 2011	1st face-to-face full team meeting
July 2012	2nd team meeting and meeting with information scientists
Jan – July 2012	Systematic review of literature on 'Business Skills'
August 2012	Chapter submitted to Veterinary Business & Enterprise (Elsevier)
October 2012	Chapter accepted (publication date 09/2013)[5]
late 2012	Primary database search
Dec 2011-March 2013	Evaluation, data coding, and follow-up/secondary searches
April-June 2013	Re-coding, resolution of differences, analysis of results
July-August 2013	2nd face-to-face full team meeting; final synthesis of results; presentation of preliminary findings at UK Veterinary Education Symposium July 2013.
Sept-Dec 2013	Draft, review and finalise manuscripts targeted for publication in *Journal of Veterinary Medical Education* & presentation at AMEE 2014

9. The review team
In brief:
Dr Martin Cake is a veterinarian and academic, with an active interest in professionalism both as an educator (as coordinator of Murdoch University's *Veterinary Professional Life* modules) and as curriculum designer (as Academic co-Chair of the program). He is author of over 30 peer-reviewed publications, including one paper in *Journal of Veterinary Medical Education*, for which he regularly acts as reviewer.

Professor Susan Rhind is chair of veterinary medical education at the University of Edinburgh. She has completed a previous BEME review[4] and has published and presented widely in veterinary research and veterinary medical education research.

Professor Sarah Baillie is chair of veterinary education at the University of Bristol. She has undertaken a range of research and development projects in veterinary education and has published widely. She has completed a previous BEME review[4]. She is a National Teaching Fellow (2010).

Dr Alison Blaxter has 30 years experience as a practicing veterinary surgeon, and has taught non-technical skills to veterinary undergraduates at Bristol Veterinary School for the last 15 years. She has recently designed and implemented the new Professional Studies course for the Bachelor of Veterinary Science programme at Bristol University.

Fiona Brown, MA, BSc, is Liaison Librarian, Veterinary Medicine, Veterinary Library, Royal (Dick) School of Veterinary Studies. Interests include information literacy, scholarly communication, and historical veterinary library collections.

Marshall Dozier, MSc, LISdip, is Academic Liaison Director, Medicine and Veterinary Medicine and Senior Liaison Librarian, Medicine, Main Library, University of Edinburgh. Interests include systematic review methods, information literacy, and e-learning.

Four of the review team (SR, SB, FB and MD) have successfully collaborated on a previous BEME review[4].

10. Conflict of interest statement
There are no conflicts of interest to report. Two members of the review team (SMR and SB) have published a recent paper in the field[3] which is expected to be included in the review. No financial support is declared.

11. Plans for updating the review
The rate of change within the field suggests need for a further review or update within approximately 5 years. It is also hoped that within that period, follow-up studies will be completed to provide fresh evidence of the influence of graduate competences at the higher levels of Kirkpatrick's hierarchy (i.e. in the behaviour or results of graduates in the workplace).

12. References cited
1. Royal College of Veterinary Surgeons (RCVS) Day and Year 1 Competences http://www.rcvs.org.uk/document-library/day-and-year-one-competences/
2. North American Veterinary Medical Education Consortium (NAVMEC) Roadmap for Veterinary Medical Education in the 21st Century: Responsive, Collaborative, Flexible http://www.aavmc.org/data/files/navmec/navmec_roadmapreport_web_booklet.pdf
3. Rhind SM, Baillie S, Kinnison T, Shaw DJ, Bell CE, Mellanby RJ, Hammond J, Hudson NPH, Whittington RE, Donnelly R. (2011). The transition into veterinary practice: Opinions of recent graduates and final year students. *BMC Med Educ*, doi:10.1186/1472-6920-11-64
4. Rhind SM, Baillie S, Brown F, Hammick M, Dozier M (2008). Assessing Competence in Veterinary Medical Education: Where's the Evidence? *J Vet Med Educ*, 35(3): 407-411.
5. Cake M, Rhind SM, Baillie S (2013) The Need for Business Skills in Veterinary Education: Perceptions versus evidence. In: *Veterinary Business & Enterprise*, Ed. C Henry, to be published by Elsevier, September 2013

Appendix 1   **Proposed Coding Sheet**

A.	Number [in this study]				
B.	Other code/reference [eg. DOI]				
C.	Author(s)				
D.	Year of publication				
E.	Title				
F.	Journal				
G.	Vol / Issue / Pages	vol	issue		pg

H.	Region of origin	1 2 3 4 5 6	US Canada UK Rest of Europe (record country)……………………… Australia/NZ Other (record country)……………………………..........
I.	Country of origin (if not noted above)		

J.	Type of publication:	1 2 3 4 5 6	Journal article (peer reviewed) Conf. paper / proceedings Letter Comment Editorial Non-peer reviewed article	7 8 9 10 11 12	Book chapter Thesis Published report Online report Grey literature Other

K.	Source	1 2 3 4 5	Primary database search Secondary database search Internet / Google search Hand search Ancestral search from cited refs
L.	In **veterinary** domain?	1 2 3 4	Entirely Predominantly Partially [→ EXCLUDE from analysis, for discussion only] No [→ EXCLUDE]
M.	Provides **original evidence** that one or more non-technical attributes/competences are important to the success of graduate veterinarians?	1 2 3 4 5	Yes – evidence of stakeholder **perception** Yes – evidence of **benefit** to graduate in practice No – opinion + cited evidence only No – opinion only, cites no evidence No – irrelevant
N.	Level of evaluation	1 2 3 4 5	Title only (unnecessary/unable to source abstract) → reject Abstract only → reject Skim read full article → reject Full reading → reject Full reading → accept

O.	1st Reviewer	1 MC	2 SB	3 SR	4 AB	5 Other……………………
P.	2nd reviewer/auditor	1 MC	2 SB	3 SR	4 AB	5 Other……………………
Q.	Review history					

	EXCLUDED SOURCES		
	R.	Competence domain	
	S.	Contains a list?	
	T.	References for follow-up	
	U.	Excluded - other notes	
STUDY DETAILS			

V.	Type of study	1 2 3 4	Survey Focus group Workshop / structured consensus Expert opinion	5 6 7 8	Action-based Observational Case study Other *(note below)*
W.	Type of study – notes				

X.	Stated/implied aims of study			
Y.	Size of study population			
Z.	Response rate (for survey)			
AA.	Wording of survey question(s)			
AB.	Career stage referenced	1 2 3 4	Refers to new graduate/Day 1 level Refers to recent graduate/Year 1 level Refers to veterinarians in general Not described	
AC.	Measure used (eg. Likert scale, % agree etc.)			
AD.	Stakeholder category(s)	1 Junior undergraduates 2 Senior undergraduates 3 Recent graduates (>3 yrs) 4 Veterinarians	5 Employers 6 Academy / faculty 7 Professional bodies 8 Clients	
AE.	Stakeholder group – notes (eg. years since graduation)			
AF.	Cohort comparison	1 None 2 Gender effect 3 Student versus veterinarians 4 Clients versus veterinarians 5 Other *(note below)*		
AG.	Cohort comparison - notes			
AH.	Nature of evidence	1 Rating/ranking by stakeholder(s) 2 Structured consensus process 3 Effect on grad-level outcome 4 Effect on employability	5 Transition to practice 6 Effect on education Effect 7 on patient care 8 Other	
AI.	Nature of evidence – notes			
AJ.	Perceived importance	1 Not measured 2 rating/ranking of mixed attributes (technical / non-technical) 3 rating/ranking of multiple non-technical attributes	4 Rating of non-technical attribute(s) within specific domain 5 Structured consensus with ranking 6 Structured consensus without ranking	
AK.	Level of evidence - adapted Kirkpatrick hierarchy	1 GA affects reaction (e.g. thinks GA important) 2 GA affects skills or knowledge	3 GA affects behaviour 4a GA affects professional practice 4b GA benefits patients	
AL.	Appropriateness of study design		Poor 1 2 3 4 5 Excellent	
AM.	Appropriateness of study implementation		Poor 1 2 3 4 5 Excellent	
AN.	Appropriateness of study analysis		Poor 1 2 3 4 5 Excellent	
AO.	Bias in design or sampling	1 Minimal 2 Some/possible 3 Biased		
AP.	Notes on study design implementation, analysis etc.			
AQ.	Strength of evidence	1 Weak 2 Ambiguous; a trend 3 Sufficient evidence; conclusions probably supported 4 Clear evidence 5 Very strong or unequivocal evidence		
AR.	Notes on evidence			
AS.	Key/standout conclusions (in relation to importance of GAs)			
AT.	Any other notes			