

# Alignment between veterinary education and veterinary practice

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## *Abstract*

*The perception of alumni from curriculum 1995 and curriculum 2001 at the Faculty of Veterinary Medicine Utrecht was studied as well as an adjustment of the existing questionnaire was made. Questionnaires were sent out to alumni from C'95 and C'01 from 2011 until 2013. One hundred and twenty-nine questionnaires were completed and results showed that all competencies were important for their daily activities as a veterinarian. The amount of time spent on the competencies during veterinary education was considered enough for "collaboration" and "health and welfare", too much for "scholarship" and too little for "veterinary knowledge and skills" and "entrepreneurship". The competence "communication" was also considered underrepresented in both curriculum and also primary care cases were pointed out as underrepresented in both C'95 and C'01. Comparison of C'95 and C'01 came up with one significant difference in favor of C'95 which suggests that taking an X-ray was less (well) taught in C'01, but sample size was insufficient. There has been little improvement reforming C'95 to C'01, but caution has to be taken in this conclusion because of low number of responses. The questionnaire only differed from the competency framework and AVMA demands on three points which made adjustment of the questionnaire possible with only slight changes.*

## **Introduction**

The veterinary profession is constantly changing because of the ongoing shifts in demand from society and the professional field. The veterinary profession has changed from veterinarians that took care of horses for transportation and warfare, to caretaking of food production and today's ambassador for companion animals. Furthermore, the emergence of new diseases is occurring every eight months and some of them are of zoonotic nature, giving the veterinarian a public health function as well(1). The image of the veterinarian is changing in time and therefore, it is important that veterinary education also changes in time, to be able to educate veterinarians that are up to modern standards. In the Netherlands, veterinary education was adapted numerous times during the past 30 years, partly due to the demands in the field and society. From a more teacher-centered curriculum in 1982 to a more student-centered curriculum in 1995, followed by curriculum 2001 and the current curriculum (bachelor-master) introduced in 2007. First changes were made due to a recommendation, made by the reports from Pew National Veterinary Education Program in 1988 and EAEVA (European Association of Establishments for Veterinary Education) in 1990, to shift to more independent learning. These organizations consisted of collaborating countries with veterinary education founded to improve education of veterinarians (2-4). Moreover, Dutch research released a final report in 1988 with recommendations for future change in the curriculum, supporting the European and worldwide reports (5). While changing the curriculum of veterinary education the need to evaluate became more and more important. Nowadays accrediting organizations such as the AVMA (American Veterinary Medical Association) demand regular evaluation of veterinary curricula to ensure quality and continue improvement of veterinary education.

A way of evaluating education, which can provide faculties with information they need to change their curriculum, is by sending out surveys. These surveys can be sent to alumni, and also to other stakeholders of veterinary education. Alumni survey research uses alumni retrospective views on their training to gather valuable information about the quality of education from the users' perspectives (9). It gives faculties an opportunity to evaluate the achievement of educational goals and to find gaps in the curriculum that alumni discover in professional practice. It also provides the faculty with information about employment status and transition from university to work. Because feedback from

alumni is always based on education from a single institution and single curriculum, results can only be used to evaluate education on that certain faculty. If alumni survey research is done regularly, it could enable faculties to continue improvement of their curriculum design and enhance the competence of their alumni. This, together with the demands from accrediting organizations, gave rise to research evaluating the veterinary education on faculties all over the world (6-9).

Several faculties worldwide have used surveys that were sent out to their alumni to evaluate their curriculum. A study in England and Ireland showed that while overall appreciation of education by alumni was good, certain elements of the curriculum were in need of some improvement. Business management was one of the elements that was underrepresented in their education, where farmed fish and deer medicine was proclaimed overrepresented (6). At Tufts University School of Veterinary Medicine (TUSVM) alumni, veterinary employers and employees of the faculty were asked to fill in a survey with the aim to compare opinions of different stakeholders. Employees of the faculty had several significantly different opinions as compared to both alumni' and veterinary employers' opinions. Ethics were pointed out as important and underrepresented in the curriculum, whereas the average opinion of the faculty employees was that ethics were less important and maybe therefore less included in the curriculum. Also business management was considered to be underrepresented in Tufts Universities curriculum by alumni and veterinary employers as well (7). The Ontario Faculty of Veterinary Medicine put out a survey for alumni 7 or 10 months after graduating and concluded that overall, all alumni were capable doing their jobs. However, alumni working with horses and exotic animals were clearly less satisfied with their capabilities. The topic where alumni felt least certain about was business management (financial management) (8).

In the Netherlands a comparison was made by Jaarsma et al. (9) between two very different curricula; C'82 was a teacher-centered educational program, where C'95 was student-centered. Alumni from C'82 and C'95 both scored their training as satisfactory but some competencies scored significantly higher in C'95, such as clinical knowledge and skills, communication and academic skills.

Underrepresented topics in both curricula were business management followed by communication with clients, primary care cases and practical skills. A study supporting this research put up a competency framework for which different stakeholders were asked what they thought would be the qualities of the professional veterinarian. This framework, based on 7 domains, serves as a guideline for competencies and educational goals. One of the domains is entrepreneurship, where competencies as business management and planning belong, a competency alumni felt had been underrepresented in their veterinary training (10).

After the first alumni survey done by jaarsma et al. (9), the Faculty of Veterinary Medicine at Utrecht University, sent out a questionnaire in 2011, 2012 and 2013 to alumni 2 and 5 years after graduation. Since the study by Jaarsma et al. the educational program has changed another two times. The questionnaire that was used to collect this data has not been changed over time. Thus, there is a possibility that the questionnaire is not up to date, to comply with the developments made in veterinary education, such as the new competency framework.

This study will focus on alumni from C'95 and C'01 and their opinions about their veterinary education. Furthermore, the questionnaire will be compared to the new competency framework and the changes in perceptions about competencies relevant for the veterinary professional to provide future research with an adapted questionnaire. The main objective of this study is:

- Find out whether or not alumni of C'95 and C'01 feel sufficiently prepared for veterinary practice and if there are differences between C'95 and C'01.

The alternate objectives of this study were:

- Assessing the existing questionnaire in the light of a changing profession and a new focus on competencies in veterinary training and whether or not the questionnaire is therefore still a sufficient instrument to perform alumni survey research
- Find out if the questionnaire is able to provide information needed to comply with demands made by the accrediting organization (AVMA).

## Methods

### Context

This study was conducted at the Faculty of Veterinary Medicine, Utrecht University, Netherlands. For the current study data of questionnaires taken in the years 2011 until 2014 was available. The questionnaire was not changed, apart from some minor adjustments like a change in answering possibilities from percentages to a five-point Likert scale, since first used in 2001. After analyzing the data from the questionnaire, veterinarians from C'01 and C'07 were approached by e-mail and telephone for further discussion about the results.

### Survey instrument

The questionnaire developed in 2001 by Jaarsma et al. (9), was used to question alumni from 2011 until 2014. Names and email-addresses were recorded in the electronic database of the Royal Dutch Veterinary Society (KNMvD). Alumni 2 and 5 years after graduating received an email explaining the aims of this study and were assured the information would be confidential. Four and 8 weeks after the initial email, a reminder was sent to non-responders.

The questionnaire consisted of 26 multiple choice and open-ended questions about general information such as year of graduation, current and past work experience, internships during education, transition to work and the chosen track during the curriculum. Fifty-eight Likert scale (three-point or five-point scale) and open-ended questions are about competencies that have been, or not been, acquired during education. Twenty-four items asked about specific competencies relating to clinical knowledge and skills and practical/technical skills. Thirty-four items were pertained to generic competencies relating to communication and collaboration (9 items), entrepreneurship and management (8 items), scholarship (4 items), health and welfare (4 items) and personal development (9 items). Seven three-point Likert scale questions were about the amount of attention paid to these competencies and 7 five-point Likert scale questions about the importance of them. Two open-ended questions addressed the topics alumni felt had been over- or under-represented in the curriculum. Two questions asked the alumni to rate their overall satisfaction with their training and their career on a scale from 1 to 10. Because of minor differences in answering possibilities in 2 of the questions, an assumption had to be made to be able to compare the results. The assumptions consisted of converting answers from one question's possibilities 0%, <5% and 5-19% to little/none, 20-39%, 40-59% and 60-79% to regularly and 80-95% or >95% to (very) often. The other question's answers were converted from 0% and 0-25% to little/none, 25-50% and 50-75% to regularly and 75-100% to (very) often.

### Subjects

From 2011 until 2013 alumni, 2 and 5 years after graduating, were asked to complete a questionnaire. The alumni had either completed the '95 or the '01 curriculum. Both curricula had a six-year program. Because it is not uncommon that students take longer than 6 years to graduate and it was possible to finish the C'95 program while C'01 students had already started, in 2011 and 2012 questionnaires from students from C'95 were still available. The students from C'95 would have graduated in 2006 or 2007 and would consequently almost all be students that took longer than the planned 6 years to graduate. Furthermore, for the discussion after the analysis of the questionnaires also alumni from C'07 (the current curriculum) were approached to check if the findings from the questionnaire were still relevant for today's education.

### Data analysis

The data were entered into Microsoft Office Excel sheets, in which first calculations were made. Averages per item were calculated to get an overall reflection on both curricula, after which the curriculum averages from C'95 and C'01 were calculated separately to be able to compare them with each other. For the three-point Likert scale question a mean score of <1.8 and >2.1 was considered unsatisfactory and mean scores between 1.8 and 2.1 considered satisfactory. For the five-point Likert scales <3.0 was considered unsatisfactory, a score between 3.0 and 3.5 was considered indicative of a need for improvement and a score of >3.5 was considered satisfactory. Further analysis was done using SPSS 20.0. T-tests were used to test significant differences per item between curriculum '95 and

'01. Cronbach's Alpha was used to assess homogeneity among items before categorizing by competency. Alpha levels higher than 0,80 were considered as groups of questions forming an average for the competence with sufficient consistency. After analysis calculations on sample size per question were done using a formula for continuous variables, to make sure sample sizes were sufficiently large enough (11). The used sample size, standard deviation and level of significance were needed to calculate the number of responses needed for each individual question.

## Results

One hundred and twenty-nine Alumni, 2 and 5 years after graduating, completed a questionnaire that was sent out to 306 alumnus in the years 2011 until 2014. Forty of the questionnaires collected were from alumnus 5 years after graduating in curriculum 1995. Sixty-two of the questionnaires collected were from alumnus 2 years after graduating in curriculum 2001 and 22 questionnaires collected were from alumnus 5 years after graduating in that same curriculum. One questionnaire was filled in by an alumnus that graduated in the bachelor/master curriculum that followed the 2001 curriculum; this questionnaire was excluded from the results. Four questionnaires returned empty and were also excluded from the results. One hundred and twenty-four questionnaires remained. Because not all respondents answered all items, the numbers of responses (n) per item are given in the tables. Furthermore, the calculated desired sample sizes are also given in the tables (SS). Because of the lack of questionnaires from curriculum 1995 alumnus 2 years after graduating, the comparison made in this study was between alumni from curriculum '95 and '01, 5 years after graduating. Results of the questionnaires completed by the 2001 curriculum alumnus 2 years after graduating were used for overall assessment of the educational programs (not in comparison with C'95). Of the 3 times questionnaires were sent out response rates were 40,8%, 39,0% and 50,7% from year '11-'12, '12-'13 and '13-'14 respectively. Of all 125 respondents included in the study, 32,8% was C'95 alumni and 67,2% was C'01 alumni. Of all respondents 63 (50,4%) alumni graduated 5 years before completing the questionnaire of which 65% in C'95 and 35% in C'01. 62 (49,6%) alumni graduated 2 years before filling in the questionnaire, all of them graduated in C'01. The competencies are divided in a group called the "specific" competencies which contains items that are traits of the veterinarian and which are not relevant for other professions. The other group, called the "general" competencies, contains items that can be important for more professions than only the veterinary profession.

### Demographics

Of the total of 116 participants that answered the question: 'what is your gender', 70,7% were female. In C'95, 80,6% was female, whereas in C'01 70% was female (no significant difference). The mean age was 32 years in C'95 and 32,29 years in C'01. There was a significant difference in the time it took alumni to finish their education between C'95 (7,6 years) and C'01 (6,9 years). No comparison could be made between track choices of the two curricula because the faculty changed track choices from 8 to 6 different tracks.

### Positions and careers after graduation

Most of the alumni (77,4%) were in private practice, 7,3% worked or were in specialty training at Utrecht University, 8% had jobs in veterinary public health, 0,8% in education, 13,7% of the alumni were active in other veterinary jobs and 2,4% was still unemployed. The ratio of alumni working in private practice to alumni working in other positions was 85% to 15% in C'95 and 86,4% to 13,6% in C'01. Alumni of C'95 and C'01 were equally satisfied with their careers, giving an average of 7,56 and 7,90 respectively on a scale of 1 to 10 (no significant difference).

### Overall assessment (regardless of Curriculum)

Tables 2 ("specific" competencies) and 3 ("general" competencies) present the scores per item regardless of curriculum or year after graduating (both C'95 and C'01, 2 and 5 years after graduating). Entrepreneurship and management is the lowest scoring competence followed by health and welfare. Highest scoring competence, and only competence considered in need of improvement, is scholarship.

6 Items (10,3%) scored a mean score of higher than 3,50, most of them were in the competence “clinical and practical knowledge and skills” (5 items). 33 Items (56,9%) scored a mean score lower than 3,00. 19 Items (32,8%) scored a mean score between 3,00 and 3,50. Mean scores and SD of answers to the question: “how much time was spend on the following competencies during veterinary training on a three-point Likert scale (1=Too little, 2=Enough and 3= Too much)” are presented in table 4 (N=120). The same is done for the question: “What is the importance for the following competencies for your daily activities on a five-point Likert scale (1= not important at all until 5= very important)” in table 5 (N=120). Scholarship is the highest scoring competence when it comes to the amount of time spend during veterinary training, where it is second lowest scoring competence when it comes to importance for daily veterinary activities. Entrepreneurship is the lowest scoring competence for both time spend during veterinary training and importance to daily veterinary activities. Thirty-four questions had a sufficient sample size of which 11 in the “specific” competencies and 23 in the “general” competencies.

“Specific” Competencies	Items	N	Mean	SD	SS
	<i>Veterinary training sufficiently prepared me to:</i>				
<b>Clinical and practical knowledge and skills</b>		<b>122</b>	<b>2,93</b>	<b>0,65</b>	
<b>1</b>	Detect a veterinary problem	122	3,73	0,74	93
<b>2</b>	Do a full anamnesis	122	3,97	0,71	86
<b>3</b>	Perform a physical examination	122	3,98	0,73	90
<b>4</b>	Translate observations into an examination and treatment plan	122	3,59	0,76	100
<b>5</b>	Make a diagnosis	122	3,58	0,76	98
<b>6</b>	Make a treatment plan considering public health, animal health and animal welfare	122	3,19	0,88	132
<b>7</b>	Take preventive measures	122	3,19	0,79	108
<b>8</b>	Give a prognosis	122	2,83	0,82	116
<b>9</b>	Manage to complete a consult in preset time	122	2,23	0,95	156
<b>10</b>	Make use of treatments responsibly	122	3,15	1,02	179
<b>11</b>	Perform simple blood diagnostics	122	3,12	0,85	123
<b>12</b>	Perform simple laboratory work	122	3,19	0,78	105
<b>13</b>	Perform fertility work	122	2,61	0,87	129
<b>14</b>	Perform ultrasounds	122	2,01	1,00	172
<b>15</b>	Perform x-rays	122	1,98	0,91	141
<b>16</b>	Perform first line surgery	122	1,76	0,83	118
<b>17</b>	Refer patients when needed	122	3,36	0,77	101
<b>18</b>	Euthanize an animal of the followed species track	122	3,02	1,13	219
<b>19</b>	Euthanize an animal of the other specie tracks	122	2,09	0,90	138
<b>20</b>	Perform an emergency slaughter	122	2,68	1,12	215
<b>21</b>	Assay animals, animal transport and animal slaughter	122	2,28	1,01	174
<b>22</b>	Perform first aid on an animal of the chosen species track	122	3,44	0,87	130
<b>23</b>	Perform first aid on an animal of the other specie tracks	122	2,32	0,82	113
<b>24</b>	Analyze business management	122	2,93	1,10	205

**Table 2** Mean score and SD on a 5-point Likert scale (1= poorly prepared, 5= very well prepared) for the "specific" competencies acquired during training. N= number of responses per competence or item. SS= desired sample size per item.

<b>“General” competencies</b>	<b>Items</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>SS</b>
	<i>Veterinary training sufficiently prepared me to:</i>				
<b>Communication and collaboration</b>		<b>121</b>	<b>2,86</b>	<b>0,42</b>	
<b>1</b>	Pay attention to client’s wishes	121	3,19	0,82	114
<b>2</b>	Give clear explanation to clients	121	3,16	0,83	119
<b>3</b>	Breaking bad news	121	2,79	0,89	134
<b>4</b>	Calm down a client	121	2,50	0,89	136
<b>5</b>	Put up a network	121	2,44	0,98	165
<b>6</b>	Communicate and collaborate with colleagues	121	3,43	0,77	103
<b>7</b>	Give efficient instructions to colleagues and personnel	121	2,32	0,92	144
<b>8</b>	Refer patients to colleagues	121	3,33	0,83	117
<b>9</b>	Communicate on a higher level with representatives of different veterinary fields	121	2,55	1,03	183
<b>Entrepreneurship and management</b>		<b>121</b>	<b>2,38</b>	<b>0,57</b>	
<b>1</b>	Work with protocols	121	3,43	0,91	140
<b>2</b>	Plan daily work	121	2,98	0,89	135
<b>3</b>	Give clients a pricing	121	2,15	0,79	107
<b>4</b>	Manage pharmacy and supplies	121	2,53	0,90	137
<b>5</b>	Manage a practice/business	121	2,17	0,84	121
<b>6</b>	Create policies for the practice	121	2,09	0,86	126
<b>7</b>	Negotiate prices and costs	121	1,66	0,66	75
<b>8</b>	Sell veterinary knowledge	121	2,05	0,83	118
<b>Scholarship</b>		<b>121</b>	<b>3,18</b>	<b>0,68</b>	
<b>1</b>	Search and make use of scientific literature	121	4,00	0,76	100
<b>2</b>	Perform a scientific research	121	3,47	0,77	101
<b>3</b>	Train other people	121	2,59	0,90	137
<b>4</b>	Educate other people	121	2,66	0,99	167
<b>Health and welfare</b>		<b>121</b>	<b>2,82</b>	<b>0,17</b>	
<b>1</b>	Asses quality programs in the light of public health	121	2,84	0,77	103
<b>2</b>	Guard animal welfare	121	3,05	0,73	92
<b>3</b>	Act professional in case of infectious animal diseases	121	2,75	0,80	110
<b>4</b>	Balance different interests in relation to public health, animal health, animal welfare and practice management in a responsible manner	121	2,64	0,78	103
<b>Personal development</b>		<b>121</b>	<b>2,93</b>	<b>0,37</b>	
<b>1</b>	Deal with responsibilities	121	2,80	0,86	127
<b>2</b>	Deal with stress	121	2,39	0,91	140
<b>3</b>	Have faith in your abilities and skills	121	2,66	0,95	155
<b>4</b>	Acknowledge your own limits in knowledge and skills	121	3,25	0,87	129
<b>5</b>	Work on gaps in knowledge and skills	121	3,41	0,83	119
<b>6</b>	Cope with and admit mistakes	121	2,90	0,88	132
<b>7</b>	Be open to receive feedback	121	3,32	0,92	146
<b>8</b>	Give feedback	121	3,13	0,95	154
<b>9</b>	Handle conflict	121	2,52	0,89	135

Table 3 Mean score and SD on a 5-point Likert scale (1= poorly prepared, 5= very well prepared) for the "general" competencies acquired during training. N= number of responses per competence or item. SS= desired sample size per item.

Competency	N	Mean	SD	SS
Veterinary knowledge and skills	120	1,65	0,48	109
Communication	120	1,50	0,52	128
Collaboration	120	1,79	0,48	111
Entrepreneurship	120	1,28	0,47	103
Scholarship	120	2,22	0,51	121
Health and welfare	120	1,94	0,51	122
Personal development	120	1,63	0,55	143

Table 4 amount of time spend on different competencies during veterinary training (mean and SD) on a three-point Likert scale 1 = too little 2 = enough 3 = too much. N= number of responses per competence. SS= desired sample size per item.

Competency	N	Mean	SD	SS
Veterinary knowledge and skills	120	4,34	0,95	154
Communication	120	4,79	0,47	37
Collaboration	120	4,34	0,57	56
Entrepreneurship	120	3,41	0,85	122
Scholarship	120	3,45	0,89	134
Health and welfare	120	3,78	0,70	84
Personal development	120	4,21	0,61	63

Table 5 Importance of competencies for daily activities (mean and SD) on a five-point Likert scale 1 = not important at all 5 = very important. N= Number of responses per competence. SS= desired sample size per item.

### Competencies acquired during veterinary training

Table 6 represents the results for the “specific” competencies and table 7 represents the results for the “general” competencies. Performing x-rays’ was scored significantly different between the two curricula and in favor of C’95. No competency scored higher than 3.5 average (considered satisfactory) in both curricula. However 5 items (20,83%) in the “specific” competencies and 2 items (5,88%) in the “general” competencies had an average of >3.5 (considered satisfactory). 12 Items (50%) in the specific competencies and 24 items (70,59%) in the “general” competencies had an average of <3.00 (considered unsatisfactory). One item in the section “general” competencies was considered unsatisfactory in C’95, but in need of improvement in C’01. This leaves 7 items (29,17%) in the “specific” competencies and 8 questions (23,53%) in the “general” competencies with an average score between 3.00 and 3.50 (considered in need of improvement). Highest scoring competency was scholarship followed by clinical and practical knowledge and skills. Highest scoring item was ‘search and make use of scientific literature’ scoring 4,03 and 4,00 for C’95 and C’01 respectively. Lowest scoring competency in both curricula is ‘entrepreneurship and management’ followed by ‘health and welfare’. Lowest scoring item for both curricula is ‘negotiate prices and costs’ with an average of 1.60 for C’95 and 1.50 for C’01. Outcomes of the sample size calculations suggest that in the comparison of C’95 to C’01 only the question: “on a scale of 1 to 5 (1 being not important, 5 being very important) how important is communication for your daily activities?” had a sufficient sample size.

“Specific” Competencies	Items	N '95	Mean '95	SD '95	SS '95	N '01	Mean '01	SD '01	SS '01	Alpha
	<i>Veterinary training sufficiently prepared me to:</i>									
<b>Clinical and practical knowledge and skills</b>		<b>24</b>	<b>2,90</b>	<b>0,66</b>		<b>24</b>	<b>2,87</b>	<b>0,74</b>		<b>0,99</b>
<b>1</b>	Detect a veterinary problem	38	3,66	0,85	123	20	3,80	0,62	65	
<b>2</b>	Do a full anamnesis	39	4,00	0,69	81	20	3,90	0,85	124	
<b>3</b>	Perform a physical examination	38	3,89	0,73	90	20	4,10	0,64	70	
<b>4</b>	Translate observations into an examination and treatment plan	40	3,53	0,82	114	20	3,70	0,73	92	
<b>5</b>	Make a diagnosis	39	3,56	0,79	106	20	3,65	0,75	95	
<b>6</b>	Make a treatment plan considering public health, animal health and animal welfare	38	3,16	0,89	134	20	3,20	1,01	173	
<b>7</b>	Take preventive measures	39	3,36	0,63	67	20	3,05	0,83	116	
<b>8</b>	Give a prognosis	39	2,77	0,81	112	20	2,75	0,79	106	
<b>9</b>	Manage to complete a consult in preset time	37	2,27	0,96	158	20	2,25	0,91	142	
<b>10</b>	Make use of treatments responsibly	38	3,13	0,99	168	20	3,10	1,02	178	
<b>11</b>	Perform simple blood diagnostics	38	3,29	0,98	154	21	3,33	0,80	108	
<b>12</b>	Perform simple laboratory work	38	3,34	0,88	132	21	3,38	0,74	93	
<b>13</b>	Perform fertility work	36	2,64	0,90	138	20	2,40	0,82	115	
<b>14</b>	Perform ultrasounds	36	1,89	0,89	134	20	1,90	0,85	124	
<b>15</b>	Perform x-rays	36	2,53	0,81	112	18	1,61*	0,85	123	
<b>16</b>	Perform first line surgery	37	1,86	1,03	182	20	1,65	0,59	59	
<b>17</b>	Refer patients when needed	37	3,35	0,82	116	19	3,32	0,75	96	
<b>18</b>	Euthanize an animal of the followed species track	38	2,68	1,19	241	20	2,95	1,05	188	
<b>19</b>	Euthanize an animal of the other specie tracks	37	2,11	0,97	159	19	1,95	0,97	161	
<b>20</b>	Perform an emergency slaughter	30	2,07	1,01	176	16	2,69	1,14	221	
<b>21</b>	Assay animals, animal transport and animal slaughter	29	1,90	0,94	151	16	2,25	1,13	216	
<b>22</b>	Perform first aid on an animal of the chosen species track	37	3,38	0,79	108	20	3,35	1,14	221	
<b>23</b>	Perform first aid on an animal of the other specie tracks	36	2,53	0,88	132	18	2,17	0,86	126	
<b>24</b>	Analyze business management	29	2,72	1,07	194	16	2,38	1,31	293	



**Table 6 Mean score and SD of C'95 and C'01 on a 5-point Likert scale (1= poorly prepared, 5= very well prepared) for the "specific" competencies acquired during training. N= number of responses per competence or item. SS= desired sample size per item. Cronbachs Alpha levels were calculated to ensure homogeneity in the groups (alpha's higher than 0,80 are sufficient). \* = Significant differences (P<0,01).**

<b>“General” competencies</b>	<b>Items</b>	<b>N ‘95</b>	<b>Mean ‘95</b>	<b>SD ‘95</b>	<b>SS ‘95</b>	<b>N ‘01</b>	<b>Mean ‘01</b>	<b>SD ‘01</b>	<b>SS ‘01</b>	<b>Alpha</b>
	<i>Veterinary training sufficiently prepared me to:</i>									
<b>Communication and collaboration</b>		<b>9</b>	<b>2,79</b>	<b>0,42</b>		<b>9</b>	<b>2,71</b>	<b>0,47</b>		<b>0,98</b>
<b>1</b>	Pay attention to client’s wishes	40	3,10	0,78	103	20	3,05	0,69	80	
<b>2</b>	Give clear explanation to clients	40	3,03	0,83	118	20	3,05	0,69	80	
<b>3</b>	Breaking bad news	39	2,87	0,95	154	20	2,50	1,00	171	
<b>4</b>	Calm down a client	39	2,44	0,88	133	20	2,25	1,02	177	
<b>5</b>	Put up a network	39	2,28	0,89	134	20	2,30	0,98	164	
<b>6</b>	Communicate and collaborate with colleagues	40	3,30	0,72	89	20	3,25	0,72	88	
<b>7</b>	Give efficient instructions to colleagues and personnel	40	2,20	0,88	133	20	2,10	1,02	178	
<b>8</b>	Refer patients to colleagues	39	3,26	0,91	141	20	3,35	0,81	113	
<b>9</b>	Communicate on a higher level with representatives of different veterinary fields	40	2,60	1,08	200	19	2,53	1,07	197	
<b>Entrepreneurship and management</b>		<b>8</b>	<b>2,28</b>	<b>0,59</b>		<b>8</b>	<b>2,20</b>	<b>0,65</b>		<b>0,97</b>
<b>1</b>	Work with protocols	38	3,39	1,00	171	20	3,45	0,83	116	
<b>2</b>	Plan daily work	40	2,90	0,96	156	20	2,80	0,77	101	
<b>3</b>	Give clients a pricing	39	2,10	0,79	106	20	1,80	0,83	119	
<b>4</b>	Manage pharmacy and supplies	37	2,30	0,74	94	20	2,45	0,89	134	
<b>5</b>	Manage a practice/business	38	2,11	0,73	90	20	1,90	0,91	142	
<b>6</b>	Create policies for the practice	38	1,92	0,82	114	20	1,95	0,94	152	
<b>7</b>	Negotiate prices and costs	37	1,60	0,64	71	20	1,50	0,61	63	
<b>8</b>	Sell veterinary knowledge	38	1,92	0,78	105	19	1,74	0,81	111	
<b>Scholarship</b>		<b>4</b>	<b>3,15</b>	<b>0,78</b>		<b>4</b>	<b>3,11</b>	<b>0,71</b>		<b>0,94</b>
<b>1</b>	Search and make use of scientific literature	40	4,03	0,73	92	20	4,00	0,73	90	
<b>2</b>	Perform a scientific research	40	3,58	0,71	87	20	3,35	0,81	113	
<b>3</b>	Train other people	40	2,48	0,91	140	20	2,65	0,93	149	
<b>4</b>	Educate other people	38	2,50	0,86	127	18	2,44	1,15	225	
<b>Health and welfare</b>		<b>4</b>	<b>2,66</b>	<b>0,22</b>		<b>4</b>	<b>2,63</b>	<b>0,11</b>		<b>0,94</b>
<b>1</b>	Asses quality programs	31	2,77	0,99	167	16	2,63	0,89	134	

	in the light of public health									
2	Guard animal welfare	35	2,89	0,83	118	18	2,78	0,81	112	
3	Act professional in case of infectious animal diseases	36	2,58	0,91	140	16	2,56	0,96	159	
4	Balance different interests in relation to public health, animal health, animal welfare and practice management in a responsible manner	38	2,39	0,75	97	19	2,53	0,77	102	
<b>Personal development</b>		<b>9</b>	<b>2,74</b>	<b>0,34</b>		<b>9</b>	<b>2,78</b>	<b>0,41</b>		<b>0,98</b>
1	Deal with responsibilities	40	2,78	0,95	153	20	2,45	0,83	116	
2	Deal with stress	40	2,43	0,96	157	20	2,10	0,91	142	
3	Have faith in your abilities and skills	40	2,58	0,93	148	20	2,65	0,99	167	
4	Acknowledge your own limits in knowledge and skills	40	3,08	0,86	126	20	3,20	0,89	137	
5	Work on gaps in knowledge and skills	40	3,33	0,97	161	20	3,25	0,91	142	
6	Cope with and admit mistakes	40	2,63	0,87	129	20	2,80	1,06	191	
7	Be open to receive feedback	40	2,93	0,86	126	20	3,25	1,07	195	
8	Give feedback	40	2,68	0,94	152	20	2,90	0,97	160	
9	Handle conflict	40	2,23	0,83	118	20	2,40	0,94	151	

**Table 7 Mean score and SD of C'95 and C'01 on a 5-point Likert scale (1= poorly prepared, 5= very well prepared) for the "general" competencies acquired during training. N= number of responses per competence or item. SS= desired sample size per item. Cronbachs Alpha levels were calculated to ensure homogeneity in the groups (alpha's higher than 0,80 are sufficient).**

### **Curriculum evaluation: underrepresented and overrepresented topics, desired changes in veterinary education and transition to work**

Table 8 presents the results of the question: "did veterinary education pay too little, enough or too much time on the following competencies". Number of respondents was 39 for C'95 and 20 for C'01. Entrepreneurship scored lowest averages in both curricula, meaning least amount of time was paid on that competency during veterinary training. Scholarship was the only competence that was considered satisfactory in both curricula. In C'01 health and welfare was considered to be satisfactory whereas C'95 alumni scored an average of lower than 1.8 (considered unsatisfactory). There were no significant differences between the two curricula. In comparison, alumni were asked to score all competencies on their importance for daily activities with a five-point Likert scale, 1 being not important at all, 5 being very important (table 9). All scores were > 3.50 which is considered satisfactory. Entrepreneurship had the lowest average score and communication was considered most important for daily activities.

Competency	N C'95	Mean C'95	SD C'95	SS C'95	N C'01	Mean C'01	SD C'01	SS C'01
<b>Veterinary knowledge and skills</b>	39	1,72	0,46	99	20	1,75	0,44	94
<b>Communication</b>	39	1,38	0,49	115	20	1,40	0,50	120
<b>Collaboration</b>	39	1,74	0,50	118	20	1,65	0,49	114
<b>Entrepreneurship</b>	39	1,28	0,46	99	20	1,20	0,41	80
<b>Scholarship</b>	39	2,10	0,50	120	20	2,05	0,22	24

<b>Health and welfare</b>	39	1,77	0,48	111	20	2,00	0,56	150
<b>Personal development</b>	39	1,31	0,47	104	20	1,55	0,51	124

**Table 8 amount of time spend on different competencies during veterinary training (mean and SD for C'95 and C'01) on a three-point Likert scale 1 = too little 2 = enough 3 = too much. N= number of responses per competence. SS= desired sample size per item.**

<b>Competency</b>	<b>N C'95</b>	<b>Mean C'95</b>	<b>SD C'95</b>	<b>SS C'95</b>	<b>N C'01</b>	<b>Mean C'01</b>	<b>SD C'01</b>	<b>SS C'01</b>
<b>Veterinary knowledge and skills</b>	39	4,13	1,03	181	20	4,60	0,75	97
<b>Communication</b>	39	4,82	0,39	26	20	4,90	0,31	16
<b>Collaboration</b>	39	4,41	0,55	51	20	4,40	0,60	61
<b>Entrepreneurship</b>	39	3,56	0,85	124	20	3,55	0,76	98
<b>Scholarship</b>	39	3,67	0,87	129	20	3,60	0,88	124
<b>Health and welfare</b>	39	3,74	0,64	69	20	3,85	0,81	113
<b>Personal development</b>	39	4,21	0,57	56	20	4,25	0,64	70

**Table 9 Importance of competencies for daily activities (mean and SD for C'95 and C'01) on a five-point Likert scale 1 = not important at all 5 = very important. N= number of responses per competence. SS= desired sample size per item.**

In total 79 answers were collected for the two open ended questions asking the alumni about over- and under-represented topics during veterinary training (51 from c'95 and 28 from c'01). Most common answers of the underrepresented topics for both curricula were:

1. Experience with primary cases and surgeries (14 responses for C'95 and 7 responses for C'01)
2. Communication with clients (12 responses for C'95 and 6 responses for C'01)

Other suggestions were business management (4 responses), self-management skills (time management, stress and burn-out) (6 responses) and personal development (learn from mistakes, taking initiative and work independently) (4 responses). Most common answers of the overrepresented topics for both curricula were:

1. Specialist cases (9 responses for C'95 and 4 responses for C'01)
2. Scientific research and/or science based education (6 responses for C'95 and 2 responses for C'01)

Other suggestions were education of non-track animal species (4 responses), chemistry and molecular biology (2 responses) and public health (3 responses).

The transition from university to work scored an average of 3,12 (SD 0,80) for C'95 and 2,60 (SD 1,05) for C'01 on a five-point Likert scale (1= very easy transition 5= very difficult transition) (significant difference  $P < 0,05$ ). C'95 reasons for a difficult transition were:

1. Preparation due to veterinary education (47,6%)
2. Not enough guidance from employer (38,1%)

C'01 reasons for a difficult transition were:

1. Not enough guidance from employer (43,8%)
2. Preparation due to veterinary education (37,5%)

### **Overall quality of the curriculum**

Alumni of C'95 scored the quality of their curriculum a 6,94 (SD 1,17) and alumni from C'01 a 6,75 (SD 0,79) on a scale from 1 to 10. Moreover on a five-point Likert scale question (1 = totally disagree, 5 = totally agree), asking if alumni were sufficiently educated to use practical skills and knowledge, C'95 had an average of 3,03 and C'01 an average of 3,05.

### **Questionnaire evaluation: Focus groups**

In total 377 veterinarians were approached by email and/or telephone and were asked if they were interested to take part in focus groups about the results from the questionnaire. Two hundred and eighty-three were from C'01 and 94 from C'07. Of the 283 C'01 veterinarians 161 were approached by telephone and 122 by email. In total, for C'01, 5 veterinarians were interested and available on the set dates but only 3 of them were available on the same date. Of the 94 C'07 alumni not all alumni already had a job and were therefore excluded from participation. Several veterinarians were interested

but only 3 of them were available on the set dates. Because of the low number of available participants the focus groups were canceled and no further results are available.

### Questionnaire evaluation: compliance with competency framework and AVMA demands

Table 10 and 11 presents the comparison of the used questionnaire to the competency framework and the AVMA demands (a selection of demands relevant to the current study). The competency framework matches the questionnaire apart from some small differences in specific questions. These differences can be covered with slight adjustments to the existing questions. The AVMA demands that are relevant to this study almost totally comply with the existing questionnaire, except for the selected group the survey is sent to (not to alumni 1 year after graduation).

Domain	Competency framework	Covered by questionnaire question(s)
<b>Veterinary expertise</b>	Perform veterinary activities in an adequate manner	Detect a veterinary problem Perform a full anamnesis Perform a physical examination Translate observations into an examination and treatment plan Make a diagnosis Make a treatment plan considering public health, animal health and animal welfare Take preventive measures Give a prognosis Perform simple blood diagnostics Perform simple laboratory work Perform fertility work Perform ultrasounds Perform x-rays Perform first line operations Euthanize an animal of the followed species track Euthanize an animal of the other specie tracks Perform an emergency slaughter Analyze business management
	Perform adequately in veterinary emergency situations	Euthanize an animal of the followed species track Euthanize an animal of the other specie tracks Perform an emergency slaughter Perform first aid on an animal of the chosen species track Perform first aid on an animal of the other specie tracks Calm down a client
<b>Communication</b>	Communicate effectively with clients, colleagues, other personnel, and third parties	Pay attention to client's wishes Give clear explanation to clients Breaking bad news Calm down a client Communicate and collaborate with colleagues Refer patients to colleagues Communicate on a higher level with representatives of different veterinary fields

	Establish and maintain functional relationships	Put up and maintain a network
<b>Collaboration</b>	Collaborate effectively with colleagues, practice assistants, and third parties within and outside one's own organization	Communicate and collaborate with colleagues
		Refer patients to colleagues
	Effectively guide personnel, clients, and third parties	Refer patients when needed
<b>Entrepreneurship</b>	Plan and organize one's own practice activities	Give efficient instructions to colleagues and personnel
		Work with protocols
	Plan daily work	
	Manage the pharmacy and product stock in accordance with quality standards	Manage pharmacy and supplies <b>(MISSING: Quality standards)</b>
	Efficiently contribute to business administration	Manage a practice/business
	Ensure a responsible and transparent system of quality assurance in one's professional work environment	Negotiate prices and costs
<b>Health and welfare</b>	Take responsibility in relation to public health	Work with protocols
		Create policies for the practice <b>(MISSING TRANSPARENT)</b>
	Take responsibility in relation to animal health and animal welfare	Asses quality programs in the light of public health
	Balance different interests in relation to public health, animal health, animal welfare and practice management in a responsible manner	Make a treatment plan considering public health, animal health and animal welfare
<b>Scholarship</b>	Critically appraise, use, and discuss scientific and professional publications	Guard animal welfare
		Balance different interests in relation to public health, animal health, animal welfare and practice management in a responsible manner
<b>Personal development</b>	Critically reflect on the quality of (one's own) professional activities and take action to improve it	Search and make use of scientific literature
		Perform a scientific research
		Acknowledge your own limits in knowledge and skills
		Work on gaps in knowledge and skills
	Act in accordance with appropriate standards of individual professional behavior	Cope with and admit mistakes
		Be open to receive feedback
		Deal with responsibilities
		Deal with stress
		Have faith in your abilities and skills
		Give feedback
		Handle conflict
		Be open to receive feedback

**Table 10 Comparison of the competency framework to the questionnaire. In red are mismatches between the framework and questionnaire. Each domain is divided into competencies for the competency framework. Each competency in the framework can be covered by several questions from the questionnaire.**

<b>AVMA demand</b>	<b>Questionnaire question(s)</b>
<b>employment rates of graduates (within one year of graduation)</b>	How many months did it take for you to find employment that matches your education
	In which branches were you formerly employed
	In which branch are you currently employed (is provided with the possibility to answer: "I am, and have always been, unemployed")
	<b>No questionnaires were sent to Alumni one year after graduation</b>
<b>assessments of graduating seniors; and assessments</b>	See table 6 comparing competency framework to

<b>of alumni at some post-graduation point (for example, three and/or five years post-graduation) assessing educational preparedness and employment satisfaction</b>	questionnaire
	Which subjects have been underrepresented during education
	Which subjects have been overrepresented during education
	Do you agree that your education has prepared you enough for your first employment
	On a scale of 1 to 10, how do you score your education
	On a scale of 1 to 10, how satisfied are you with your employment

**Table 11 comparison of relevant AVMA demands to the questionnaire. In red are mismatches between demands and questionnaire. Each AVMA demand can be covered by several questions in the questionnaire.**

## Discussion

The purpose of this study was to examine how alumni of two curricula evaluate their training in light of their experiences in veterinary practice 2 and 5 years after graduating. Moreover the questionnaire had to be evaluated in order to ensure an adequate and efficient survey instrument for alumni survey research in the future.

Response rates of this current study are lower than previous alumni survey research done by Jaarsma et al. (9). Discussion about the results of the comparison between C'95 and C'01 is difficult, if not impossible, because of the too small sample sizes, except for one question about communication. However, discussion about the results of the overall assessment does come up with some conclusions about veterinary education regardless of the curriculum alumni had followed.

Overall assessment of veterinary education at Utrecht University shows that all competencies are rated as important for the daily activities of the alumni. This is in line with the competency framework (10). When ranking the different competencies from 1 to 7 (1= highest score, 7=lowest score) on mean scores given by alumni on the importance of the competencies for their daily activities, the competency "communication" comes in at first place. This question was answered by 120 alumni whereas the calculated sample size needed for a reliable result was 37. This implies that communication skills are of great importance for a veterinarian. The results also show that the opinion of alumni is that education of communication skills is underrepresented in veterinary training. However, all items that had scores lower than 3,00 (table 3) in the competence "communication" did not have a sufficient sample size. Also the question if too little, enough or too much time was spend on communication during veterinary education did not have a sufficient sample size which makes conclusions about education in communication skills difficult. The competence "scholarship" scored an average score of 2,22, which is considered unsatisfactory (too much time was spend on this competence). Sample size for this question was 120 whereas the needed sample size was 121. Although the sample size does not exactly meet the needed sample size this does strongly suggest that "scholarship" is overrepresented in veterinary education. "Health and welfare" was the only competence considered educated enough (average score of 1,94) with a sample size of 120 (needed sample size was 121). The other 5 competencies scored lower than 1,8, but only the competencies "veterinary knowledge and skills", "collaboration" and "entrepreneurship" had sufficient sample sizes which suggests that these competencies received too little amount of time during veterinary education. Items 8, 16 and 23 of the competence "veterinary knowledge and skills" and items 3, 5, 7 and 8 of the competence "entrepreneurship" (table 2 and 3) support this suggestion with average scores lower than 3,00 and sufficient sample sizes.

The results of this study also show that, when comparing C'95 and C'01, there was only one significant difference between the opinions of the two curricula. The difference was in favor of C'95 which might suggest that performing an x-ray, is less (well) taught in C'01 than in C'95. The only other difference was that C'01 scored receiving feedback between 3.0 and 3.5 (considered in need of improvement) where C'95 scored the same question <3 (considered unsatisfactory). The difference was not significant, but still suggests a slight improvement in C'01. Results show that 20.83% of the questions in the "specific competencies" scored an average of >3 (considered satisfactory) and 5.88% of the questions in the "general competencies" scored an average that was considered satisfactory.

This could mean that alumni are still well prepared for the specific competency despite of more attention to general competencies during their training.

The alumni of both C'95 and C'01 pointed out "primary care cases" and "communication skills" as competencies that were underrepresented in veterinary education and of high importance for working in veterinary practice. This could be because veterinarians are expected to perform work independently, from their first day at work. This is also evident when looking at the reasons why alumni feel transition from university to work was difficult. For C'01 guidance at work was number 1 reason for the difficult transition and for C'95 it was reason number 2. This could suggest that transition from university to work is less dependent on the veterinary education for C'01 than it was for C'95 and that it was more dependent on the practice they started working after university (one with much or little/none guidance from colleagues). Nevertheless, preparation by veterinary education received an almost identical score, and is therefore probably also of great importance to a good transition.

The results from this study appear to show that there has been little improvement in reforming C'95 to C'01. Most competencies were still perceived as unsatisfactory when it comes to the amount of time spent on the competency during veterinary training. Other competencies are rated as satisfactory but later on labeled as competency that was being overrepresented in the curricula. These results are not in line with the study from Jaarsma et al. where the reformed curriculum 1995 improved significantly on several competencies in comparison with curriculum 1982 (9). However, primary care cases and communication skills were also perceived as deficiencies of veterinary education, just like in this current study. This could suggest that little is changed in the amount of time spent on these competencies during veterinary training or these competencies are of such complicated nature that veterinary education cannot prepare veterinarians enough to comply with the needed "skill-levels" for these competencies in veterinary practice. The comparison made in this study is unfortunately not very reliable because of too small sample sizes for the both curricula. However, the overall assessment (regardless of curriculum) shows some reliable results that are in line with other research done in the past suggesting that competencies like "communication" and "entrepreneurship" should receive more attention during veterinary education (6-9).

The Alternate objectives of this study are to assess the existing questionnaire. Expectations were that the questionnaire would differ from the competency framework and AVMA demands in quite a big way. However, after comparing only slight revisions seem needed to make the questionnaire comply with the competency framework and AVMA demands. For example the questionnaire missed the term quality standards when it comes to managing pharmacy and supplies. Adjusting the question to: "did veterinary education prepare you enough to manage pharmacy and supplies in a way that meets current quality standards?" would increase the compliance with the competency framework. Moreover, for the AVMA demands it seems that the selected group to which the survey is sent does not comply but when alumni answer the question "in what year did you graduate" and the question "how much relevant work experience do you have" you can easily calculate the amount of time it took the student after graduating to find a veterinary associated job and thus calculate the employment rates within one year after graduating. Besides these necessary changes, some other flaws came to light during this study. For more information about the opinions of alumni, alumni get the change to fill in their e-mail addresses at the end of the questionnaire if they are interested to be approached for additional interviews. This information is very important but it would be better if alumni could leave their telephone numbers because getting a reaction through mail has proven to be very difficult where getting a reaction by phone was far easier. One other flaw is that the response rate of the last 3 years was lower than before. It could be because of the amount of surveys sent out these days that alumni feel less obliged to fill in this particular questionnaire but it could also be because the database that is used to select the alumni for the alumni survey research (or the process of selection) is not complete/sufficient and less questionnaires are sent out.

Besides the flaws in the questionnaire this study also comes with its limitations. First of all the fact that results are based upon opinions of alumni which are always subject to some bias. This could mean that alumni who had more experience with practical cases due to extracurricular internships, or other practical experience would inappropriately attribute this to the education they had. Also all alumni are different and some people can have better communication skills by nature making it easier to educate these people and make them improve their skills even more. Furthermore, this study only focused on

the opinion of alumni whereas other studies (8) also questioned employers and teachers. This could give better insight in the preparation of students by veterinary education at the Faculty of Veterinary Medicine Utrecht for veterinary practice. Moreover, the study failed to organize focus groups because of a too low number of available participants. One other Dutch study showed that it is possible to organize such focus groups (10) and the reason why it failed to succeed this time remains unknown. Perhaps it is easier to organize the focus groups in a few years when more C'07 alumni have jobs and connections with their still studying fellow veterinarians are still intact. The results of this study offer Utrecht University some topics where improvement seems necessary. Although changes are made regularly and new curricula have been developed in the past 20 years it seems that competencies such as communication and entrepreneurship are still underrepresented in the educational program. Because the new curriculum (bachelor-master) has revised its program it is very important to repeat the current study to find out if and how the education of veterinarians in the Netherlands has improved over the past few years. The alternations to the questionnaire also provide future research with a more sufficient survey instrument.

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