European College of Bovine Health Management

Certifying Examination

Job Task Analysis Report 2022

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Executive Summary

In May 2021, the European College of Bovine Health Management (ECBHM) conducted a Job Task Analysis study to define the role of a board-certified specialist in Bovine Health. The ECBHM worked with Veterinary Specialty Exams, LLC (VSE) to develop and conduct the Job Task Analysis study that would describe the knowledge requirements of competent Diplomates. Results of the Job Task Analysis study provide the basis for making a valid claim of appropriate test score inference.

The ECBHM appointed a committee of Subject Matter Experts (SMEs) to provide content expertise. The committee consisted of 6 members with diverse specializations, areas of employment and geographic locations. The Committee spent considerable time discussing the knowledge and skills required of a day-one ready Diplomate. These elements were used to create a new framework that consisted of 110 competencies organized into 23 content areas.

The new framework was used to develop an online survey. The survey contained multiple scales to rate each competency required of board-certified specialists in Bovine Health. ECBHM also included several demographic questions to gather confidential data describing the survey respondents. VSE administered the survey instrument using the Qualtrics XM® platform.

The ECBHM Board sent an email invitation to take the survey to the entire ECBHM listserv, which included 164 Diplomates. Out of the 161 individuals who received invitations, 97 participated in the survey, for a response rate of 60.2%. Approximately 52% of the respondents indicated that the survey completely covered the important knowledge areas required to be a Bovine Health Diplomate, while approximately 48% felt that it did so adequately.

VSE conducted three follow-up webinars, using Zoom web conferencing, to review the survey results and all comments from the respondents. The goal of these meetings was to establish exclusion criteria to differentiate between the important and unimportant competencies, based on respondents' ratings. The committee finalized the list of competencies and established domain weights, which will serve as the new blueprint for the examination. Adoption of the content outline and the examination blueprint establishes the link between the competencies necessary to become a board-certified specialist in Bovine Health and successful performance on the certifying examination.

Introduction

Survey Overview: The Content Validation Model

The foundation of a valid, reliable, and legally defensible professional certification program is a well-constructed Job Task Analysis study. The Job Task Analysis study establishes the link between test scores achieved on certification exams and the competencies being tested. Therefore, pass or fail decisions correlate to competent performance. When evidence of validity based on examination content is presented for a specific professional role, it is critical to consider the relative importance of the competencies being tested. *The Joint Standards for Educational and Psychological Testing (AERA, APA, and NCME, 2014)* state:

> Standard 14.10
> When evidence of validity on test content is presented, the rationale for defining and describing a specific job content domain in a particular way (e.g., elements, knowledge, skills, abilities or other personal characteristics) should be stated clearly.

> Standard 14.14
> The content domain to be covered by a credentialing test should be defined clearly and justified in terms of importance of the content for the credential-worthy performance in an occupation or profession. A rationale should be provided to support a claim that the knowledge or skills being assessed are required for credential-worthy performance in an occupation and are consistent with the purpose for which the licensing or certification program was instituted.

Purpose of the Job Task Analysis Study

The European College of Bovine Health Management worked with Veterinary Specialty Exams, LLC (VSE) to develop a certification examination program to meet the above-mentioned standards. A Job Task Analysis study was conducted, starting in May 2021, which included developing a survey that described the requirements for a competent board-certified specialist in Bovine Health. Based on the Job Task Analysis, ECBHM determined the content for its certification exam.

This report provides an overview of the survey design, analysis, and results. Survey results of demographic data are also displayed. In addition, the implications of these results on examination development are discussed.

Survey Methodology

Survey Development

Following the meetings with the subject matter experts (SMEs), VSE placed the competencies from the new framework into a survey format. A copy of the final survey is available in Appendix A. The SMEs who participated in the Job Analysis process are listed in Appendix B.

Rating Scales

VSE and ECBHM established the following rating scales for the survey:

Importance: How <u>important</u> is this competency?
- Not at all important (0)
- Slightly important (1)
- Moderately important (2)
- Very important (3)
- Extremely important (4)

Frequency: How <u>often</u> do you perform duties that require this competency?
- Never (0)
- Rarely (1)
- Sometimes (2)
- Often (3)
- Always (4)

Demographic Questions

In order to evaluate if the ratings varied based on respondents' years of experience or other pertinent information, VSE included a demographic questionnaire. These demographic questions gathered the following information:

- Year of certification
- Completion of ECBHM residency
- Date and location of ECBHM residency
- Type of ECBHM residency (SRP/ARP)
- ECBHM exam completion
- History of supervising ECBHM residents
- Number of ECBHM residents supervised
- Number of ECBHM residents employed at their practice
- Training of residents together with other Diplomates
- Highest degree earned
- Primary production system
- Percentage of time spent in production systems (dairy/beef/veal/feedlot)
- Other animal species with which the respondent works
- Primary area of employment
- Country or countries in which the respondent works

Sampling Protocol

The invitation email from the ECBHM Board served as a preamble to the survey, encouraging participation, describing the process for accessing the online survey, and highlighting the critical nature of the respondents' decisions and opinions. ECBHM sent multiple reminders via email to maximize the response rate.

Data Collection and Analysis

After the survey administration was complete, VSE exported the data from Qualtrics® and utilized Microsoft Excel 365® and IBM SPSS® version 25.0 for further analysis.

Survey Results

Results are divided into four sections: A) Survey Metrics, B) Demographic Results, C) Rating Scales, D) Comments and Content Distribution and E) Decision Criteria for Determining the Exam Blueprint.

A. Survey Metrics

Survey Return Rate

Invitations to take the online survey were sent to the entire ECBHM listserv, which included 164 Diplomates. Out of the 161 individuals who received invitations, 97 attempted the survey, for a response rate of 60.2%.

Survey Adequacy

At the end of the survey, respondents were asked about the adequacy of survey content. Approximately 52% of the respondents indicated that the survey completely covered the important knowledge areas required to be an ECBHM Diplomate, while approximately 48% felt that it did so adequately (Figure 1, Table 1).

How well did this survey cover the important knowledge areas required to be an ECBHM Diplomate?

Figure 1: Survey Adequacy

48%   52%

■ Completely   ■ Adequately   ■ Inadequately
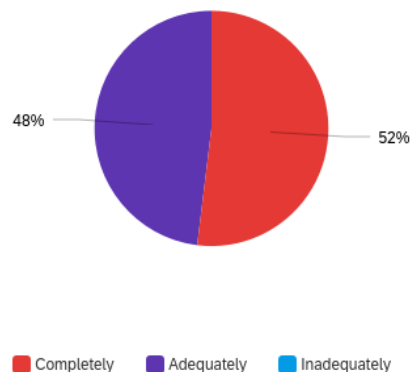
Table 1: Survey Adequacy

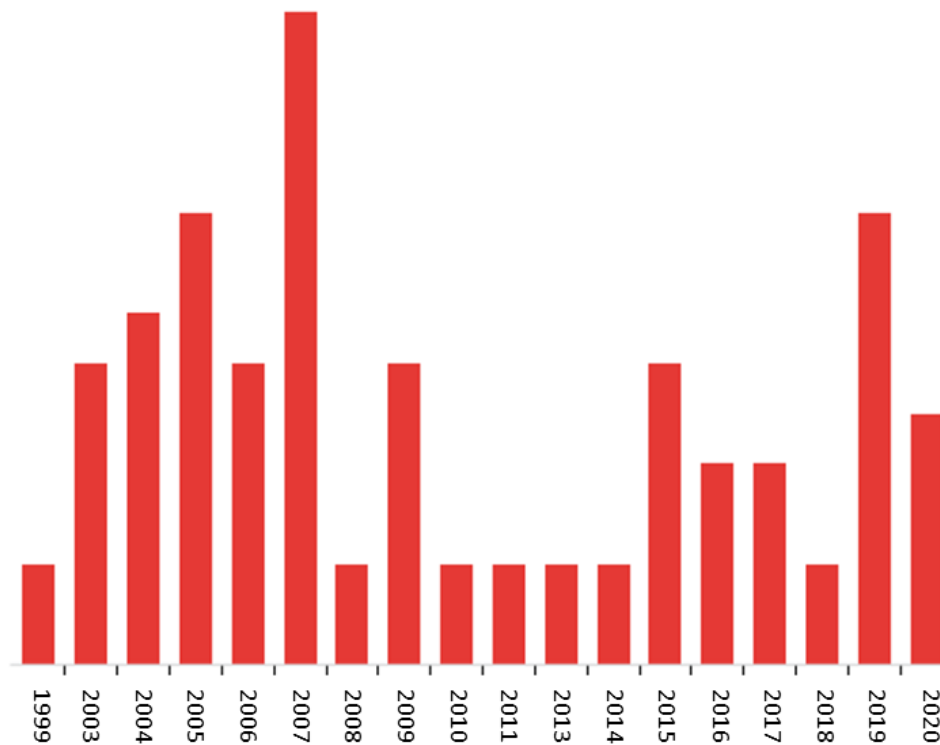| Adequacy	Frequency	Valid Percent (%)
Completely	40	51.95
Adequately	37	48.05
Inadequately	0	0.00
Total Responses	**77**	**100.0**

Following the survey adequacy rating question, respondents were given the opportunity to list any additional knowledge areas that they felt should have been included in the survey. They were also asked to include any additional comments, questions, or concerns.

B. Demographic Results

Year of Certification

Respondents were asked to provide the year they received their certification. 89 of the respondents answered this question. The most common response was 2007 with 13 respondents or 14.61% (Figure 2, Table 2).

Figure 2: Year of Certification

Table 2: Year of Certification

Year of Certification	Frequency	Valid Percent (%)
1999	2	2.25
2003	6	6.74
2004	7	7.87
2005	9	10.11
2006	6	6.74
2007	13	14.61
2008	2	2.25
2009	6	6.74
2010	2	2.25
2011	2	2.25
2013	2	2.25
2014	2	2.25
2015	6	6.74
2016	4	4.49
2017	4	4.49
2018	2	2.25
2019	9	10.11
2020	5	5.62
Total Responses	**89**	**100**

Completion of ECBHM residency

Respondents were asked to indicate whether they completed an ECBHM residency. 89 of the respondents answered this question. Most of the respondents, 48 or 53.93%, did not complete an ECBHM residency (Figure 3, Table 3).

Figure 3: ECBHM residency completion
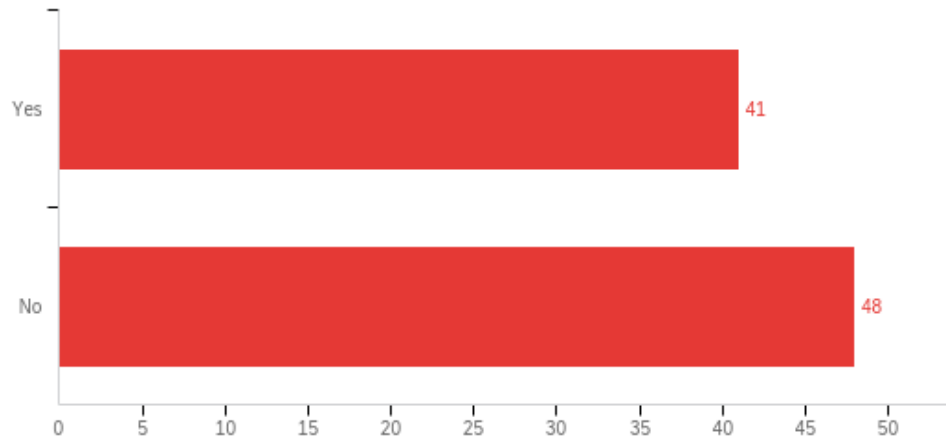
Table 3: ECBHM residency completion

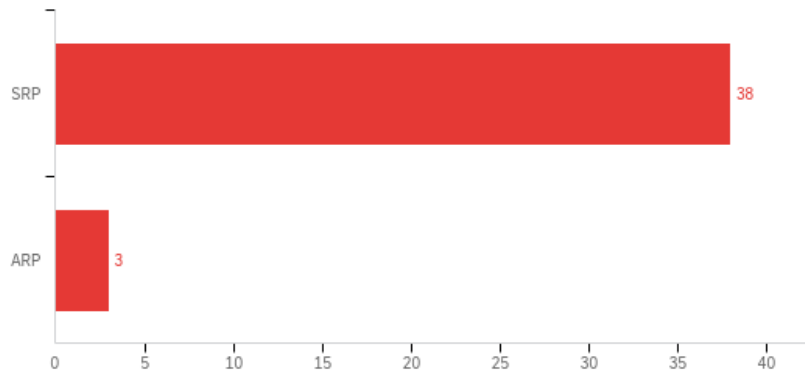| Residency completion	Frequency	Valid Percent (%)
Yes	41	46.07
No	48	53.93
Total Responses	**89**	**100.0**

Time and Location of ECBHM residency

Respondents were asked where and when their ECBHM residency was completed. A total of 41 respondents answered this question. The responses to this question can be found in Appendix C.

ECBHM residency type

Of the 41 respondents that answered this question, 38 (92.68%) indicated that their ECBHM residency was a Standard Residency Program (SRP), while 3 (7.32%) had an Alternative Residency Program (ARP) (Figure 4, Table 4).
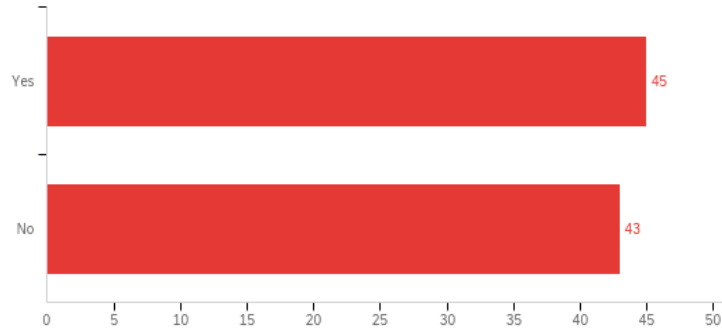
Figure 4: ECBHM residency type

Table 4: ECBHM residency type

Residency type	Frequency	Valid Percent (%)
SRP	38	92.68
ARP	3	7.32
Total Responses	**41**	**100.0**

Sat ECBHM exam

Respondents were asked to indicate if they sat the ECBHM certifying examination. 45 (51.14%) indicated that they sat the exam, while 43 (48.68%) did not (Figure 5, Table 5).
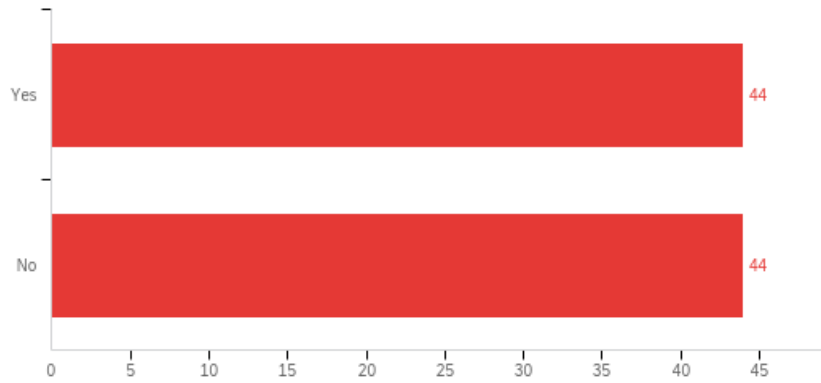
Figure 5: Sat ECBHM exam

Table 5: Sat ECBHM exam

Sat exam	Frequency	Valid Percent (%)
Yes	45	51.14
No	43	48.86
Total Responses	**88**	**100.0**

Supervised ECBHM residents

Of the 88 respondents, 44 (50%) indicated that they supervised ECBHM residents in the past, while 44 (50%) indicated that they did not (Figure 6, Table 6).

Figure 6: Supervised ECBHM residents

Table 6: Supervised ECBHM residents

Supervised residents	Frequency	Valid Percent (%)
Yes	44	50.00
No	44	50.00
Total Responses	**88**	**100.0**

Number of residents supervised

Respondents were asked to indicate the number of residents they supervised or co-supervised. The range was 1 to 17, with a mean of 3.28 (Table 7).

Table 7: Number of residents supervised

Number of residents	Frequency	Valid Percent (%)
1	16	37.21
2	6	13.95
3	7	16.28
4	4	9.3
5	2	4.65
6	3	6.98
7	2	4.65
8	1	2.33
9	1	2.33
17	1	2.33
Total Responses	**43**	**100**

Number of ECBHM Diplomates at practice or institute

Respondents were asked to indicate the number of ECBHM Diplomates that are employed at that practice or institute. The range was 0 to 8, with a mean of 2.88 (Table 8).

Table 8: Number of ECBHM Diplomates at practice or institution

Number of residents	Frequency	Valid Percent (%)
0	6	14.63
1	6	14.63
2	4	9.76
3	12	29.27
4	5	12.20
5	3	7.32
6	3	7.32
7	1	2.44
8	1	2.44
Total Responses	**41**	**100**

Train residents with other Diplomates

Of the 43 respondents, 32 (74.42%) indicated that they train residents together with other Diplomates (Figure 7, Table 9).

Figure 7: Train residents with other Diplomates
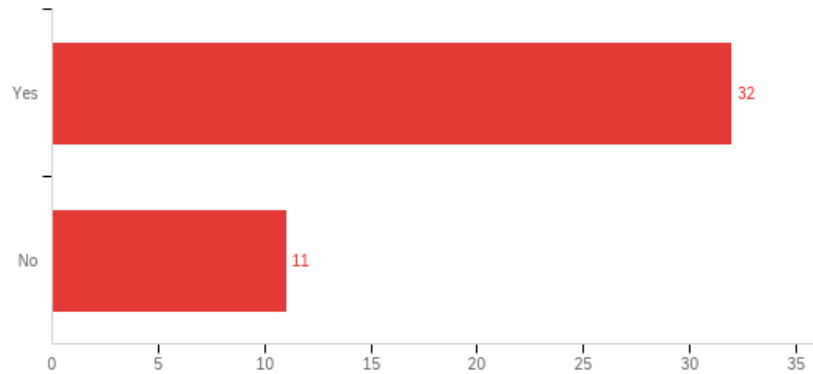
Table 9: Train residents with other Diplomates

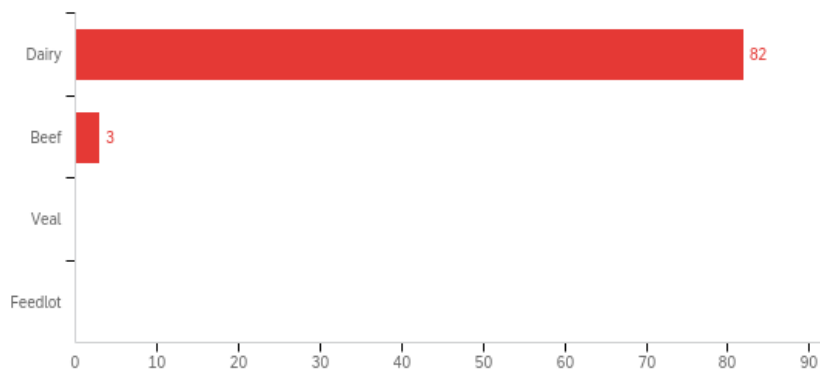| Train residents	Frequency	Valid Percent (%)
Yes	32	74.42
No	11	25.58
Total Responses	**43**	**100**

Highest degree earned

Respondents were asked to indicate their highest degree earned. 85 respondents answered this question. The complete list of responses to this question can be found in Appendix D.

Primary production system

Of the 85 respondents that answered this question, 82 (96.47%) indicated that dairy was their primary production system. 3 (3.53%) indicated that beef was their primary production system. None of the respondents selected veal or feedlot (Figure 8, Table 10).

Figure 8: Primary production system
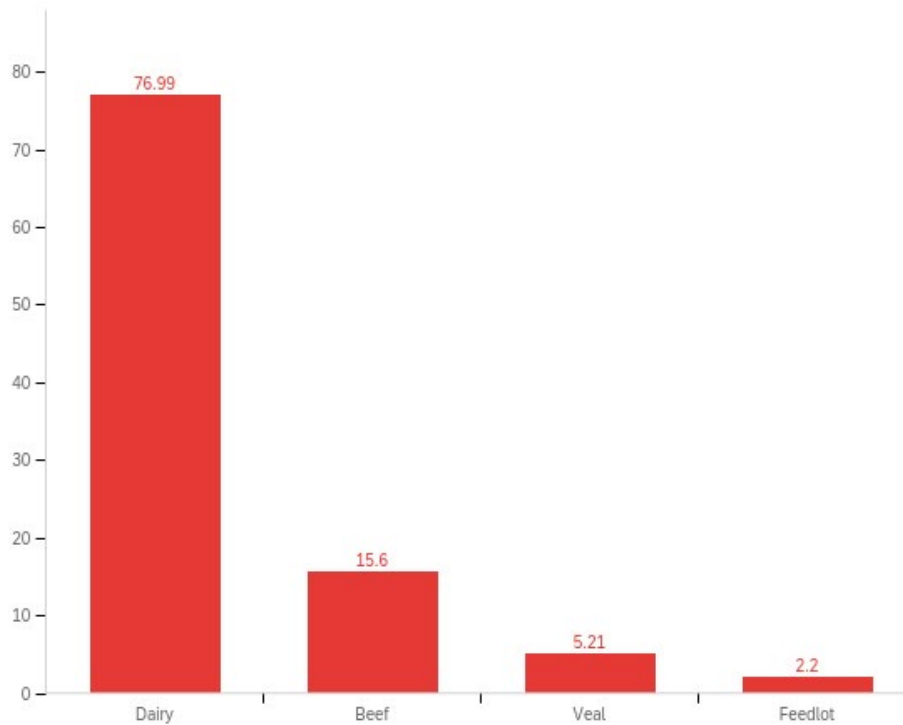

Table 10: Primary production system

Primary system	Frequency	Valid Percent (%)
Dairy	82	96.47
Beef	3	3.53
Veal	0	0.00
Feedlot	0	0.00
Total Responses	**41**	**100**

Percentage of time spent in production systems

Respondents indicated that they spent the majority of their time (76.99%) in dairy production systems (Figure 9, Table 11).
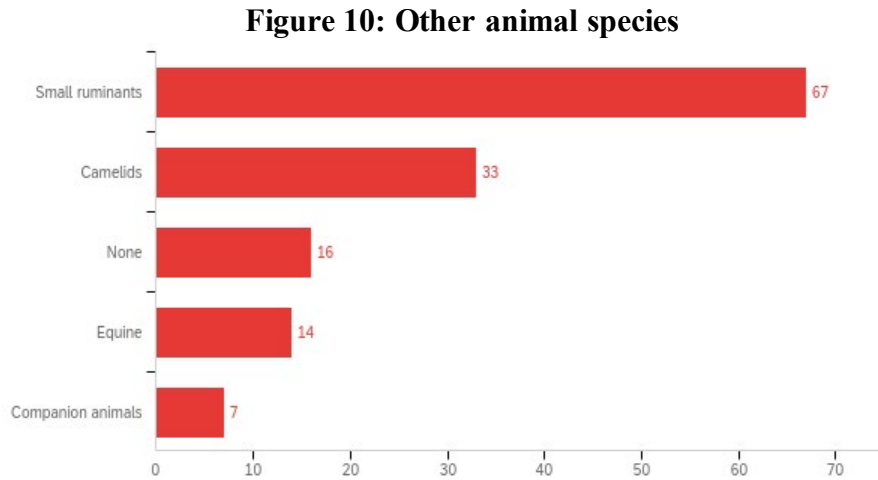
Figure 9: Time spent in production systems

Table 11: Time spent in production systems

Primary system	Percent (%)
Dairy	76.99
Beef	15.6
Veal	5.21
Feedlot	2.2
Total	**100%**

Other animal species

Small ruminants (67 (48.91%)) and camelids (33 (24.09%)) were the two species that respondents indicated they worked with most frequently (Figure 10, Table 12).

Figure 10: Other animal species

Table 12: Other animal species

Species	Frequency	Valid Percent (%)
Small ruminant	67	48.91
Camelids	33	10.22
None	16	5.11
Equine	14	24.09
Companion animals	7	11.68
Total Responses	**41**	**100**

Primary area of employment

Of the 85 respondents that answered this question, 34 (40%) indicated that Academic – Clinical was their primary area of employment. For the respondents that selected Other, they indicated breeders association, laboratory - clinical diagnostics, private organization / field advisor, agricultural teaching and research center, diagnostics, or PhD student as their primary area of employment (Figure 11, Table 13).

Figure 11: Primary area of employment
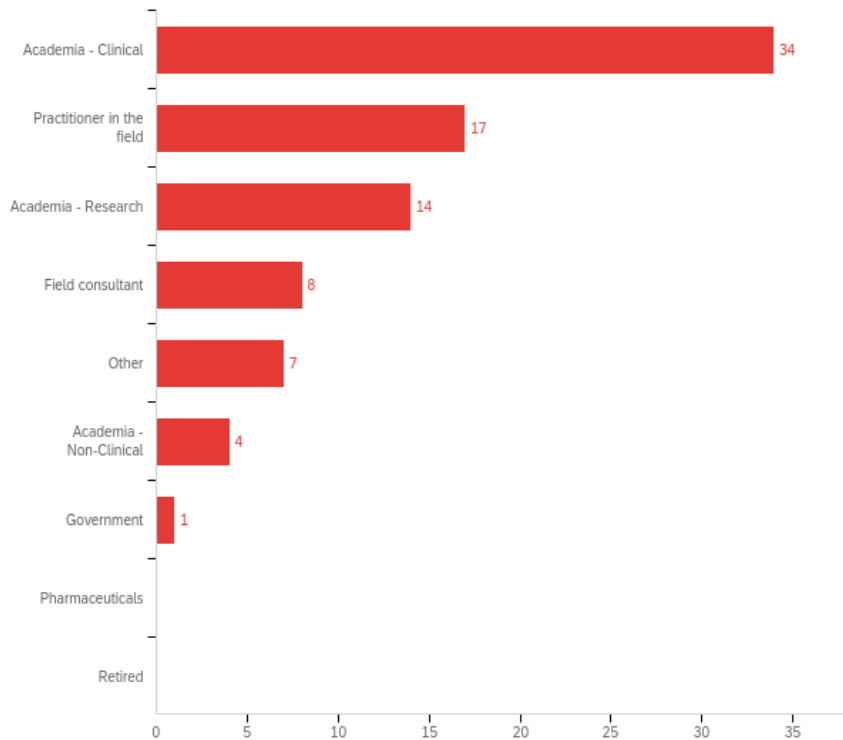
Table 13: Primary area of employment

Area	Frequency	Valid Percent (%)
Academic - Research	14	16.47
Academic – Clinical	34	40.00
Academic – Non-clinical	4	4.71
Practitioner in the field	17	20.00
Pharmaceuticals	0	0.00
Field consultant	8	9.41
Government	1	1.18
Retired	0	0.00
Other	7	8.24
Total Responses	**85**	**100**

Country

Respondents were asked to indicate the country (or countries) in which they work. The responses are shown below (Table 14).

Country	Frequency	Valid Percent (%)
Austria	4	5.48%
Belgium	3	4.11%
Canada	1	1.37%
Denmark	2	2.74%
Finland	2	2.74%
France	8	10.96%
Germany	2	2.74%
Greece	1	1.37%
Ireland	2	2.74%
Italy	1	1.37%
Luxembourg	1	1.37%
Netherlands	5	6.85%
Portugal	1	1.37%
Spain	5	6.85%
Sweden	2	2.74%
Switzerland	9	12.33%
United Kingdom	23	31.51%
Uruguay	1	1.37%
Total Responses	**73**	**100**

C. Rating Scales

The mean scores, using all rating scales, for each competency are available in Appendix E.

Importance:

Respondents were asked to rate how important each competency was based on the following scale: Not at all important (0), Slightly important (1), Moderately important (2), Very important (3) and Extremely important (4). Scores ranged from 1.73 to 3.55. Twenty-four areas, listed below, had mean scores below 2.5. The full list, sorted by descending importance, is available in Appendix F.

13.7 Knowledge of variations in antimicrobial use in different cattle industries and different EU countries (**1.73**)
14.3 Biochemistry (e.g. water analysis) (**1.81**)
08.5 Enucleation (**1.81**)
05.2 Basic insights in immune response depending on vaccine type used: Th1 vs Th2 (**1.96**)
10.6 Impact of biotechnology on welfare (**1.99**)
23.2 Hereditary and congenital diseases (**2.01**)
05.7 Knowledge of existing immunomodulative products, especially those marketed (**2.03**)
09.4 General anaesthesia in calves and adult cattle (**2.06**)
01.6 Toxicology (**2.07**)
08.4 Intestinal surgery (**2.12**)
05.4 Knowledge of EU regulation of vaccines (**2.13**)
23.1 Genetic improvement of stock (**2.18**)
08.7 Udder and teat surgery (**2.22**)
07.3 Rare diseases (**2.23**)
03.4 Feedlots (**2.23**)
02.4 Use of sensor technology and artificial intelligence (**2.28**)
14.1 Microbiology (**2.29**)
08.8 Claw and limb surgery (tenotomy, amputation, fracture repair, management of tendon and joint diseases) (**2.38**)
14.2 Pharmacology / pharmacokinetics (**2.40**)
08.3 Umbilical surgery (**2.41**)
11.4 Statistical tests - choosing an appropriate test (**2.44**)
05.3 Calculate a cost-benefit analysis of implementing vaccination programmes (**2.44**)
03.5 Veal (**2.44**)
06.5 Transportation of samples (**2.46**)

Frequency

Respondents were asked to indicate how often they personally performed tasks that required proficiency in competency based on the following scale: Never (0), Rarely (1), Sometimes (2), Very often (3) and Always (4)). Mean frequency scores ranged from 0.81 to 3.16. Seventeen areas, listed below, had frequency scores less than 1.5. The full list, sorted by descending frequency, is available in Appendix G.

03.4 Feedlots (**0.81**)

03.5 Veal (**0.94**)

08.5 Enucleation (**1.04**)

05.4 Knowledge of EU regulation of vaccines (**1.16**)

08.4 Intestinal surgery (**1.17**)

10.6 Impact of biotechnology on welfare (**1.18**)

13.7 Knowledge of variations in antimicrobial use in different cattle industries and different EU countries (**1.27**)

09.4 General anaesthesia in calves and adult cattle (**1.29**)

05.2 Basic insights in immune response depending on vaccine type used: Th1 vs Th2 (**1.30**)

08.7 Udder and teat surgery (**1.31**)

03.3 Beef fattening units (**1.31**)

23.2 Hereditary and congenital diseases (**1.33**)

14.3 Biochemistry (e.g. water analysis) (**1.37**)

05.3 Calculate a cost-benefit analysis of implementing vaccination programmes (**1.41**)

23.1 Genetic improvement of stock (**1.46**)

05.7 Knowledge of existing immunomodulative products, especially those marketed (**1.46**)

07.3 Rare diseases (**1.49**)

D. Comments and Content Distribution

Knowledge Areas Not Covered

Respondents had the opportunity to list important additional knowledge areas that were not covered in the survey but were felt to be important as Bovine Health Diplomate. Responses included:

- Basic competencies (i.e., diagnose pregnancy, competently trim an overgrown claw)
- Environmental concerns or use of veterinary products (i.e., anthelmintic and the current debate around livestock production on global warming - relevant topic)
- Inclusion of genomic testing of breeding stock in the breeding section
- Knowledge of the milking parlor, control and testing
- Teaching skills (continuing education for farmers, veterinarians) beyond just communication
- Teaching techniques (i.e., delivery of information / inspiring learning to undergrads / postgrads, dissemination of knowledge)
- Understanding of veterinary business management

Comments

The respondents left detailed comments regarding each competency, as well as comments about the overall survey. These were collated and presented to the committee for review and discussion. The complete list of overall comments is available in Appendix H and the competency-specific comments are available in Appendix I.

Distribution of Content

Respondents were asked to indicate their recommendation for the distribution of content on the annual certifying examination. The mean percentage allocation recommendations for each content area are listed below. Additional details are available in Appendix J.

1. Manage herd problems in cattle, involving both endemic and epidemic or (re-)emerging disease (**7.58%**)
2. Design farm-specific herd health monitoring programs for the prevalent health issues in Europe, involving adult cattle and calves (**6.18%**)
3. Describe, analyze and advise on commonly encountered housing and feeding systems for cattle and identify associated risk factors for animal health and welfare (**4.97%**)
4. Describe, analyze and advise on bovine nutrition for relevant production systems (**4.70%**)
5. Understand the basic principles of vaccinology, immunology and immunomodulation (**3.09%**)

6. Understand and apply the principles of biosecurity tailored to the farm and at a larger (inter)national level **(4.51%)**

7. Understand, recognize, diagnose and treat individual cattle diseases and estimate their importance to herd health **(6.57%)**

8. Perform advanced (non-specialist) surgery in cattle and have knowledge of advanced therapeutic and surgical techniques **(3.99%)**

9. Appropriately use and advise on pain medications and anesthetic techniques **(4.43%)**

10. Advise, promote and improve animal welfare (beyond the legal minimal EU requirements) **(5.01%)**

11. Understand epidemiological principles and apply to data analysis **(5.25%)**

12. Understand and implement the principles of evidence-based veterinary medicine **(5.19%)**

13. Measure antimicrobial use (including but not limited to antibiotics, chemotherapeutics and anti-parasitic drugs) and apply the principles of rational antimicrobial use **(3.74%)**

14. Understand principles of paraclinical / ancillary disciplines **(2.75%)**

15. Use and interpret diagnostic tests and procedures for individual animal and herd diagnosis and application as part of a herd health program (e.g. purchase control) **(5.26%)**

16. Apply medical imaging techniques on farm **(3.43%)**

17. Perform necropsy using a methodical approach and take appropriate samples for diagnostic purposes **(3.42%)**

18. Understand and contribute to animal health economics **(3.40%)**

19. Diagnose, advise on and control zoonotic disease related to animal contact or consumption of products **(3.48%)**

20. Be aware of relevant current EU legislation and be able to translate into practical situations **(2.77%)**

21. Interpret and apply scientific literature **(4.53%)**

22. Effectively communicate with a variety of stakeholders and influence human behaviour **(3.39%)**

23. Basic understanding and application of breeding and genetics **(2.35%)**

E. Decision Criteria for Determining the Exam Blueprint

VSE conducted three webinar discussions to present the results of the survey to the committee of SMEs for their review. Prior to the meeting, the SMEs received a copy of the preliminary survey analysis report. The purpose of these meetings was to review the survey results, modify the list of competencies (if needed), and finalize the exam blueprint. During the webinar meetings, the SMEs examined the competencies by the following criteria:

- Importance
- Frequency
- Respondent comments

The committee elected to retain all of the initial competencies, despite some having lower importance and/or frequency ratings. Based on the respondent comments, the committee added a content area called "24. Knowledge of sustainable farming systems/practices associated with climate change mitigation and increased biodiversity".

To facilitate the construction of the certifying examination, the 24 content areas were aggregated into four primary domains. The weight assigned to each domain was based on the summation of the mean weights for each content area. Some content areas, such as "14. Understand principles of ancillary disciplines" were assigned to more than one domain. In these cases, the weight was divided equally between the assigned domains. Rather than strict percentages, the committee assigned ranges to each domain to allow for additional flexibility in the exam construction process.

The final domain weights are listed below, and the final content outline is available in Appendix K. This will serve as the blueprint for the certifying examination. Adoption of the content outline and the examination blueprint establishes the link between the competencies necessary to become a board-certified specialist in Bovine Health and successful performance on the certifying examination.

Table 14: Examination Blueprint and Domain Weights

Domain	Weight
Herd Health	30-36%
Individual Medicine and Surgery	22-28%
Epidemiology, Evidence-Based Veterinary Medicine and Economics	21-27%
Legislation, One Health and Animal Welfare	17-23%