# Appendix E

Rating scales

| | Frequency | | | | | Importance | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Competency** | **All** | **Sat exam** | **Did not sit exam** | **Residency** | **No Residency** | **All** | **Sat exam** | **Did not sit exam** | **Residency** | **No Residency** |
| 01.1 Reproduction | 3.34 | 3.68 | 2.97 | 3.68 | 3.02 | 2.53 | 3.05 | 1.95 | 3.08 | 2.02 |
| 01.2 Mastitis | 3.41 | 3.74 | 3.03 | 3.75 | 3.09 | 2.65 | 3.14 | 2.11 | 3.18 | 2.16 |
| 01.3 Lameness | 3.41 | 3.66 | 3.13 | 3.65 | 3.19 | 2.76 | 2.95 | 2.53 | 2.93 | 2.60 |
| 01.4 Infectious disease | 3.41 | 3.50 | 3.32 | 3.50 | 3.33 | 2.84 | 3.05 | 2.61 | 3.03 | 2.67 |
| 01.5 Metabolic disorders | 3.28 | 3.64 | 2.87 | 3.65 | 2.93 | 2.87 | 3.20 | 2.47 | 3.28 | 2.49 |
| 01.6 Toxicology | 2.07 | 2.20 | 1.92 | 2.25 | 1.91 | 1.53 | 1.48 | 1.58 | 1.55 | 1.51 |
| 01.7 Calf and youngstock health | 3.55 | 3.82 | 3.26 | 3.83 | 3.30 | 2.98 | 3.23 | 2.71 | 3.25 | 2.72 |
| 02.1 Define key outcomes | 2.99 | 3.23 | 2.74 | 3.26 | 2.74 | 2.55 | 2.98 | 2.08 | 3.03 | 2.12 |
| 02.2 Obtain relevant data | 3.12 | 3.42 | 2.82 | 3.38 | 2.88 | 2.63 | 2.95 | 2.29 | 2.92 | 2.37 |
| 02.3 Manage and interpret data | 3.32 | 3.63 | 2.97 | 3.62 | 3.05 | 2.85 | 3.26 | 2.42 | 3.23 | 2.51 |
| 02.4 Use of sensor technology and artificial intelligence | 2.28 | 2.44 | 2.13 | 2.44 | 2.14 | 1.71 | 2.07 | 1.32 | 2.15 | 1.30 |
| 03.1 Dairy | 3.27 | 3.38 | 3.16 | 3.40 | 3.16 | 2.60 | 2.69 | 2.53 | 2.76 | 2.47 |
| 03.2 Cow/calf/suckler herds | 2.80 | 2.90 | 2.71 | 2.92 | 2.70 | 1.90 | 1.95 | 1.79 | 1.97 | 1.84 |
| 03.3 Beef fattening units | 2.53 | 2.71 | 2.37 | 2.79 | 2.30 | 1.31 | 1.21 | 1.42 | 1.29 | 1.33 |
| 03.4 Feedlots | 2.23 | 2.48 | 2.00 | 2.55 | 1.95 | 0.81 | 0.67 | 0.97 | 0.71 | 0.91 |
| 03.5 Veal | 2.44 | 2.64 | 2.26 | 2.71 | 2.21 | 0.94 | 0.88 | 1.00 | 0.89 | 0.98 |
| 04.1 Knowledge of anatomy, physiology and principles of normal digestion | 3.14 | 3.36 | 2.92 | 3.39 | 2.91 | 2.41 | 2.67 | 2.13 | 2.71 | 2.14 |
| 04.2 Knowledge of basic nutritional requirements of the cow at different ages and stages of production | 3.15 | 3.43 | 2.87 | 3.45 | 2.88 | 2.56 | 2.79 | 2.32 | 2.84 | 2.30 |
| 04.3 Understand common feeding concepts and principles of diet formulation | 2.98 | 3.12 | 2.84 | 3.13 | 2.84 | 2.35 | 2.50 | 2.18 | 2.61 | 2.12 |
| 04.4 Knowledge of common dietary constituents used in compounding rations and commonly used methods of conservation | 2.54 | 2.57 | 2.55 | 2.61 | 2.49 | 1.99 | 2.10 | 1.89 | 2.16 | 1.84 |
| 04.5 Analyze basic nutrition parameters, identify problems and improve rations | 2.75 | 2.98 | 2.53 | 3.00 | 2.53 | 2.09 | 2.33 | 1.82 | 2.45 | 1.77 |
| 04.6 Collect and interpret appropriate samples related to nutrition and metabolism | 2.78 | 3.00 | 2.53 | 2.97 | 2.60 | 2.15 | 2.33 | 1.92 | 2.37 | 1.95 |
| 04.7 Knowledge of commonly seen diseases with nutritional causes | 3.22 | 3.62 | 2.79 | 3.68 | 2.81 | 2.59 | 2.86 | 2.29 | 2.92 | 2.30 |
| 04.8 Knowledge of nutritional deficiencies - signs, epidemiology, diagnosis, correction and prevention | 2.98 | 3.31 | 2.61 | 3.32 | 2.67 | 2.32 | 2.57 | 2.03 | 2.61 | 2.07 |
| 05.1 Knowledge of vaccine types, advantages/disadvantages | 2.74 | 2.74 | 2.73 | 2.74 | 2.74 | 2.09 | 2.07 | 2.11 | 2.05 | 2.12 |
| 05.2 Basic insights in immune response depending on vaccine type used: Th1 vs Th2 | 1.96 | 1.83 | 2.11 | 1.87 | 2.04 | 1.30 | 1.20 | 1.41 | 1.26 | 1.33 |
| 05.3 Calculate a cost-benefit analysis of implementing vaccination programmes | 2.44 | 2.57 | 2.32 | 2.58 | 2.31 | 1.41 | 1.50 | 1.32 | 1.55 | 1.29 |
| 05.4 Knowledge of EU regulation of vaccines | 2.13 | 2.17 | 2.08 | 2.21 | 2.05 | 1.16 | 1.19 | 1.14 | 1.29 | 1.05 |
| 05.5 Knowledge of vaccination programs for important diseases | 2.96 | 3.17 | 2.77 | 3.18 | 2.76 | 2.19 | 2.50 | 1.84 | 2.55 | 1.86 |
| 05.6 Design/evaluate vaccination protocols in an evidence-based manner | 2.81 | 3.05 | 2.57 | 3.05 | 2.59 | 1.81 | 2.05 | 1.57 | 2.16 | 1.50 |
| 05.7 Knowledge of existing immunomodulative products, especially those marketed | 2.03 | 2.02 | 2.03 | 2.08 | 1.98 | 1.46 | 1.50 | 1.43 | 1.58 | 1.36 |
| 06.1 Cleaning and disinfection (including spectra of disinfectants) | 2.76 | 2.88 | 2.67 | 2.87 | 2.66 | 2.41 | 2.43 | 2.42 | 2.45 | 2.37 |
| 06.2 Control of human and animal trade/movement | 2.53 | 2.48 | 2.58 | 2.39 | 2.66 | 1.90 | 1.79 | 2.06 | 1.82 | 1.98 |
| 06.3 Purchase management and quarantine | 3.01 | 3.19 | 2.81 | 3.18 | 2.85 | 2.13 | 2.12 | 2.17 | 2.24 | 2.02 |
| 06.4 Principles of infectious disease management | 3.42 | 3.64 | 3.17 | 3.63 | 3.22 | 2.76 | 2.86 | 2.67 | 2.84 | 2.68 |
| 06.5 Transportation of samples | 2.46 | 2.52 | 2.36 | 2.53 | 2.39 | 2.10 | 2.12 | 2.08 | 2.18 | 2.02 |
| 07.1 Common diseases | 3.44 | 3.71 | 3.14 | 3.71 | 3.20 | 3.16 | 3.43 | 2.86 | 3.42 | 2.93 |
| 07.2 Novel diseases | 2.87 | 3.05 | 2.67 | 3.08 | 2.68 | 1.80 | 1.79 | 1.83 | 1.89 | 1.71 |
| 07.3 Rare diseases | 2.23 | 2.33 | 2.11 | 2.37 | 2.10 | 1.49 | 1.40 | 1.61 | 1.47 | 1.51 |
| 07.4 (Re)emerging diseases | 2.84 | 2.83 | 2.83 | 2.84 | 2.83 | 1.62 | 1.55 | 1.72 | 1.63 | 1.61 |
| 07.5 Diseases relevant to herd health | 3.42 | 3.74 | 3.06 | 3.74 | 3.12 | 2.91 | 3.26 | 2.53 | 3.34 | 2.51 |
| 08.1 Laparotomy | 2.81 | 3.02 | 2.54 | 3.13 | 2.50 | 2.04 | 2.29 | 1.74 | 2.26 | 1.83 |
| 08.2 Abomasal surgery (conventional and via laparoscopy) | 2.82 | 3.07 | 2.51 | 3.16 | 2.50 | 2.01 | 2.31 | 1.66 | 2.29 | 1.75 |
| 08.3 Umbilical surgery | 2.41 | 2.60 | 2.23 | 2.63 | 2.20 | 1.62 | 1.81 | 1.40 | 1.79 | 1.45 |
| 08.4 Intestinal surgery | 2.12 | 2.26 | 1.97 | 2.37 | 1.88 | 1.17 | 1.24 | 1.09 | 1.26 | 1.08 |
| 08.5 Enucleation | 1.81 | 2.14 | 1.43 | 2.26 | 1.38 | 1.04 | 1.24 | 0.80 | 1.21 | 0.88 |
| 08.6 Dehorning and castration | 2.56 | 2.76 | 2.34 | 2.82 | 2.33 | 1.92 | 2.33 | 1.43 | 2.24 | 1.63 |
| 08.7 Udder and teat surgery | 2.22 | 2.43 | 1.97 | 2.53 | 1.93 | 1.31 | 1.52 | 1.06 | 1.53 | 1.10 |
| 08.8 Claw and limb surgery (tenotomy, amputation, fracture repair, management of tendon and joint diseases) | 2.38 | 2.64 | 2.09 | 2.68 | 2.10 | 1.50 | 1.60 | 1.37 | 1.58 | 1.43 |
| 08.9 Reproductive surgery (i.e. caesarean section) | 2.97 | 3.07 | 2.86 | 3.13 | 2.83 | 1.60 | 1.93 | 1.23 | 1.92 | 1.30 |
| 09.1 Principles of pain detection and management | 3.32 | 3.67 | 2.94 | 3.68 | 2.98 | 2.65 | 2.95 | 2.31 | 2.95 | 2.34 |
| 09.2 Effects and side effects of NSAID, GCS, sedatives, anesthetics | 3.01 | 3.24 | 2.74 | 3.24 | 2.80 | 2.40 | 2.55 | 2.23 | 2.50 | 2.30 |
| 09.3 Sedation of calves and adult cattle | 2.87 | 2.98 | 2.77 | 3.00 | 2.75 | 2.12 | 2.21 | 2.03 | 2.18 | 2.05 |
| 09.4 General anaesthesia in calves and adult cattle | 2.06 | 2.14 | 1.97 | 2.21 | 1.93 | 1.29 | 1.33 | 1.25 | 1.32 | 1.28 |
| 09.5 Procedures of regional and local anaesthesia | 3.14 | 3.36 | 2.91 | 3.36 | 2.93 | 2.37 | 2.62 | 2.09 | 2.58 | 2.18 |
| 09.6 Legal requirements (EU) | 2.69 | 2.86 | 2.51 | 2.87 | 2.53 | 1.77 | 1.90 | 1.60 | 2.00 | 1.55 |
| 10.1 Legislation and codes of practice affecting cattle welfare | 3.09 | 3.24 | 2.94 | 3.21 | 2.98 | 2.49 | 2.52 | 2.46 | 2.58 | 2.40 |
| 10.2 Interaction with stakeholders involved in cattle welfare | 2.81 | 2.88 | 2.74 | 2.92 | 2.70 | 2.28 | 2.36 | 2.20 | 2.50 | 2.08 |
| 10.3 Normal behavioural patterns and their alteration by stress, pain and disease | 3.03 | 3.29 | 2.74 | 3.24 | 2.83 | 2.50 | 2.60 | 2.40 | 2.63 | 2.38 |
| 10.4 Welfare in relation to stockmanship, housing nutrition and breeding | 3.01 | 3.24 | 2.77 | 3.21 | 2.83 | 2.42 | 2.64 | 2.17 | 2.74 | 2.13 |
| 10.5 Design tailored monitoring programs | 2.59 | 2.74 | 2.43 | 2.76 | 2.43 | 1.83 | 1.93 | 1.74 | 1.97 | 1.70 |
| 10.6 Impact of biotechnology on welfare | 1.99 | 1.95 | 2.03 | 2.00 | 1.98 | 1.18 | 1.17 | 1.20 | 1.26 | 1.10 |
| 11.1 Frequency data, incidence and prevalence | 3.04 | 3.33 | 2.71 | 3.29 | 2.80 | 2.54 | 2.88 | 2.14 | 2.87 | 2.23 |
| 11.2 Sample size, association vs causation, confounding, bias, odds ratios, relative risk, attributable risk, sampling strategies | 2.76 | 2.88 | 2.66 | 2.87 | 2.65 | 2.27 | 2.36 | 2.20 | 2.42 | 2.13 |
| 11.3 Study design | 2.50 | 2.52 | 2.46 | 2.50 | 2.50 | 2.28 | 2.14 | 2.46 | 2.13 | 2.43 |
| 11.4 Statistical tests - choosing an appropriate test | 2.44 | 2.36 | 2.51 | 2.37 | 2.50 | 2.10 | 1.95 | 2.26 | 1.95 | 2.25 |
| 11.5 Interpretation of tests results (Se, SP, PPV, NPV) | 3.09 | 3.24 | 2.94 | 3.24 | 2.95 | 2.69 | 2.83 | 2.54 | 2.84 | 2.55 |
| 12.1 Understand the principles of and the reasons for conducting clinical audits at the farm practice level | 2.81 | 3.00 | 2.63 | 3.00 | 2.63 | 2.03 | 2.00 | 2.09 | 2.03 | 2.03 |
| 12.2 Define appropriate research questions, search literature for evidence, summarize findings based on level of evidence and advise accordingly | 3.08 | 3.05 | 3.11 | 3.00 | 3.15 | 2.51 | 2.40 | 2.66 | 2.42 | 2.60 |
| 13.1 Knowledge of current recommendation of the prudent use of drugs | 3.36 | 3.50 | 3.20 | 3.50 | 3.23 | 2.86 | 2.98 | 2.74 | 2.97 | 2.75 |

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| 13.2 Basic knowledge of potential for residues in animal products and the environment | 3.09 | 3.11 | 2.06 | 3.11 | 3.08 | | 2.33 | 2.31 | 2.34 | 2.37 | 2.30 |
| 13.3 Understand the basics of bacterial culturing, microbial identification and antimicrobial susceptibility testing | 2.76 | 2.86 | 2.66 | 2.82 | 2.70 | | 2.13 | 2.21 | 2.03 | 2.32 | 1.95 |
| 13.4 Understand the basics of efficacy testing of antiparasitic drugs | 2.60 | 2.76 | 2.43 | 2.76 | 2.45 | | 1.54 | 1.67 | 1.37 | 1.68 | 1.40 |
| 13.5 Knowledge of application of drugs to minimize development of resistance | 3.19 | 3.26 | 3.11 | 2.39 | 3.10 | | 2.41 | 2.52 | 2.29 | 2.61 | 2.23 |
| 13.6 Knowledge of methods of quantification of antimicrobial use (dose based vs. mass based) | 2.65 | 2.79 | 2.49 | 2.84 | 2.48 | | 1.78 | 1.83 | 1.71 | 1.89 | 1.68 |
| 13.7 Knowledge of variations in antimicrobial use in different cattle industries and different EU countries | 1.73 | 1.86 | 1.57 | 1.89 | 1.58 | | 1.27 | 1.29 | 1.23 | 1.34 | 1.20 |
| 13.8 Basic knowledge of the potential role of the cattle sector in resistance selection in humans | 2.64 | 2.71 | 2.57 | 2.74 | 2.55 | | 1.79 | 1.64 | 2.00 | 1.71 | 1.88 |
| 14.1 Microbiology | 2.29 | 2.17 | 2.46 | 2.16 | 2.43 | | 2.10 | 2.05 | 2.17 | 2.13 | 2.08 |
| 14.2 Pharmacology / pharmacokinetics | 2.40 | 2.33 | 2.49 | 2.34 | 2.45 | | 1.96 | 1.86 | 2.09 | 1.89 | 2.03 |
| 14.3 Biochemistry (e.g. water analysis) | 1.81 | 1.86 | 1.74 | 1.89 | 1.73 | | 1.37 | 1.45 | 1.26 | 1.50 | 1.25 |
| 14.4 Appropriate tests available for common diseases (including principles of sensitivity and specificity) | 3.18 | 3.48 | 2.83 | 3.47 | 2.90 | | 2.65 | 2.79 | 2.49 | 2.82 | 2.50 |
| 15.1 Take appropriate samples | 3.28 | 3.50 | 3.03 | 3.50 | 3.08 | | 2.68 | 2.98 | 2.31 | 3.00 | 2.38 |
| 15.2 Select most appropriate test(s) | 3.31 | 3.50 | 3.09 | 3.47 | 3.15 | | 2.69 | 2.98 | 2.37 | 3.00 | 2.40 |
| 15.3 Describe tests strengths and weaknesses | 2.86 | 2.93 | 2.77 | 2.92 | 2.80 | | 2.35 | 2.45 | 2.23 | 2.53 | 2.18 |
| 15.4 Interpret routine laboratory diagnostics (haematology and clinical pathology) | 2.87 | 3.12 | 2.57 | 3.13 | 2.63 | | 2.58 | 2.71 | 2.40 | 2.66 | 2.50 |
| 15.5 Interpret routine analysis of different body fluids (peritoneal fluid, milk, synovial fluid, cerebrospinal fluid, urine, rumen fluid) | 2.81 | 3.00 | 2.57 | 3.00 | 2.63 | | 2.35 | 2.45 | 2.23 | 2.50 | 2.20 |
| 16.1 Understand imaging techniques which are typically available on farm | 2.65 | 2.93 | 2.31 | 2.97 | 2.34 | | 2.32 | 2.55 | 2.09 | 2.53 | 2.13 |
| 16.2 Perform and interpret advanced but not specialized imaging | 2.60 | 2.76 | 2.43 | 2.79 | 2.43 | | 2.17 | 2.36 | 1.94 | 2.31 | 2.03 |
| 17.1 Perform a protocolized field necropsy, including appropriate sampling | 2.73 | 3.05 | 2.34 | 3.00 | 2.48 | | 1.81 | 1.90 | 1.71 | 1.97 | 1.65 |
| 17.2 Identify gross pathologies | 2.79 | 3.12 | 2.40 | 3.08 | 2.53 | | 2.08 | 2.07 | 2.09 | 2.13 | 2.03 |
| 17.3 Understand the biohazard/public health implications of necropsies | 2.83 | 3.00 | 2.63 | 3.00 | 2.68 | | 1.69 | 1.69 | 1.69 | 1.79 | 1.60 |
| 18.1 Understand the impact of herd health, diseases and animal welfare on farm finances, productivity and public health | 3.17 | 3.36 | 2.94 | 3.34 | 3.00 | | 2.59 | 2.76 | 2.43 | 2.89 | 2.30 |
| 18.2 Understand financial implications of intervention measures and prevention | 3.09 | 3.17 | 3.00 | 3.18 | 3.00 | | 2.56 | 2.64 | 2.51 | 2.74 | 2.40 |
| 18.3 Perform a cost-benefit analysis, economic analysis of production results | 2.68 | 2.71 | 2.63 | 2.71 | 2.65 | | 1.73 | 1.60 | 1.91 | 1.66 | 1.80 |
| 19.1 Knowledge of public health dangers related to cattle and their products: meat, milk, animal contact | 2.97 | 3.14 | 2.77 | 3.16 | 2.80 | | 2.06 | 1.93 | 2.26 | 2.00 | 2.13 |
| 19.2 Relevant legislation for zoonotic diseases | 2.99 | 3.14 | 2.80 | 3.13 | 2.85 | | 1.96 | 1.83 | 2.14 | 1.89 | 2.03 |
| 19.3 Basic knowledge of the clinical signs of zoonotic diseases (from cattle) in humans | 2.67 | 2.76 | 2.57 | 2.76 | 2.58 | | 1.54 | 1.57 | 1.51 | 1.55 | 1.53 |
| 20.1 Cattle health and welfare | 2.95 | 3.14 | 2.74 | 3.11 | 2.80 | | 2.18 | 2.31 | 2.06 | 2.45 | 1.93 |
| 20.2 Rearing | 2.55 | 2.86 | 2.20 | 2.84 | 2.28 | | 1.79 | 1.88 | 1.71 | 1.97 | 1.63 |
| 20.3 Slaughter and euthanasia | 2.81 | 3.02 | 2.57 | 2.97 | 2.65 | | 1.72 | 1.81 | 1.63 | 1.92 | 1.53 |
| 20.4 Drug use | 2.95 | 3.05 | 2.83 | 3.03 | 2.89 | | 2.22 | 2.24 | 2.20 | 2.34 | 2.10 |
| 20.5 Biosecurity and regulated animal diseases | 2.97 | 3.05 | 2.89 | 3.03 | 2.93 | | 2.14 | 2.07 | 2.23 | 2.08 | 2.20 |
| 21.1 Evaluate a scientific paper on quality of evidence and translate its content to field applications | 3.09 | 3.29 | 2.86 | 3.34 | 2.85 | | 3.06 | 2.95 | 3.23 | 3.00 | 3.13 |
| 21.2 Effectively communicate results of paper | 2.94 | 3.10 | 2.74 | 3.16 | 2.73 | | 2.81 | 2.69 | 2.97 | 2.74 | 2.88 |
| 21.3 Demonstrate knowledge of recent literature | 2.73 | 2.98 | 2.46 | 3.03 | 2.45 | | 2.87 | 2.81 | 2.97 | 2.87 | 2.88 |
| 22.1 Define appropriate communication strategies for different circumstances | 2.76 | 2.95 | 2.54 | 2.97 | 2.55 | | 2.72 | 2.88 | 2.57 | 2.97 | 2.48 |
| 22.2 Knowledge of factors affecting human behaviour and strategies for influencing behaviour change | 2.54 | 2.64 | 2.43 | 2.66 | 2.43 | | 2.29 | 2.24 | 2.40 | 2.29 | 2.30 |
| 22.3 Effectively communicate with veterinary specialists, first line practitioners, farmers, farm advisers, consumers and stakeholders from the cattle industry | 3.19 | 3.52 | 2.80 | 3.53 | 2.88 | | 3.12 | 3.43 | 2.77 | 3.45 | 2.80 |
| 23.1 Genetic improvement of stock | 2.18 | 2.29 | 2.06 | 2.32 | 2.05 | | 1.46 | 1.38 | 1.57 | 1.45 | 1.48 |
| 23.2 Hereditary and congenital diseases | 2.01 | 2.10 | 1.91 | 2.11 | 1.93 | | 1.33 | 1.21 | 1.49 | 1.26 | 1.40 |