

2019 ACVPM Essay Exam: Example Questions and Answers

NOTICE: In a departure from recent years, rather than posting all essay questions from the prior year, the new method will be to post one question from each subject matter area with grading criteria and example answer(s). The goal is to better demonstrate intent and facilitate study practices and examination preparation.

Notes:

- Points are assessed not just for technical knowledge, but for demonstrated ability to communicate that knowledge across a variety of audiences and formats. One quarter of total essay points are communication points distributed among the questions. Demonstrated communication may include clarity, formatting, and readability. Therefore, for all answers, proper spelling, punctuation, and grammar is required. All responses must also be clear and accurate using complete sentences, answering each question as completely but as concisely as possible. These concepts are evidenced in example answers below. .
- As ACVPM Diplomates are frequently called upon to communicate evolving and emerging events and topics, some of the items presented below represent topics for which answers may still be under investigation and ongoing research has yielded updated information since the examination was prepared. As such, all reasonable responses representing current scientific thought will be considered at the time the examination is conducted. The answers provided are examples only.

Environmental Health

For all answers, proper spelling, punctuation, and grammar is required. Your responses must be clear and accurate using complete sentences. Answer each question as completely but as concisely as possible.

Example Question:

Hurricane Florence, shown near peak intensity southeast of Bermuda as a Category 4 major hurricane with sustained winds of 130 miles per hour (mph), devastated the Carolinas September 2018. Despite weakening to a Category 1 hurricane before making landfall in the United States, Florence uprooted trees, caused widespread power outages, and then stalled for several days pummeling the Carolinas with torrential downpour causing inland flooding. At least 55 people died and property and economic losses in the Carolinas alone was estimated to be at least \$18 billion.



Southeast North Carolina has more than 2,000 large-scale hog operations. These operations contain open-air pits to collect untreated sewage hog-manure lagoons to manage waste. Flooding from Hurricane Florence threatened to breach hog-manure lagoons as depicted below.

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- (a) Briefly describe three (3) environmental concerns following flooding that result in breaches or overflowing of hog-manure lagoons.
- (b) Briefly describe one (1) method that could help farmers prevent breaches or overflowing of hog-manure lagoons on their land.

Grading: 6 points total. 1 point for each of the 3 environmental concerns of overflowing hog-manure lagoons (up to 3 points); 1 point for method to reduce hog-manure pit overflow; 1 point each for communication.

Example answer:

- (a) Overflowing hog-manure lagoons pose a number of different environmental concerns. Overflowing lagoons would likely eventually flow into local waterways with pathogens from the manure potentially contaminating drinking water. The spread of antimicrobial residues is also a concern given the production methods that might rely on antimicrobials. Hog manure contains nitrate and too much nitrate introduced into surrounding waterways could deplete oxygen levels in the water, this could have a severe effect on freshwater marine and plant life. The manure could also contribute to dangerous algal blooms affecting wildlife and humans.
- (b) Several methods could help farmers prevent hog-manure lagoons from overflowing, one of which includes pumping down the lagoon levels before the storm to help handle the expected storm surge, and another includes building lagoons at higher elevations to decrease the likelihood that floodwater would reach the lagoons.

Epidemiology & Biostatistics

For all answers, proper spelling, punctuation, and grammar is required. Your responses must be clear and accurate using complete sentences. Answer each question as completely but as concisely as possible.

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Example Question:

Investigators hypothesized that a new milking protocol would reduce the risk of mastitis. To test the hypothesis, they randomized four hundred recently calved dairy cattle without mastitis to one of two groups (new milking protocol vs. old milking protocol), and recorded parity and whether or not (yes or no) the cattle had at least one incident of mastitis within the first 60 days after calving. In a brief note, explain to a colleague how to statistically test this hypothesis. In your explanation, identify the dependent and independent variable for the analysis, the expected distribution of the dependent variable, and an appropriate statistical test.

Grading Rubric:

Category	Perfect	OK	Pretty bad
Dependent and Independent Variable	2	1	0
	Correctly identifies the “at least one incident of mastitis within the first 60 days of calving” as the dependent variable, and treatment group as the independent variable.	Partially correct. Either the independent variable or dependent variable are incorrect.	Incorrectly identifies both variables.
Statistical test and Distribution	2	1	0
	Correctly identifies a Chi-Square test, Fisher Exact, Logistic Regression, z-test for proportions, and the appropriate distribution (binomial or Chi-square)	Partially incorrect. For instance, identifies the correct statistical test, but doesn’t provide the correct distribution	Completely incorrect. For instance, identifies statistical tests for continuous variables (e.g. T-test, ANOVA), or uses a non-specific terms (e.g. regression model, two-sample test)
Grammar, punctuation, spelling.	0.5	.25	0
	Appropriate use of grammar, punctuation, and spelling, as would be expected in professional writing	Minor mistakes that could be forgiven in professional writing	Obvious mistakes that would be inappropriate for a professional, including run-on/incomplete sentences or repeated misspellings
Layout and Organization of writing	0.5	.25	0
	Easy to read with a logical flow	Some components of the writing are clumsily written, do not flow well, or aren’t ordered logically.	The writing is difficult to read and follow. No logical order or flow. Little thought and effort put into the presentation.

Example answer:

The dependent variable is the variable that reflects whether or not the cow had at least one incident of mastitis in the first 60 days after calving, and is expected to have a binomial distribution. A Z-test could be used to determine if the proportion of

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cows that have at least one incident of mastitis with the first 60 days after calving is different between groups.

Food Protection

For all answers, proper spelling, punctuation, and grammar is required. Your responses must be clear and accurate using complete sentences. Answer each question as completely but as concisely as possible.

Example Question:

In 2018, the US Food and Drug Administration (FDA) issued a public notification about their ongoing investigation into reports of canine dilated cardiomyopathy (DCM) in dogs eating certain pet foods.

- a). Describe the type of pet food ingredients being investigated for a dietary link to the DCM cases.
- b). Since DCM itself is not rare in dogs, explain what makes the reported cases in this investigation unusual.
- c). Describe the one recommended blood test to conduct on a dog presenting with decreased energy, cough, and difficulty breathing that is on the diet under investigation.
- d). Detail the dietary and supplement changes you would recommend if diet-associated DCM is suspected.
- e). Describe one recommendation you would give for any other dogs at home that are on the same diet when diet-associated DCM is suspected.

Grading: 7 points total. 1 Point for each [a).- e).] for technical content; 2 Points for communication. (Note that ability to address emerging topics is important for an ACVPM diplomate. Exam takers will not be held responsible for new information or materials available after examination preparation.)

Example answer:

- a). The common thread in research to date is legumes, pulses (seeds of legumes), and/or potatoes as main ingredients in the food and typically associated with boutique, exotic-ingredient and grain-free (BEG), vegetarian, vegan, or home-prepared diets. The legumes include protein, starch and fiber derivatives of these ingredients (such as pea protein and starch).
- b). The reports of canine dilated cardiomyopathy (DCM) are unusual in that many of the reported cases occurred in canine breeds that are not typically genetically

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prone to the disease, and that the cases were reported to have been fed the same type of diet (labeled as “grain-free”).

- c). For a dog presenting with decreased energy, cough, and difficulty breathing that is on the diet under investigation, the one recommended blood test to conduct is plasma or whole blood taurine concentration.
- d). If diet-associated DCM is suspected in a patient presenting with decreased energy, cough, and difficulty breathing that is on the diet under investigation, it is recommended to change the diet to one made by a well-established manufacturer that contains standard ingredients (e.g., chicken, beef, rice, corn, and wheat) and add supplemental taurine to the diet.
- e). For any other dogs at home on the same diet under investigation, it is recommended that all other dogs in the household that are eating that diet be screened for DCM and change the diet to one made by a well-established manufacturer that contains standard ingredients.

Infectious and Parasitic Diseases

For all answers, proper spelling, punctuation, and grammar is required. Your responses must be clear and accurate using complete sentences. Answer each question as completely but as concisely as possible.

Example Question:

Psittacosis was recently identified in several poultry slaughter plant workers. As a consulting public health veterinarian, you are asked to prepare a notice for managers and staff of the plant. The notice is limited in length (not more than 150 words). Your notice should address the disease agent, signs/symptoms, route of exposure, and prevention in clear language appropriate for the audience.

Grading: 4 Points total. 3 points for each area to discuss; 1 point for communication. The description should be succinct with correct grammar, complete sentences, and language appropriate for lay workers and management. Key points should include a description of the agent, symptoms in workers, source of infection and transmission, and prevention.

Example answer:

Psittacosis is a disease that may be contracted from exposure to poultry droppings and excretions; particularly from breathing contaminated dust from cages and transport vehicles/containers. You will not get it from eating poultry meat. It is caused by a bacterium called *Chlamydia psittaci* and in serious cases may require antibiotic treatment. Symptoms are generally mild with flu-like headaches, muscle pain, chills, or difficulty breathing, but may be severe in immune compromised

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individuals. You should report and seek medical care if you experience symptoms of psittacosis. Measures to prevent infection include:

- Clean and sanitize cages and facilities.
- Wear protective equipment such as masks, gloves, and face shields as recommended by your safety protocols.
- Avoid inhalation of dried excretions and wear protective masks when in environments that may expose you to dust or poultry excretions.
- Wash hands thoroughly before eating or leaving work spaces.

Public Health Administration and Education

For all answers, proper spelling, punctuation, and grammar is required. Your responses must be clear and accurate using complete sentences. Answer each question as completely but as concisely as possible.

Example Question:

In January 2019, the Centers for Disease Control and Prevention (CDC) reported that they were investigating a multistate outbreak of *Salmonella* infections linked to pet hedgehogs. As of January 23, 2019, eleven individuals from eight states had been found to be infected with the outbreak strain of *Salmonella* Typhimurium. The affected individuals were questioned about their contact with animals in the week prior to becoming ill. Of the eleven identified cases, ten (91%) reported having contact with pet hedgehogs, which were purchased from a variety of sources.

Investigators used PulseNet to identify illnesses that may have been associated with this outbreak.

- a) What is PulseNet? How does PulseNet help public health officials identify illnesses associated with a particular outbreak?
- b) A case of human salmonellosis associated with this outbreak has been identified in your community. As a county public health official, you want to be prepared to answer questions about how people can stay healthy around small pets. Briefly describe four preventive measures owners of small pets can take to prevent infection with *Salmonella*.

Grading: 6 Points total.

- a). 3 Points: 1 point -what is PulseNet; 1 point - discussion of DNA fingerprints, PFGE, or whole genome sequencing; 1 point communication.
- b). 3 Points: 1/2 point for each preventive measure and 1 point for communication.

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Example answer:

- a). PulseNet is a national network of public health and food regulatory laboratories. These laboratories isolate bacteria (i.e. *Salmonella*) from sick individuals and generate a DNA fingerprint using subtyping tools such as pulsed-field gel electrophoresis (PFGE) or whole genome sequencing (WGS.) The DNA fingerprint patterns are uploaded into a database where epidemiologists can review and search the data for identical patterns. A group of matching patterns or clusters will prompt investigators to search for the source of the outbreak.

Once a group of individuals with matching DNA fingerprints has been identified, public health investigators will interview patients to determine potential exposures such as contaminated food or contact with live animals. DNA fingerprints from food or animal sources can then be compared to the fingerprints from the ill individuals. Once the source has been determined, effective strategies can be developed to prevent new illnesses from occurring. PulseNet is an efficient system that detects outbreaks early and allows public health officials to take rapid action to quickly determine the source, alert the public, and establish control measures to prevent additional people from becoming sick.

- b). Examples of preventive measures:

- Small pets such as rodents and hedgehogs are not recommended for households with children under 5 years of age, the elderly, or people with weakened immune systems. Pick the right pet for your family.
- Clean and disinfect pet equipment and supplies regularly. It is best to clean cages, toys, etc. outside the home if possible. Do not use the kitchen sink or areas where food is prepared, served, stored, or consumed.
- Do not allow small pets to enter food preparation areas.
- Wash hands with soap and water after touching, feeding, or caring for pets.
- Do not kiss, nuzzle, or snuggle small pets or hold them close to your face.