

1) Sensitivity can be calculated as follows :

- A. Number of true positives / Number of true negatives
- B. Number of True positives / Total number of positives
- \* C. Number of true positives / Number who actually have disease
- D. The proportion of patients with negative test results who are correctly diagnosed

A true positive is an individual who has the disease and tests positive. Sensitivity equals Number of true positives / Number who actually have disease.

2) The positive predictive value is the proportion of patients with positive test results who are correctly diagnosed

- A. False
- \* B. True

When a test returns a positive, the individual may be a true positive (if it actually does have the disease) or a false positive (if it does not have the disease). The positive predictive value of a test is calculated as follows : Number of True positives / Total number of positives

3) Specificity of a test is the proportion of true positives among all positives returned by a test

- \* A. False
- B. True

Specificity is the probability of a test returning a negative when the individual does not have the disease. Calculated as "Number of true negatives / Number who don't have disease"

4) Predictive value of a negative test is the proportion of patients with negative test results who are correctly diagnosed

- A. False
- \* B. True

Predictive value = Number of True negatives / Total number of negatives

5) The natural history of a disease includes factors relating to

- \* A. time, host and environment
- B. genetics, environment and agent
- C. time, genetics and environment
- D. host, agent and time

6) Incidence can be described as the proportion of "events of interest" at a point in time

- A. True
- \* B. False

The incidence of disease is defined as the number of new cases of disease occurring in a population during a defined time interval. The number is useful to epidemiologists because it is a measure of the risk of disease.

7) The proportion of "events of interest" at a point in time correlates with the concept of prevalence

- \* A. True
- B. False

In epidemiology, the prevalence of a disease in a statistical population is defined as the total number of cases of a given disease in a specified population at a specified time

8) The mortality rate for a disease compares the number of individuals who died due to that disease with the entire at-risk population

- A. False
- \* B. True

This is unlike the case-based fatality rate that only considers the number of individuals who have that disease in the denominator.

9) The case fatality rate of X can be computed by which equation

- \* A. Number died of X / Total Number sick with X
- B. Number died of X / Total in population
- C. Number sick with X / Total in population
- D. None of the above

10) A herd of 100 calves have 20 lame ones. Of these 20, 10 are lame due to crocodile attacks. This means that the proportional morbidity rate for crocodile attack lameness is

- \* A. 50%
- B. 20%
- C. 10%
- D. None of the above

The proportional morbidity rate of a disease is defined as the proportion sick with the disease divided by the total sick individuals. It has no relation with the at-risk population.

11) When a chronic disease exists in a population, prevalence is usually far greater than incidence

- A. False
- \* B. True

Under chronic disease conditions, individuals who have fallen ill stay ill for a long period. If incidence happens to be high, prevalence rockets still higher. The converse happens when a disease is short-lived. In such a case incidence tends to be higher than prevalence because, for example, even if 100 caught the disease during the period in question, only 20 of them remained ill at the end of the period. (In such a case incidence would be 5 times as high as prevalence)

12) When a short-term disease exists in a population, prevalence is usually far greater than incidence

- A. True
- \* B. False

When a disease is short-lived, incidence tends to be higher than prevalence because, for example, even if 100 caught the disease during the period in question, only 20 of them remained ill at the end of the period. (In such a case incidence would be 5 times as high as prevalence). Under chronic disease conditions, individuals who have fallen ill stay ill for a long period. Consequently, prevalence tends to be higher than incidence.

13) Of 100 lambs born, 5 were stillborn while another 8 were killed by crocodiles. The crude mortality rate is

- A. 6.5%
- \* B. 13%
- C. 8%
- D. 5%

The crude mortality rate is defined as the number of deaths divided by the total in the population. It is of little interest to Vets, although one would suspect that farm managers would be a lot more concerned with such a statistic.

14) Measurement of performance often uses cut-off points, unlike measurement of disease.

- \* A. False
- B. True

Performance tends to be on a continuum, while a disease condition is usually a binary variable (diseased or not diseased). Consequently, measurement of disease would use cut-off points.

15) A right skewed distribution has a longer tail on the right. Also, the median will be less than the average (mean).

- \* A. True
- B. False

A distribution with a long tail to the right indicates the presence of a number of outliers in that direction. Since the average is pulled upwards by such outliers, but the median isn't, the median will tend to be less than the average in a right-skewed distribution.

16) The SMART approach to setting goals [in Health Management ... or life :) ] is that they should be (single answer)

- A. Time-framed
- B. Measurable
- C. Achievable
- D. Specific
- \* E. All of the above

SMART = Specific, Measurable, Achievable, Results oriented, Time-framed

17) In the health management context, when a herd is termed naive, it means

- A. the average weight is less than 75% of market weight
- B. all individuals in the herd belong to the same sex
- \* C. it has not been exposed to a pathogen
- D. the average animal has not yet been weaned

18) The best way to test the hypothesis that disease is more likely in young than in old animals is to stratify the herd by age

- A. False
- \* B. True

19) Age is an important host factor because

- A. a number of operations segregate animals by age
- \* B. disease susceptibility is frequently associated with age
- C. it is easy to stratify by age
- D. of the all-in all-out method

20) When the balance between host and agent favours the agent, the disease often becomes

- A. pandemic
- \* B. epidemic
- C. endemic
- D. stable in the host

An infection is said to be "endemic" in a population when that infection is maintained in the population without the need for external inputs. Endemics tend to have a stable prevalence and incidence. Epidemics tend to have every increasing rates of incidence because conditions favor the agent. A pandemic is an epidemic that spans large regions (e.g. like the world, or North America)

21) A zoonotic disease is one that is

- A. shared by a number of species of animals, but not humans
- B. common in zoos
- C. likely to cause an epidemic
- \* D. shared by animals and humans

Zoonosis is any infectious disease that may be transmitted from other animals, both wild and domestic, to humans or from humans to animals.

22) A sufficient cause of disease is a combination of agent, host and environment factors that tips the scale in favor of the agent thus resulting in disease.

- \* A. True
- B. False

An infectious disease has an agent which is a NECESSARY CAUSE of disease. Without the agent, the disease cannot occur. However, the mere presence of the agent does not trigger the disease. Other conditions in the host and environment must be met for the disease to occur.

23) Diseases that have a short duration tend to have a low prevalence:incidence ratio.

- \* A. True
- B. False

When a disease is short-lived, incidence tends to be higher than prevalence because, for example, even if 100 caught the disease during the period in question, only 20 of them remained ill at the end of the period. (In such a case incidence would be 5 times as high as prevalence). Under chronic disease conditions, individuals who have fallen ill stay ill for a long period. Consequently, prevalence tends to be higher than incidence.

24) The Reed-Frost model of infectious disease spread uses the hypothesis that a vaccine offers 100% efficacy

- A. True
- \* B. False

The Reed-Frost model addresses the spread of infectious disease. It shows that although on an individual basis a vaccine may NOT offer 100% efficacy, vaccination of a herd might reduce the spread of the virus because the number of susceptible individuals will reduce.

25) Artificial insemination is NOT used in the Avian industry, except in

- A. Broiler chicken breeders
- B. Layer chicken breeders
- \* C. Turkeys
- D. Broiler chicken grandparent stock

Low fertility in turkeys, resulting from unsuccessful mating as a consequence of large, heavily muscled birds or of reduced libido, is a serious and costly problem in the production of hatching eggs. Artificial insemination (AI) is widely used to overcome this problem. AI has not found wide application in chickens.

26) In Broiler breeder barns, birds move around on the floor. Stacked nest boxes are where eggs are laid. "Floor eggs" in a broiler breeder barn are an indication of

- A. Calcium deficiency
- B. Too few roosters
- \* C. Not enough nest boxes
- D. Too much space, too few birds

27) Broiler chicken take how long to reach market weight?

- A. 14-18 weeks
- B. 10-13 weeks
- C. 8-10 weeks
- \* D. 5-6 weeks

Broilers are slaughtered when they weigh 1.7 - 2.6 kg, which usually takes around 38 - 42 days. Roasters are grown slightly longer, to weigh approximately 3 kg or more at slaughter. Turkeys reach slaughter weight at 14 to 18 weeks.

28) Reptiles require specie-specific diets which are usually difficult to provide

- \* A. True
- B. False

The most common reason for presentation of exotic pets to veterinarians is for husbandry related disease issues.

29) The most common reason for presentation of exotic pets to veterinarians is for husbandry related disease issues.

- A. False
- \* B. True

For example, reptiles require species specific diets which are usually difficult to provide. This can often result in serious bone deficiencies.

30) The major issue restricting the expansion of swine units in Ontario is

- A. Inhospitability of the northern regions of Ontario
- B. Reduced demand for pork
- C. Low profitability
- \* D. Manure management regulations

31) The market value of a pig is based on (multiple answers)

- \* A. Back fat
- B. Sex
- \* C. Carcass weight
- \* D. Contract price
- E. Age

A crucial determinant of the price of a carcass is where it falls within the hog grading table or index. There is a strong incentive to have live weights of 100-120 kgs (carcasses are about 80% of live weight) and to have a high lean meat ratio (>64% or back fat < 19mm). Deviations are heavily penalized. For example, if live weight is 80 kgs or less, the value per kg drops by 90%.

32) A barrow is a

- A. A male swine
- B. A male goat
- C. Something that came between Desmond and Molly
- \* D. A male swine that was castrated at an early age
- E. A castrated male sheep

Gilts and barrows are female and male pigs in a finisher barn of a commercial swine unit.

33) At approximately what age is a pig expected to reach market weight?

- \* A. 26-32 weeks
- B. 32-38 weeks
- C. 18-24 weeks
- D. 12-18 weeks

Piglets are weaned at 7 to 48 days. The age at weaning is not set in stone and is variable throughout the industry. The starter period lasts from weaning to around 90 days. Finally, the grower/finisher period ends at around the age of around 180-220 days, the more important consideration being a live weight of 100-120 kgs.

34) If a sow has had 3 litters, she is parity

- A. 6
- B. 4
- C. 2
- \* D. 3

Normally, a sow's reproductive efficiency reduces beyond a parity of 8.

35) Sow crates are often considered psychologically less desirable for the sow when compared to a pen. One advantage of a sow crate is that sows can be fed individually.

- \* A. True
- B. False

In a pen, a meek sow does not "inherit the earth"; she, often times, simply remain undernourished.

36) If a farrowing unit has good productivity, approximately what is the minimum % of pigs born alive that will remain alive at weaning?

- \* A. 92%
- B. 98%
- C. 80%
- D. 85%

About 5% of piglets are still born. Of those born alive, about 8% can be expected to die before being weaned. Piglets are born in farrowing crates, where the sow is restricted by the bars of the crate from turning around. The purpose of the crate is to decrease the likelihood that the sow will lie down on, and crush, one of her piglets.

37) The following are some environmental factors that help reduce pre-weaning mortality (multiple answers)

- \* A. Heat lamps in creep area
- B. Iron injections to piglets
- \* C. Use farrowing crates
- D. Clip needle teeth

All piglets get an iron injection because they are born anemic. Piglets' 'needle' teeth are clipped soon after birth to prevent injury & infection to pen-mates. However, they are NOT environmental factors. Typical pre-weaning mortality is around 8%.

38) What is the most important way of reducing tail and ear biting?

- A. Clip needle teeth
- \* B. Ensure sufficient access to feed and water
- C. Paint tails and ears with a foul-tasting tincture
- D. Dock tails

Pigs stuck in the queue when accessing food or water tend to bite.

39) Increasing the number of hours of light to stimulate increased egg production is a common practice

- \* A. True
- B. False

One 25-40 watt bulb located above the feed and water area at ceiling height for each 40 sq. feet of pen. Provide 14 to 16 hours of light per day for maximum year round production. Never decrease the lighting period on birds in production or they will stop producing. You will have to add lights in the fall or winter. An inexpensive time clock can be installed to turn lights on in the morning hours and let the birds go to roost with the natural sunset.

40) Excessive feather pecking in birds is thought to be related to

- A. Too little space for each bird
- \* B. Frustrated foraging behaviour
- C. Irritation due to mites
- D. A natural cannibalistic instinct

41) When discussing disease, important host factors are (multiple answers)

- \* A. Breed
- B. Lighting conditions
- C. Feed
- \* D. Age
- \* E. Sex
- F. Temperature

Host factors are characteristics in the host that affect its resistance to disease.

42) A disease that exists in a population of animals at a predictable rate of occurrence is usually

- \* A. Endemic
- B. Pandemic
- C. Epidemic
- D. None of the above

An infection is said to be "endemic" in a population when that infection is maintained in the population without the need for external inputs. Endemics tend to have a stable prevalence and incidence. Epidemics tend to have every increasing rates of incidence because conditions favor the agent. A pandemic is an epidemic that spans large regions (e.g. like the world, or North America)

43) A farmer mentions that there were 2 pig deaths per 100 pigs at risk per month over the past year. She is referring to

- A. Prevalence
- B. Specificity
- \* C. Incidence
- D. Sensitivity

The incidence of disease is defined as the number of new cases of disease occurring in a population during a defined time interval. The number is useful to epidemiologists because it is a measure of the risk of disease. In epidemiology, the prevalence of a disease in a statistical population is defined as the total number of cases of a given disease in a specified population at a specified time. Sensitivity and Specificity are statistics related to testing for disease.

44) Leghorns are a breed of

- A. Meat chicken
- B. Cattle
- \* C. Layer chicken
- D. Turkey

The Leghorn is one of the most popular poultry birds around the globe. Another popular layer breed in North America is the Rhode Island Red.

45) Layer hen breeders produce male and female chicks. Sex identification usually occurs how many days after hatching?

- A. 3
- \* B. 1
- C. 5
- D. 7

Male chicks are disposed off in what can best be described as a giant grinding machine. It is believed that they "don't feel a thing".

46) Osteoporosis is a major issue in the egg-laying industry. Which of the following plays the most critical role in preventing it?

- A. Size of egg
- B. Lighting (because it triggers Vit. D production)
- \* C. Pre-lay diet
- D. Density (overcrowding)

47) One of the best ways of ensuring bio-security is to follow the all in, all out method

- A. False
- \* B. True

The all in/ all out management system is the main hygiene measure within the farm and should be applied, along with cleaning and disinfection, in order to interrupt the transfer process of infectious agents amongst groups of animals. The all in/ all out management maximises growth, minimises mortality and medication costs.

48) If a farmer finds newborn piglets lying one on top of the other, it is usually a sign of

- A. Creep area too hot
- B. The sow is rejecting the piglets
- \* C. Creep area too cold
- D. Nothing. Piglets like to cuddle

49) Needle teeth are clipped from newborn piglets

- \* A. To reduce skin infections in litter mates
- B. To avoid future dentition problems
- C. To protect other piglets during the grower stage
- D. None of the above

After birth, several procedures may be performed on piglets to improve their survival chances and/or to prevent future problems. These procedures include disinfecting navels to prevent infections, clipping needle teeth to prevent injuries to other pigs or the sow, giving supplemental iron to improve the blood's oxygen carrying capacity, docking tails to prevent future injury and castrating boars to prevent off-flavored meat.

50) Supply management is used in the Poultry industry to

- A. Limit imports
- B. Maintain prices in the domestic market
- C. Balance domestic and international supply
- \* D. Regulate domestic supply

51) The 5 principles of health management are the

- A. 3 Rs
- B. 6 Ts
- C. 4 Qs
- \* D. 5 Ws

The principles of health management are neatly encapsulated in the 5Ws : What, Who, When, Where, Why. What – characteristics of disease. Who - characteristics of diseased hosts (age, breed, sex, etc). When – frequency of disease. Where – spatial pattern. Why – What has changed - Determinants

52) Vaccination helps herd health primarily by

- \* A. Reducing the number of susceptible individuals
- B. Killing the agent before an epidemic takes control
- C. Ensuring that none in the herd get the disease
- D. None of the above

The Reed-Frost model addresses the spread of infectious disease. It shows that although on an individual basis a vaccine may NOT offer 100% efficacy, vaccination of a herd might reduce the spread of the virus because the number of susceptible individuals will reduce.

53) An attempt to eliminate an agent of disease from a farm makes most sense

- A. If it is feasible and economic to do so
- \* B. If the agent needs the host to survive
- C. If the herd has never been exposed to it
- D. If the agent is susceptible

54) With regards to livestock, clinical tests are best applied when prior probability of disease is

- A. 10-20%
- B. Greater than 90%
- C. Negligible
- \* D. 40-60%

This is probably related to the cost:benefit ratio

55) Carrying out multiple (different) tests in parallel usually

- A. Decreases sensitivity, increases specificity
- B. Decreases sensitivity, decreases specificity
- C. Increases sensitivity, increases specificity
- \* D. Increases sensitivity, decreases specificity

Sensitivity is a statistical measure of how well a binary classification test correctly identifies a condition. The specificity is a statistical measure of how well a binary classification test correctly classifies cases not belonging to that class. Whoa! Too technical. In lay terms, the greater the % of diseased animals a set of tests identify (as +ve), the more sensitive it is. Specificity related to the number of false positives. When a test is very specific, it will not show +ve for any condition other than the one being tested for. Or, the % of negatives identified among those who don't have the disease would be very high.

56) Productivity (for example, in terms of milk production) tends to affect social status of animals within the herd

- \* A. False
- B. True

57) When considering environmental factors that affect disease, toxins would be considered a biotic factor

- \* A. False
- B. True

Biotic factors include flora, fauna and microorganisms. Air, soil, water, climate, toxins are abiotic factors.

58) Selenium deficiency is common to the Great Lakes region. This would be a "Macro" environmental factor

- \* A. True
- B. False

Micro – Cage or stall environment; Local – Farms within a county affected by excessive rain; Macro – Province, country, geographic region.

59) When discussing disease susceptibility, it is quite uncommon for host factors to interact with environmental factors

- \* A. False
- B. True

Disease susceptibility is almost always related to a combination of host, agent and environmental factors. For Example -Pneumonia problems in 6 month old calves could be due to a combination of: Waning Colostral Immunity (Host Factor) AND Change in Location - Different Barn with Poor Ventilation (Environment).

60) The key defining characteristic of a zoonotic disease is that it infects multiple species of animals

- A. True
- \* B. False

A zoonosis is any infectious disease that may be transmitted from animals to humans or from humans to animals. Examples are rabies, lyme disease, ringworm, toxoplasma, avian flu.

61) A disease will never switch from being endemic to becoming epidemic.

- A. True
- \* B. False

A endemic disease normally has a predictable long-term balance between host and agent. However, if environmental, host or agent conditions change, the balance may tip in favor of the agent, triggering an epidemic. For example, the common cold is endemic; if the virus mutates to a version that humans don't have protection against, it can rapidly become epidemic (depending on environmental conditions). As time goes by, people develop resistance to the mutation and it subsides to being endemic again.

62) Risk rate is synonymous with prevalence

- A. True
- \* B. False

Risk rate is synonymous with incidence. It measures "speed" of occurrence of new cases. Prevalence denotes a static rate, taken at a point in time. For example, if 10 calves in a barn of 100 are lame, the prevalence of lameness is 10%. If 3 calves are new cases (since the last monthly visit), incidence or risk rate is 3%.

63) When a population is dynamic, a simplified approach to calculating incidence or prevalence is to use the average population at risk.

- A. False
- \* B. True

64) When a population is relatively stable and the risk period (period between measurements) is short, one usually computes incidence by using the average population at risk.

- A. True
- \* B. False

In such a situation, it's simpler and not very inaccurate to use the "initial population at risk" or the "final population at risk" or the "final population at risk".

65) When the risk period (period between measurements) is long, one usually computes incidence by using the average population at risk.

- A. False
- \* B. True

Incidence = # of first occurrences / [(initial # at risk + final# at risk)/2] X 100.  
For example : A dairy farm has 40 milking cows in January and 60 milking cows in December. During the year 25 new first occurrences of mastitis are recorded. What is the incidence of mastitis? Answer :  $25 / ((40+60)/2) = 50\%$

66) Proportional morbidity is a good indicator of population health

- \* A. False
- B. True

Proportional morbidity is a measurement that only examines the sick population in an attempt to categorize them further. For example, suppose 50 sheep are lame (in an unknown population). Out of these, 20 are lame due to running into a barbed wire fence. The proportional morbidity for lameness due to barbed wire is  $20/50 = 40\%$

67) The crude mortality rate measures deaths due to any causes

- \* A. True
- B. False

68) The mortality rate for a disease compares the number of individuals who died due to that disease with the entire at-risk population

- A. False
- \* B. True

This is unlike the case-based fatality rate that only considers the number of individuals who have that disease in the denominator. For example, out of 100 dairy calves, 25 have diarrhea. Of these 25, 10 died. Mortality rate for diarrhea =  $10/100 = 10\%$  while Case fatality rate =  $10/25 = 40\%$

69) Herd turnover is often used as a synonym for Removal rate

- A. False
- \* B. True

It is usually expressed as a % that represents the number of animals removed divided by the average herd size.

70) The gestation period for pigs is (in days)

- A. 95-98
- B. 130-134
- C. 100-105
- \* D. 114-117

There is very little variation in the gestation period of 114-117 days. The number of offspring per gestation averages about 11 (8-20) with about 5% being born stillborn.

71) Pre-weaning mortality of well-raised piglets is about

- A. 15%
- B. 3%
- C. 10%
- \* D. 8%

About 8% of piglets born alive die before being weaned. Piglets in modern farms are born in farrowing crates, where the sow is restricted by the bars of the crate from turning around. The purpose of the crate is to decrease the likelihood that the sow will lie down on, and crush, one of her piglets.

72) Which of the following offspring are usually born anemic?

- A. Sheep
- B. Goats
- \* C. Pigs
- D. Dogs

After birth, several procedures may be performed on piglets to improve their survival chances and/or to prevent future problems. These procedures include disinfecting navels to prevent infections, clipping needle teeth to prevent injuries to other pigs or the sow, giving supplemental iron to improve the blood's oxygen carrying capacity, docking tails to prevent future injury and castrating boars to prevent off-flavored meat.

73) The biggest advantage of weaning piglets early is

- \* A. More litters per year are possible
- B. The sow undergoes less stress
- C. Pre-weaning mortality reduces
- D. Piglets grow quicker to market weight

Piglets are weaned at 7 to 48 days. The age at weaning is not set in stone and is variable throughout the industry. The advantage of early weaning is that the sow will return to estrus a week after she stops nursing, making more litters per year possible. A disadvantage of early weaning is that it requires a higher degree of nursery attendant competence because the younger piglets are harder to wean successfully.

74) Pork production is divided into the preweaned, 'starter' and 'grower/finisher' stages. The main difference is in the ration. Starter rations have less protein than grower/finisher rations.

- \* A. False
- B. True

Starter rations have 18% protein; grower/finisher rations have 16% protein.

75) With respect to pigs, the starter period lasts from weaning to what age

- A. 70 days
- B. 110 days
- C. 50 days
- \* D. 90 days

Piglets are weaned between 7 to 48 days. The age at weaning is not set in stone and is variable throughout the industry. The starter period usually completes at 90 days while the grower/finisher stage end at about 220 days. Fattened pigs, or hogs, weigh over 100 kgs when marketed. The goal of the pork producer is to market the hogs just before they have reached full maturity, when the balance of growth switches from muscle to fat deposition.

76) The reproductive lifespan of a sow, after reaching sexual maturity, usually runs for how many years?

- A. 9-10
- \* B. 3-4
- C. 12-14
- D. 1-2

Age at first farrowing is about 1 year. Sows are usually culled after producing 8 litters (Parity=8), although HM's Web Resources do indicate that the lifespan of a sow varies from 3-8 years. With a gestation period of 114-117 days and weaning normally occurring between 7 and 48 days of piglet age, gestations per year are about 2.5. An average litter is 11 (8-20) piglets, so that in her life a sow can produce between about 80 to 220 piglets.

77) A sow's estrous cycle, in days, is

- A. 14-18
- B. 25-32
- \* C. 16-22
- D. 23-28

Estrus, itself, lasts just 24 hours. Standing under applied back pressure is the typical sign of heat in the sow. Breeding may be conducted naturally or through the use of artificial insemination. AI is much faster and can be used to import superior genetics.

78) In chicken, an egg takes how long to hatch (in days) :

- \* A. 21
- B. 38
- C. 30
- D. 15

79) Broilers are heavier than roasters

- A. True
- \* B. False

Chickens raised for meat are called roasters or broilers, depending on the weight at which they are slaughtered. Broilers are slaughtered when they weigh 1.7 - 2.6 kg, which usually takes around 38 - 42 days. Roasters are grown slightly longer, to weigh approximately 3 kg or more at slaughter.

80) Broilers are usually given hormones and antibiotics to improve growth

- A. True
- \* B. False

The broiler is normally given a dose of coccidiostats to protect against coccidiosis. Coccidiosis causes the poultry industry to suffer a considerable economic loss, especially in the production of broiler chickens. Chickens are susceptible to at least 11 species of coccidia. Hormones and antibiotics aren't generally used.

81) Since broiler chicken are so hardy, biosecurity is not a huge issue in their raising

- \* A. False
- B. True

Chicken producers raise between 5,000-100,000 chickens at a time, depending on how much quota they own. Most producers raise 6 flocks of broilers per year. Almost all meat birds in Ontario are raised indoors due to inclement weather during the winter months, and due to the risk of disease transmission to commercial birds from wild avian species. Biosecurity is a key management tool in meat bird production, given the huge populations at risk, should a disease outbreak occur.

82) Turkeys are usually marketed at a weight of 5 to 15 kg

- \* A. True
- B. False

Turkey production in Canada is only a fraction of chicken production. Other meat birds raised for human consumption include pigeons, pheasants, emu, and ostrich. Chickens broilers are slaughtered when they weigh 1.7 - 2.6 kg, while roasters weigh approximately 3 kg or more at slaughter.

83) Meat birds are usually caught and slaughtered manually when they reach an appropriate weight

- A. True
- \* B. False

When they are the appropriate weight, meat birds are caught manually in a dimly lit barn to decrease stress. However, the slaughter process is extremely automated, with a single plant killing and dressing millions of birds per week.

84) Ontogeny refers to

- \* A. the development of behaviour over an individual's lifetime
- B. the process of modification of behaviour by fear
- C. imprinting of the newborn
- D. a cancer growth of the amygdala

Ontogeny refers to the development of behaviour over an individual's lifetime, due to the biological processes associated with maturation and/or due to experiential processes of learning. Environmental effects can speed or slow down behavioural development.

85) A Modal action pattern

- A. Refers to single bits of behaviour
- \* B. Refers to stereotyped sequences of behaviour
- C. Is an internal variable that has a number of effects on behaviour
- D. Can be broken down into the Appetitive phase and the Consummatory phase

A Modal action pattern is a stereotyped sequence of behaviour that are triggered by a particular stimulus (e.g. Foals find udder, mating sequence). A reflex is a single bit of behaviour that reliably occurs in response to a stimulus (e.g. eye blink). Motivation refers to an internal variable that has a number of effects on behaviour and biases response in a particular direction.

86) The appetitive phase is part of

- \* A. Motivation
- B. Modal action pattern
- C. Reflex
- D. None of the above

Motivation refers to an internal variable that has a number of effects on behaviour and biases response in a particular direction. It can be broken down into 2 phases - the Appetitive phase in which the animal is seeking the biologically relevant stimulus, and the Consummatory phase during which the animal is interacting with the stimulus. A Modal action pattern is a stereotyped sequence of behaviour that are triggered by a particular stimulus (e.g. Foals find udder, mating sequence). A reflex is a single bit of behaviour that reliably occurs in response to a stimulus (e.g. eye blink).

87) Redirected behaviour usually happens

- A. Due to a single external stimulus
- \* B. During situations of conflicting motivations
- C. As part of a Modal action pattern
- D. When a stimulus changes

During conflicting motivations, animals can react by (1) Redirecting behaviour - aggression toward subordinate during social conflict (2) Vacuum activities - behaviour in the absence of biologically relevant stimulus (3) Displacement behaviour - performance of seemingly unrelated and irrelevant behaviour (4) Chronic stress response.

88) Emotional responses and feelings are usually

- \* A. Rooted in lower-level processes
- B. Under conscious control
- C. Triggered in the Hippocampus
- D. None of the above

The amygdala, a component of the limbic system, is believed to produce emotional responses, whereas the hippocampus consolidates memory from emotional experiences using inputs from the amygdala as well as other presenting stimuli (sight, sound, smell, etc).

89) With respect to Ontogeny (development of behaviour), a "Critical" period differs from a "Sensitive" period as follows

- A. Critical periods typically occur during adolescence
- B. Critical periods have larger impacts on future behaviour
- C. Sensitive periods have larger impacts on future behaviour
- \* D. Critical periods are short and precise, whereas Sensitive periods are longer and more flexible

During both critical and sensitive periods, a small amount of experience will have a large impact on future behaviour. However, critical periods refer to situations when the time period is short and precise (like establishing of the maternal bond during the hours after parturition). Sensitive periods are longer and more flexible, typically occurring during periods of rapid neurological growth.

90) The neonatal, transitional, socialization and juvenile periods are all important in development. The most important period from the behavioural point of view is

- A. Transitional
- \* B. Socialization
- C. Juvenile
- D. Neonatal

For a dog, the approximate timelines are - Neonatal : 0-10 days, Transitional, Socialization : 3-14 weeks, Juvenile : 14 wks to 18 months. Cats - Neonatal : 0-2 days, transitional, Socialization : 2-7 weeks. Horses - Neonatal - 2 hours, Transitional : 2 hrs - 4 weeks, Socialization : 1-4 months.

91) Destructive behaviour in a juvenile dog (under 18 months) is often a result of separation anxiety

- A. False
- \* B. True

A dog suffering from separation anxiety could display destructive behaviour. Dogs from animal shelters are more at risk, but not puppies. Breed variations exist. Peak destructiveness is around 18 months (by which time the owner has usually retired to a lunatic asylum ... just kidding). Never punish, disrupt cues for departure, practise sit-stay to increase tolerance to distance/visual isolation, provide high-value toy when leaving, evict from bedroom.

92) Bite inhibition in dogs is

- \* A. the development of the ability to control the amount of force exerted during biting
- B. a behavioural method that teaches dogs not to bite humans
- C. a type of muzzle
- D. None of the above

93) Imprint training is a technique to

- \* A. Improve handling of foals by interacting with them within the postnatal period
- B. Ensure a newborn animal imprints adequately with its mother
- C. Reduce separation anxiety
- D. None of the above

Imprint training is an inaptly named training technique (since it doesn't involve the neurological mechanisms of imprinting) in which foals are desensitized/habituated to handling and restraint by conducting these activities within the immediate post-natal period.

94) Coprophagy is

- A. Avoidance, for defecation, of locations previously defecated on
- B. Selection, for defecation, of locations previously defecated on
- \* C. Eating of faeces
- D. Covering of faeces by kicking up dirt

Rabbits, cavies (guinea pigs) and related species do not have the complicated ruminant digestive system. Instead they extract more nutrition from grass by giving their food a second pass through the gut. Soft caecal pellets of partially digested food are excreted and generally consumed immediately. They also produce normal droppings, which are not re-eaten. In dogs, coprophagy is usually a behavioural problem. Foals sometimes eat their dam's droppings.

95) The Brambell Report (1965) developed the Five Freedoms as guiding principles for human animal care. One of the freedoms is the freedom to perform natural behaviour

- A. False
- \* B. True

The 5 freedoms are (1) Freedom from hunger, thirst and malnutrition (2) Freedom from pain, injury and disease (3) Freedom from pain and distress (4) Freedom from discomfort (5) Freedom to perform natural behaviour. The 5 freedoms have their origin in a book published in 1964, *Animal Machines*, by Ruth Harrison. The 5 freedoms are often quoted, and have formed the basis of legislation, animal welfare husbandry standards and research priorities, particularly within Europe.

96) Dr. Temple Grandin, an autistic person, is a world renowned professional designer of humane livestock facilities. A large amount of her research is directed towards which type of animal

- A. Sheep
- B. Poultry
- \* C. Cattle
- D. Goats

Dr. Temple Grandin was the subject of an Horizon documentary "The Woman Who Thinks Like A Cow", first broadcast by the BBC on June 8, 2006. One of Dr. Grandin's memorable quotes is, "I think using animals for food is an ethical thing to do, but we've got to do it right. We've got to give those animals a decent life and we've got to give them a painless death. We owe the animal respect."

97) Sentience is/are

- A. dangerous killer programs
- \* B. the capacity to experience subjective states, such as pleasure and suffering
- C. the state of consciousness
- D. none of the above
- E. all of the above

Eastern religions including Hinduism, Buddhism, and Jainism recognize nonhumans as sentient beings. The concept of sentience in animals is fundamental to the Animal Rights movement.

98) There are two basic approaches to animal welfare assessment. They are Input-based methods and Output-based methods. Focus on mortality/morbidity data is an input-based measure.

- \* A. False
- B. True

Input-based methods focus on resources and stockmanship parameters. Examples include feeding & resting space, record-keeping, lighting, etc. Output-based methods focus on the end-product, the animal, looking at parameters that indicate how well they were treated : immune or physiologic parameters, mortality/morbidity, fearfulness, etc.

99) Niko Tinbergen published a paper in 1963 that outlined several approaches on how to answer the question of "why does the animal perform this behaviour?" Which of the following statements regarding this is false?

- A. Ultimate questions explore the evolutionary aspects of animal behaviour.
- B. Function type questions ask how does behaviour improve an animal's biological fitness.
- C. There are two major types of approaches to answering the above question: Ultimate questions and proximate questions.
- D. Proximate questions are more relevant than ultimate questions for understanding how behaviour problems arise in specific animals.
- \* E. Phylogeny type questions ask how does behaviour develop throughout an animal's lifetime.

Phylogeny type questions are a type of ultimate question, which are used to explore evolutionary aspects pertaining to animal behaviour. Phylogeny does ask how the behaviour develops through time, but not at the individual animal level. The phylogeny approach uses comparisons between related species to infer the ancestry of animal behaviour. Ontogeny type questions ask how behaviour develops within an individual animal's lifetime.

100) It is possible to quantify and measure animal behaviour.

- \* A. True
- B. False

Ethograms make it possible to define and quantify behaviour. Behavioural elements are clearly defined in an ethogram as motor patterns. For example, an ethogram for aggressive behaviour in a dog could include: "Threat": Hair on the hackles raised, teeth are visible with lips retracted, tail is held erect, with or without growling vocalizations. "Bite": Oral contact with the opponent. etc. Thus, in an experiment, behaviour can be quantified by measuring the latency (amount of time that passes before behaviour occurs), frequency, and duration of the behavioural elements.

101) Domesticated animals have been called "genetically tame" due to genetic differences that make them more suited to living with humans than their wild counterparts. Which of the following is NOT a characteristic that makes domesticated animals more suited to live with humans?

- A. Neoteny (retention, by adults, of traits previously seen only in juveniles)
- B. Polygamy
- C. Gregarious, i.e. live in social groups
- \* D. Seasonal reproduction
- E. Accepting of novel food

Year round reproduction, and not seasonal reproduction is what distinguishes many domesticated species from their wild counterparts.

102) It is possible to select for tamer individuals in a wild animal population to make a "genetically tame" version of that species.

- \* A. True
- B. False

This was in fact done as an experiment with a captive population of red foxes. After 18 generations of selection for non-aggressive individuals, the selected foxes were naturally tame and behaved and to some extent began to look like dogs. For example, they would roll over for tummy rubs, respond to names, licked faces. They also had droopy ears, their tails turned up at the end, and they had piebald coat colouring.

103) Which of the following statements is TRUE of social groups?

- A. Social hierarchies are usually stable when group members are similar in size and in age
- B. Social stress is highest for individuals at the bottom of the hierarchy
- \* C. Social hierarchies may become unstable if new individuals join the group
- D. Social hierarchies are always linear
- E. Individual recognition is very important, even for very large groups

Social hierarchies may become unstable if individuals join or leave the group, or if group members have health or physiological changes (e.g. in estrus or become sexually mature). Individual recognition is important in small groups, but becomes less important in very large groups. In large groups, animals tend to generalize their expectations of social status, for example an animal in the middle of the hierarchy would not go around challenging every individual it meets. Social hierarchies can be linear, but can also be non-linear. Males and females of the same species often have separate hierarchies as well. Social hierarchies may be unstable when individuals are very similar in size and in age. Also social stress is highest for animals in the middle of hierarchies, rather than those animals at the top or at the bottom.

104) Meta-communication involves communications between two different social groups.

- \* A. False
- B. True

Meta-communication involves a display that sets the context for the behaviour that follows it. An example of meta-communication is the play bow, which signifies that the behaviour following the bow is play, and not an aggressive act.

105) How do genes code behaviour?

- A. By coding proteins that affect an animal's physical and sensory capabilities
- B. By coding proteins associated with the nervous system and coding for neuron density and predetermined synaptic connections
- C. By coding proteins associated with hormones and neurotransmitters
- \* D. All of the above

106) Hormones can "prime" the brain for certain types of behaviour.

- A. False
- \* B. True

We often refer to the "priming effect of hormones on behaviour. For example, maternal behaviour is displayed in response to the stimulus of a newborn only when the female brain is primed with the necessary hormones. As for testosterone, let's not go there!

107) Hormones are used for communication between cells inside an animal's body, but are not used to communicate between animals.

- \* A. False
- B. True

Hormones can be released as pheromones, a type of chemical signalling that can occur between animals. Androgen-based pheromones are released in the urine, and this is why males will often mark their territories with urine.

108) What behaviour is NOT associated with the hormone, testosterone?

- \* A. Affiliative behaviour
- B. Aggression
- C. Sexual behaviour
- D. Singing and territorial behaviour
- E. All of these behaviours are mediated by testosterone

Affiliative behaviour, such as mutual grooming, and formation of maternal & social bonds are associated with opioids and oxytocin and vasopressin, respectively. Testosterone is associated with aggression, sexual behaviour and singing & territorial behaviour.

109) With respect to disease, which of these best describes the 'herd effect'?

- A. A gilt coming from another farm has to be culled because it has arrived with an infectious agent already present
- B. A flock of sheep are turned out to pasture, and 10% acquire an infection from the environment
- C. A cow acquires an agent from its external environment, is quarantined from the herd, but still dies
- \* D. A goat acquires a transmissible disease sub-clinically, and spreads it to the herd, where it manifests and causes a 30% mortality

The correct answer is D. Herd effect is described as the interaction of the individuals, which relates to the Reed Frost model (# of susceptible individuals x length of contact). Answers A and C do not promote contact between the infected individuals and the herd, and in case B, the sheep acquire the infection from the environment, not each other.

110) Which of these is the correct definition of "infectious"?

- A. The ability to spread from host to host
- B. The ability to manifest clinical signs in a host
- C. The ability to kill a host
- \* D. The ability to invade a host

Note that "the ability to spread" is the correct definition of 'contagious'. All contagious agents are infectious, but the reverse is not true.

111) If an animal is classified as 'diseased' due to an agent, what is true about it?

- \* A. the agent is present and the host is manifesting clinical signs
- B. the agent is actively spreading from animal to animal
- C. the host is in the final stages of the disease and will soon die if not treated
- D. the agent is present, but the host is not manifesting clinical signs

By definition, the diseased state is the manifestation of the agent in the host. This means that there must be a type of clinical sign to classify the animal as diseased.

112) Selective culling is which of the following methods of disease control?

- A. Control
- \* B. Eliminate
- C. Prevent
- D. None of the above

ELIMINATE - removal of specific pathogen (agent) from the environment (animal and non-animal sources). CONTROL - maintain disease at an economically acceptable level (i.e. endemic). PREVENT - minimize risk of disease occurrence. That is, prevent "sufficient cause" and control risk factors.

113) Which of the following methods of disease control 'maintains the disease at a economically acceptable level'?

- A. Eliminate
- \* B. Mitigation
- C. Control
- D. Prevent

ELIMINATE - removal of specific pathogen (agent) from the environment (animal and non-animal sources). CONTROL - maintain disease at an economically acceptable level (i.e. endemic). PREVENT - minimize risk of disease occurrence. That is, prevent "sufficient cause" and control risk factors.

114) Which of the following best represents the Reed Frost model?

- \* A. The number of infected animals is dependant on the number of susceptible individuals times the probability of adequate agent-transfer contact time between animals
- B. The number of infected animals will rise with the length of contact between animals times the number of infected individuals
- C. The number of infected animals will rise exponentially proportional to the gross number of agent present times the number of susceptible individuals
- D. The number of susceptible animals will decline with time

The reed Frost model states that  $C_t$  (cases over time) =  $S$  (susceptible individuals) x Probability of adequate contact

115) Under which of the following circumstances is vaccination most likely to be employed?

- A. Annual vaccine cost per animal is high
- \* B. Expected incidence is high
- C. Probability of vaccine reaction is high
- D. Number of infected animals is high

Expected incidence must be greater than Cost of vaccine / (cost of disease x effectiveness of vaccine). Each of these variables makes sense. The higher the incidence, the more that vaccination will be effective at curbing the disease. The cost of the vaccine will limit the economic viability of vaccination, thus reducing the likelihood of it being used. The vaccine, if highly effective, will offset the cost of the vaccination, especially if the disease is at high incidence. The cost of losing production (or entire animals) will make the vaccine more attractive to use, even at low incidence.

116) What is metaphylaxis?

- A. Mass vaccination at birth, such as seen in chickens
- \* B. Therapeutic levels of antibiotics to treat a subclinical disease
- C. Vaccination of all animals when one animal presents with a disease
- D. None of the above

Metaphylaxis is defined as the timely mass medication of an entire group of animals to eliminate or minimize an expected outbreak of disease. For example, proponents advocate the use of this technique to reduce the impact of shipping fever in groups of "high risk" calves arriving at feedlots.

117) Which of these pets would you recommend to a client with small children looking for an inexpensive pet?

- A. Parrot
- \* B. Budgie
- C. Crocodile
- D. Macaw
- E. Cockatoo

Budgies are easy to keep and are generally good with small children. Macaws are not child friendly. Parrots tend to shy towards one-person animals. Cocatoos are tame, but expensive. Crocodiles, especially the crimson variety, tend not to be good pets. They are more inclined to cut other pets open to locate obscure items like cornual nerves, celiac arteries, and gutteral pouches.

118) What temperature should eggs stay at if the breeder wishes to prevent embryo development?

- A. 30 C
- B. 70 F
- C. 50 C
- \* D. 50 F

About 10C or 50F is ideal

119) Approximately what weight would you expect a healthy broiler chicken raised in Canada to attain by 42 days of age?

- A. 0.5-0.8 kg
- B. 2.5-3.0 kg
- \* C. 1.8-2.0 kg
- D. 1.0-1.2 kg

The growth rates in the last 60 years have risen phenomenally, to the point where there is an expectation of approximately 1.8- 2 kilograms by 42 days of age.

120) Which of the following is vaccinated against while the chicks are still in the shell?

- A. Infectious bronchitis
- \* B. Marek's disease
- C. Avian encephalopathy
- D. Irritable bowel syndrome
- E. Transmissible gastroenteritis

The vaccination for Marek's disease is given at day 18 of egg incubation. This is simple, because at this age, the eggs are being moved from the setter to the hatcher. While they are suctioned up, a needle pops a tiny hole in the egg and injects vaccine into the fluids surrounding the embryo. When the yolk is taken up, the vaccine will be as well. Combined with maternal antibodies formed from vaccination of parent flocks, the chickies will be protected for some time. The other option for Marek's vaccination is hand-vaccination of day-old chicks. Chicks are pressed against an injection machine that pops the vaccine subcutaneously into their fuzzy yellow little chicken necks.

121) Which of the following is not a standard method of vaccinating chicks?

- A. Water vaccination
- B. Eye drop vaccination
- \* C. IV vaccination
- D. Spray vaccination

122) Which of the following is a side effect of the rapid growth in broiler chickens?

- A. Decreased egg production
- B. Leg myopathy / deformity
- C. Ascites
- D. Feather-loss syndrome
- \* E. B and C

Both leg deformities and ascities (as a result of right heart failure) are consequences of rapid growth.

123) Which method of killing chickens is most prevalent in North America?

- \* A. Electrical Stunning
- B. Asphyxiation
- C. Spiking
- D. Argon Gas

Argon Gas has begun to be used in the UK, but has not gained wide usage in North America.

124) On average, how long does it take a chicken to form an egg?

- A. 30 hours
- B. 20 hours
- C. 48 hours
- \* D. 26 hours

The average laying hen produces about 285 eggs per year.

125) Which of these is not an economical factor to a producer?

- \* A. Egg taste
- B. Egg numbers
- C. Egg quality
- D. Egg size

Originally, egg colour wasn't very relevant, economically speaking; however, certain producers are actually targeting ethnic groups that have certain colour preferences.

126) Why is HACCP important?

- A. It sets standards for scientific research
- B. It sets standards for fair treatment of poultry
- \* C. It sets standards for biosecurity
- D. It sets standards for egg quality

Hazardous Analysis Critical Control Points is an alternative to end-product testing, and emphasizes prevention before the resultant end-products must be disposed of.

127) An animal with BSE is diagnosed as positive for BSE if

- A. animal shows signs of temperament change (i.e. increased aggression, avoidance of humans)
- B. animal is showing neurological signs such as inability to rise/move hind limbs, appears blind, lack of co-ordination, change in posture
- C. decreased milk production and weight loss although animal has increased appetite
- D. there is hypersensitivity to sensory stimuli
- E. all of the above
- \* F. none of the above

BSE (bovine spongiform encephalopathy) can only be diagnosed during a post mortem. If the grey matter of the brain appears vacuolated under a microscope then the animal is considered positive for BSE. All the other options on the list are what you might find during a physical exam and general inspection of the animal; yet they are not confirmatory signs of BSE. The displayed symptoms merely suggest that BSE should be considered in your list of differential diagnoses. (FYI: these symptoms can last 2-6 months before an animal dies).

128) The Reed-Frost model of Disease deals with disease spread and how it relates to host, environment, and time.

- A. True
- \* B. False

The Reed-Frost model looks at the rate of disease spread through a population and how this is influenced by (1) number of susceptible individuals, (2) frequency of adequate contact. Although host, environment, and time are factors in disease, they are collectively referred to as the "Natural History" of disease.

129) In which of the following situations can disease risk be most accurately compared for a select group of individuals for a particular disease agent?

- \* A. between littermates within the same barn
- B. across all age and production groups within a barn
- C. between littermates on different farms
- D. between nonlittermates within the same barn

The host factors of age, breed, and sex almost always influence disease risk. Additionally, the effects of environment must be accounted for in order to separate the host from the environment differences, which will give a more accurate comparison (ie. same barn, presumably they grow in same conditions). Animals of different ages and breeds are housed and managed differently.

130) The strategies used for clinical diagnosing are:

- A. Pattern recognition
- B. Use of algorithms
- C. Complete or exhaustive
- D. Hypothetico-deductive
- \* E. All of the above

All of these approaches may be used during evaluation of a case in order to arrive at a definite diagnosis of a disease. The hypothetico-deductive approach is the preferred methodology. Diagnostic hypotheses are gradually refined as the veterinarian proceeds from the presenting complaint up to clinical tests.

131) What are the problems in determining whether an agent is responsible for the disease?

- A. We can easily determine whether the agent is in the host or the environment but do not know its pathogenicity
- B. The distribution of the organism in the environment can be known, but the agent may be present in a host carrier animal.
- \* C. The distribution of the organism in the environment may NOT be known, and the agent may be present in the host carrier animal

It is important to assess whether a pathogen is present or not in contributing to a specific disease. This is often hard to assess since it would require testing even the healthy animals for presence of carrier animals; also it requires testing all places in the environment to see if it is present/fits condition required for host survival.

132) Which of the following is the single most important step taken to avoid BSE in the food supply?

- A. ruminant-to-ruminant feed ban
- \* B. removal of specified risk material (SRM) from at-risk individuals
- C. surveillance program
- D. import restriction from BSE positive countries

Removal of specified risk material (SRM) is the most effective way to prevent spread of BSE into the food chain. Such material includes the skull, brain, spinal cord, intestines, and trigeminal nerve (where the prions that cause BSE are thought to be housed). The at-risk population include cattle 30 months of age or older.

133) Descriptive epidemiology is important because it

- A. Helps us understand what diseases/factors are common for host and environment
- B. Assists us in preventing disease
- C. Helpful when investigating a disease outbreak
- D. Is a useful business practice tool for understanding clients and animals
- \* E. All of the above

Descriptive Epidemiology is used to describe the "What" of disease relative to the "Where", "Who" and "When". Describing the "What" is imperative for diagnosing and treating disease.

134) Components of the host factors of disease include

- A. Physiologic states of the animal
- B. Genetic factors
- C. Intact animal vs. spayed or castrated
- \* D. All of the above
- E. None of the above

All are factors intrinsic to the host. Physiologic states are included under the Age and Sex components of host factors (such as change in hormone production or reproductive status). Genetic factors are included as breed specific host factors. Intact/Castrated is a component of the Sex host factors.

135) Is there always a clear distinction between the impact of host factors versus those of environmental factors?

- A. Yes
- \* B. No

Animals of different ages and breeds are often housed and managed and fed differently. Therefore it is difficult to separate the environmental differences from the host differences because there is no uniformity in how the different groups are managed.

136) The rate at which a disease may spread through a herd depends on

- A. The number of susceptible individuals
- B. The environment
- C. The frequency of adequate contact between individuals
- D. Both a) and b)
- \* E. Both a) and c)

This is directly from the notes. This assumes that disease is already present in the population so the environment component is irrelevant (disease already exists in the environment) Therefore the determining factors are whether or not an individual has adequate contact with the agent (infected animal) and whether or not the individual has adequate immunity (is or is not susceptible).

137) Which of the following is NOT true?

- A. Boosting herd immunity can decrease the risk of disease
- B. Host Factors almost always influence disease risk
- C. The risk of disease can be diminished by limiting contact (decreasing animal density)
- \* D. There is always a clear distinction between the impact of host factors and that of environmental factors
- E. Herd immunity means that a group of animals collectively have a resistance to infection

138) When analyzing disease outbreaks, one should consider host factors before considering environmental factors

- A. False
- \* B. True

139) With respect to disease, a combination of factors that constitute sufficient cause

- \* A. Are not elements of Host, Agent or Environment factors
- B. Are usually a single factor (determinant)
- C. Always produce a disease
- D. None of the above
- E. All of the above

Sufficient causes are a group of factors that occur together to always cause disease. This is opposed to Necessary causes which must be present, but alone do not necessarily cause disease.

140) Which if the following is true?

- \* A. An endemic disease suggests a long-term balance between agent and host that makes the disease incidence predictable
- B. Epidemics occurs when there is a balance between host and agent
- C. Sporadic disease has no agent and therefore disease does not occur
- D. An epidemic disease is one in which the agent is present but disease occurs infrequently and is not readily predictable
- E. None of the above is true

141) When considering environmental factors, it is necessary to consider:

- A. Micro Environment
- B. Local Environment
- C. Macro Environment
- \* D. All of the above
- E. None of the above

Micro – Cage or stall environment; Local – Farms within a county affected by excessive rain; Macro – Province, country, geographic region. Because they are interconnected all these environments should be considered when investigating the environmental impact on disease

142) The reason for clipping a piglet's needle teeth is/are:

- A. to protect the piglets from harming one another
- B. to encourage the sow to provide more milk to her piglets
- C. to prevent the sow's udder from being damaged by her piglets
- \* D. all of the above
- E. none of the above

All of the above are reasons for clipping a piglet's needle teeth. By removing the sharp needle teeth, the piglets will be less able to cause damage to one another while fighting and will be less apt to harm the sow's teats and udder while nursing. As a result, the sow will be more willing to nurse her piglets.

143) What is the most widely consumed meat worldwide?

- A. turkey
- \* B. pork
- C. beef
- D. fish
- E. chicken

Despite religious constraints, pork ranks as the #1 meat consumed (comprises 38% of the world's total meat protein)

144) Which of the following statements is FALSE?

- A. Biosecurity is a major concern for pig farmers
- \* B. A supply management system ensures both a market and a profit for pig farmers
- C. Most pig farms in Ontario are family owned and operated
- D. The gestation length for sows is ~115 days
- E. The optimal market weight for pigs is 110 kg

Unlike the chicken industry, a supply management system (or quota system) is not used in the swine industry. Producers sell through a marketing board, and price fluctuates.

145) Which of the following is TRUE with regards to pig production?

- \* A. Pigs are most susceptible to disease during the nursery stage
- B. As the number of pig farms is decreasing, so is the total production overall
- C. A continuous flow system will minimize the risk of disease
- D. The best place to give injection for pigs is in the rump, as the large mass of muscle makes it less painful for the piglet
- E. A pre-weaning mortality greater than 3% is unacceptable and may indicate a possible problem

Pigs are most susceptible to disease during the nursery stage. This is because they are no longer receiving passive immunity from their mother and their own immune system has not fully developed yet. Pre-weaning mortality should be less than 10%. Although there is an abundance of muscle in the rump, injection should be given in the neck to prevent damage and scarring to the rest of the body (which is more valuable).

146) Artificial Insemination (AI) is often used for swine because:

- A. fewer boars have to be kept on the farm
- B. a single boar can ejaculate up to 500mL of semen, and this is enough to impregnate up to 30 sows by AI
- C. the best possible genetic stock can be used
- D. boars can only be used up to 3 times per week in natural breeding
- \* E. all of the above are true

147) All of the following occur during "piglet processing" except:

- A. males are castrated
- B. tails are docked
- C. needle teeth are clipped
- \* D. blood sample is taken
- E. iron administration

A blood sample is not routinely taken from piglets during piglet processing.

148) A castrated male pig is called a:

- A. Boar
- B. Steer
- C. Gilt
- \* D. Barrow
- E. Buck

149) What does the term "parity" refer to?

- A. the high-pitched squeal that pigs make
- B. when babies leave their mother to live on their own
- \* C. the number of times a sow has farrowed
- D. the disease status of an animal
- E. the fact that some species choose one mate for life

Parity refers to the number of times a sow has given birth. Sows for example are kept for a parity of 6-7 before being culled.

- A. The least expensive test available
- B. The most expensive test available
- C. The test that provides the most value for money
- \* D. The best available test available

A hypothetical ideal gold standard test has a sensitivity of 100% (it identifies all individuals with a disease process; it does not have any false-negative results) and a specificity of 100% (it does not falsely identify someone with a condition that does not have the condition; it does not have any false-positive results). In practice, there are no ideal gold standard tests. Because tests can be incorrect (either a false-negative or a false-positive result), results should be interpreted in the context of the history, physical findings, and other test results in the individual that is being tested. It is within this context that the sensitivity and specificity of the gold standard test is determined. Quite often the gold standard test is not the test performed in a particular individual. In fact, many gold standard tests are not performed in the clinical practice of medicine at all. This is because the gold standard test may be difficult to perform or may be impossible to perform on a living person (i

151) With respect to sensitivity, specificity, positive predictive value and negative predictive value, which statement is true?

A. Sensitivity is directly related to the specificity : that is, if you know one, the other can be calculated

\* B. One usually knows, beforehand, the sensitivity and specificity of a test

C. The manufacturer of the test normally indicates the positive predictive value of the test

D. The positive predictive value is directly related to the negative predictive value : that is, if you know one, the other can be calculated

The manufacturer of a test normally indicates its sensitivity and specificity - for example, a common heartworm test (IDEXX SNAP® Canine Heartworm Antigen Test) is reported by the manufacturer to have a sensitivity of 98% and a specificity of 99.9%. Sensitivity is not directly related to specificity ... although, quite often, the more sensitive a test, the less specific it tends to be. The positive predictive value and negative predictive value of a test depends not only on sensitivity and specificity, but also on the real-world disease rate of the population (prevalence) in which the test is being used. As prevalence reduces, so also does the positive predictive value while negative predictive value increases ... and vice-versa.

152) A screening test is usually a cheap test that identifies candidates that require further testing (to confirm disease in them). The ideal qualities of a screening test are :

A. Very high specificity, reasonable sensitivity, quick

\* B. Very high sensitivity, reasonable specificity (>80%), quick

C. Reasonable sensitivity and specificity, quick

D. High specificity and high sensitivity, quick

Screening tests are usually used on populations with a low risk of the disease in question. The ideal screening test should be able to identify close to all individuals that have the disease (very high sensitivity). Inevitable false-positives that occur (reasonable specificity) would be 'cleared' in the next stage of testing.

153) Maximum information is gained from a test when the prior probability of disease is around

\* A. 50%

B. 10%

C. 90%

D. 1%

154) When referring to "test accuracy", one is taking into account

A. Either sensitivity or specificity, depending on the prevalence

B. Specificity

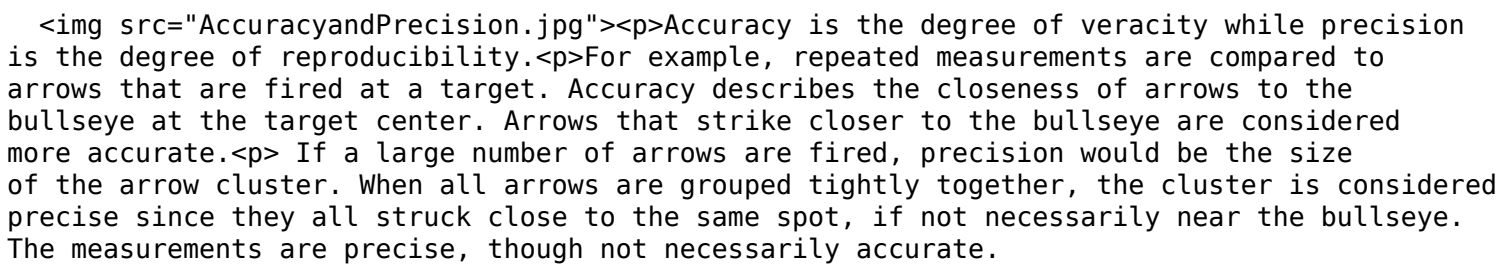
\* C. Sensitivity and specificity

D. Sensitivity

Test accuracy is measured as follows :  $(\text{Sensitivity}\% + \text{Specificity}\%) / 200$

155) Test precision refers to

- A. Sensitivity, specificity and prevalence
- \* B. The ability to return the same answer in multiple trials on the same sample
- C. Specificity
- D. The correctness of the test

Accuracy is the degree of veracity while precision is the degree of reproducibility. For example, repeated measurements are compared to arrows that are fired at a target. Accuracy describes the closeness of arrows to the bullseye at the target center. Arrows that strike closer to the bullseye are considered more accurate. If a large number of arrows are fired, precision would be the size of the arrow cluster. When all arrows are grouped tightly together, the cluster is considered precise since they all struck close to the same spot, if not necessarily near the bullseye. The measurements are precise, though not necessarily accurate.

156) Test "cut points" are related to

- \* A. Tests that return continuous results
- B. Modifying a result based on "expected prevalence"
- C. Making decisions based on prevalence
- D. Adjusting for sensitivity and specificity

Many tests yield continuous numbers. When interpreting these numbers, it is necessary to set a 'cut-point' to separate healthy from diseased animals. Usually, the cut-point is set such that sensitivity and specificity is optimized. Modifying a cut-point involves a trade-off between sensitivity and specificity.

157) Sequential testing is carried out by

- A. Running a second test all individuals
- B. Running a second test only if more than a pre-determined % (usually 1-5%) are positive on the first one
- C. Running a second test on the ones that test negative to the first one
- \* D. Running a second test on the ones that test positive to the first one

In a sequential test, one test is first performed. The 2nd test is run only on the positive reactors from the first test. Ideally, the 1st test is cheap, but has a high sensitivity. The 2nd test has high specificity (and is often more expensive). The general idea behind sequential testing is to reduce the overall cost of detecting an overwhelming majority of the diseased animals.

158) In the first test of a sequential test on 553 animals, 45 were actually diseased and tested positive, 8 were actually diseased but tested negative, 10 were healthy but tested positive and 490 were healthy and tested negative. The 2nd test would be carried out on how many animals?

- A. 490
- B. 553
- C. 53
- \* D. 55

In a sequential test, one test is first performed. The 2nd test is run only on the positive reactors from the first test. In the example, the 2nd test would be run on 45 (diseased, tested positive) plus the 10 that were healthy, but tested positive. Ideally, the 1st test is cheap, but has a high sensitivity. The 2nd test has high specificity (and is often more expensive). The general idea behind sequential testing is to reduce the overall cost of detecting an overwhelming majority of the diseased animals. Note that when 2 tests are combined as in sequential testing, the sensitivity tends to decrease (some of the positives returned by the first test return a negative in the 2nd test) while the specificity tends to increase (number of false positives reduce).

159) In the first test of a sequential test on 500 animals, 50 tested positive. In the 2nd test, 25 of the 50 tested positive. The overall sensitivity and specificity

- A. 10% and 97.5%
- B. 50% and 90%
- \* C. cannot be determined
- D. 50% and 97.5%

Without knowing the true state of the animals (which are actually diseased), it is impossible to determine sensitivity or specificity.

160) Sometimes 2 different tests (for the same disease) are conducted on each individual at the same time. These results can be interpreted in

- A. series or sequential
- B. sequentially only
- C. sequentially or in parallel
- \* D. series or parallel

When 2 different tests are conducted at the same time, they can be interpreted in series or in parallel. Series, by definition, means that both tests must return a positive to call the animal positive (note that this returns the same result as a sequential test). Parallel interpretation means that only one test needs to be positive to call the animal positive. Series interpretation, like sequential testing, increases specificity at the cost of sensitivity. Parallel interpretation of 2 tests increases sensitivity at the cost of specificity. The choice of which interpretation one uses depends on the relative consequence of a false positive versus that of a false negative.

161) The gestation period for horses is

- \* A. 320-350 days
- B. 115-120
- C. 380-400
- D. 280-300

Some of the facts with regards to foaling :<ul><li>The gestation period is 320 -350 days. </li><li>Number of offspring per gestation: 1 foal; 2% twinning rate </li><li>Birth Weight: 25-75 kg (huge breed variation) </li><li>Number gestations per year: 1 </li><li>Length of birthing process : From breaking of water usually less than 30 min (VERY RAPID). </li><li>Expulsion of Placenta: Usually within 3 hrs. If > 6 hrs, veterinary assistance required. </li><li>Veterinary Intervention in Birth: A veterinarian is not required for foaling, but the mare should be monitored closely for difficulties.</li></ul> To understand some of the unusual aspects of birth in horses, it is helpful to consider how the species survived before domestication. The horse's defense against predators always has been flight. The strongest and fastest survived and passed on their genes related to speed and agility. Adaptation made the foal one of the most precocious newborns of the animal kingdom. It must be delivered quickly, in a favorable location, and be ready to travel, fast, with its mother in a matter of hours. (In fact, the foal usually stands within 2 hours)

162) With respect to points of a horse, which of the following statements is FALSE?

- A. The knee on the forelimb is equivalent to the hock of the hindlimb
- B. The withers is the bump of thoracic vertebral spine
- C. The chestnut is on the forelimb while the ergot is on the hindlimb
- \* D. The loin and croup are on the dorsal back with the croup just ahead of the loin
- E. The gaskin is on the hind limb



163) <p>This color would best be described as

- \* A. Bay
- B. Dark bay
- C. Roan
- D. Black
- E. Chestnut

<p>

164) Which of the following horse breed do not have races specifically for their own breed?

- A. Thoroughbred
- B. Quarterhorse
- C. Arabian
- \* D. Appaloosa
- E. Standardbred

Breeds such as the **Arabian** are very, very versatile and may be seen in many different sports. **Appaloosas** are found in nearly every discipline. Setting speed records on the race track, excelling at advanced levels of dressage, jumping, games, reining, roping, pleasure, endurance and as gentle family horses. The **Thoroughbred** appears to be more versatile than the **Quarter Horse** which, in turn, seems to be more versatile than the **Standardbred**.

165) Which of the following statements with regards to relatively recent statistics on horses is INCORRECT?

- A. Quarter Horses represented the largest percentage (39.5%) of horses by breed in all regions.
- \* B. Racetracks accounted for 10.1 percent of the equidae and about 10 percent of operations.
- C. Over three-quarters (78.6%) of equine operations had five or fewer equidae in 1997
- D. The primary use of equidae on 66.8% of operations was pleasure.

In fact, racetracks accounted for just 1.1 percent of the equidae and less than 0.1 percent of operations.

166) Which of the following statements with regards to the horse industry is INCORRECT?

- A. Most horses that show are maintained specifically for that purpose
- \* B. Racing is the largest spectator sport in North America and is a multibillion dollar industry, having the highest financial turnover of all horse sports, with racehorses accounting for about 5-8% of total sport horses
- C. The English sector involves Field Hunting, Show Jumping, Dressage, etc
- D. As many as 90% of horses may be classified as pleasure horses
- E. The Western sector involves Trail, Endurance, Driving, 4H Clubs, Rodeo Games, etc
- F. The English sector tends to use Thoroughbred horses, Thoroughbred crosses, European breeds (warmbloods) and grade horses.
- G. The Western sector favours Quarter Horses, Paints and Appaloosas

Racehorses account for less than 1% of total sport horses. In Canada, Standbred racing dominates (76%) Thorough bred racing (23%) and Quarter Horse/Arabian racing (1%).

167) Which of the following statements with regards to the horse industry activity is INCORRECT?

A. Canada is an important producing country for many breeds, and is a major exporter of horses to the US. Ontario-bred Standardbreds, for example, are exported globally, as are Ontario sires.

\* B. Racing is the largest single sector in the horse industry

C. Racing is responsible for the direct employment of approximately 60,000 people in Ontario alone. This figure exceeds that for several other prominent industries such as steel manufacturing, the auto industry and airlines.

Actually, the breeding sector is the largest single sector in the horse industry, and is by far the largest spender of dollars - this is where the greatest investment is made. <p>Racing is the largest spectator sport in North America and is a multibillion dollar industry, having the highest financial turnover of all horse sports, though racehorses account for <1% of total sport horses. The large spectator turnout is in large part a consequence of sanctioned (government-approved, i.e., pari-mutuel) gambling.

168) Which of the following statements with respect to weaning of horses is INCORRECT?

A. Weaning usually occurs between 4 and 6 months.

\* B. Weaning is commenced by introducing the foal to creep feed

C. The name for the animal is weanling (up to 1 yr)

D. Subtraction weaning is when 1 mare is removed from paddock every few days

E. Forced weaning involves removing all foals from mothers at the same time

F. A horse born on May 23 2006 is a weanling till Jan 1 2007, when it is known as a yearling till Jan 1 2007

It is very important that foals are on creep feed after first few weeks of life, especially <b>before</b> weaning occurs. Creep feed can consist of a little alfalfa hay with some grain and free choice grass hay. The grain can be whole or rolled oats, cracked or flaked corn, or rolled or whole barley.<p>The birthday for all horses is January 1, regardless of date of birth. A yearling is the term given to an animal for the first year following its birthday on Jan 1. For Example: a horse born on Aug 23 2001 is a weanling till Jan 1 2002, when it is known as a yearling till Jan 1 2003, then a two year old till Jan 1 2004 etc.

- A. Weaning of dairy calves occurs at 6-8 weeks well before beef calves (6-8 mos)
- \* B. The age of the dam at first calving is, ideally, 24 mos and the gestation period, unlike beef cows, is 300-320 days
- C. Bull calves are usually slaughtered at 6 mos for veal
- D. Breeding is usually by artificial insemination
- E. The ideal (gold standard) calving interval is 12-13 mos
- F. Heifers first bred around 14 mos. They should be at least 350 kgs & 125 cms at withers.

Gestation period for dairy cows is no different from beef cows, 280-300 days. Other birth statistics include : 

- <li>Number of offspring - 1 </li><li><10% twinning rate </li><li>Birth weight - 35-50 kg </li><li>Age of dam at first calving : 22-27 mos (ideal 24 mos)</li></ul>Weaning information<ul><li>Occurs at 6-8 weeks (unlike Beef, which is 6-8 mos) </li><li>Diet prior to weaning : colostrum, milk or milk replacement </li><li>Diet after weaning : It is recommended that calves eat 0.7 kg of calf starter, three days in a row, before being weaned. Calf grower is fed from the first week and is a mixture of grains, soybeans, molasses, vitamins and minerals. Calves should be introduced to hay after a month and to haylage and silage after six months. Water should be offered from the first week. </li><li>Housing : often individually (less disease tx); could be warm-housing or outdoor (less disease) </li><li>Housing after weaning : normally group housing, as they are past critical disease susceptibility stage.

- A. When drying cows off, the aim is to dry cows off 50 to 55 days, and never less than 40 days, before the expected calving date.
- B. Lactation period is about 305 days with peak production at 30-60 days.
- C. During early lactation (4th month), the body score may drop to 2.5, but it gradually gets back to around 3-3.5 at 180 days and 3.5-4 at 270 days. Low producers are fatter.
- \* D. Dairy cows remain in a dairy herd, on average, for around 8-10 years.
- E. About 1.5 lactations are required to recoup growing costs. Most cows are milked for at least 3 lactations.

Dairy cows remain in a dairy herd, on average, for around 5 years, or about 3 lactations, although there are many cows in herds in Ontario over 10 years old. Culling is for poor reproductive performance or milk production, lameness or injuries that are likely to affect performance. <p>Some milking facts : <ul><li>Lactation - 305 days </li><li>About 1.5 lactations required to recoup growing costs; most cows milked for at least 3 lactations. </li><li>Peak production at 30-60 days (over 60 litres of milk from some) </li><li>Milking parlours; some labour involved. 6 minutes per milking. </li><li>Robotic parlours - no labour, cows come/go at will !!! </li><li>Milk is stored at 4 C</li></ul>Body score condition facts : <ul><li>6 key annual checks : midway through the dry period, at calving, and at approximately 45, 90, 180 and 270 days into lactation. </li><li>The goal for ideal body condition score for the dry cow is 3.5. </li><li>During early lactation (4th month), body score may drop to 2.5, but it gradually ge

171) With respect to the dairy marketplace, which of the following statements is FALSE?

- A. By far, the main dairy breed is Holstein
- B. Newborn calves are currently worth around \$200 for a bull and up to \$1,000 for a heifer although dairy cows and bulls which are desired as breeding stock may be priced in the tens of thousands of dollars.
- C. There are about a million dairy cows in Canada, with most of them in Ontario and Quebec
- D. The per capita consumption of milk (84 kg) is gradually reducing which that of cream (8.4 kg) has posted an 80% increase from 20 years ago
- E. The Canadian dairy industry operates on a "dairy year" basis which runs from August 1 to July 31 of the following year.
- \* F. Like the pork industry, Canada's dairy sector functions under a supply management system based on planned domestic production, administered pricing and dairy product import controls.
- G. About two-thirds of milk production is used in the manufacture of butter, cheese, yogurt and ice cream

<ul><li>Canada's dairy sector functions under a supply management system based on planned domestic production, administered pricing and dairy product import controls. </li><li>The CDC (Canadian Dairy Commission) supports the industry by implementing national policies for dairy production, by assessing changes in demand for milk and dairy products and production of milk, and by coordinating the pooling of milk revenue and the market-sharing systems.</li><li>During the 2005 calendar year, total net farm cash receipts from the dairy sector generated \$4.84 billion (processed dairy revenue was \$11.5 billion). This puts the dairy industry in fourth place in the Canadian agriculture sector behind grains, red meats and horticulture.</li><li>About 81% of Canada's dairy farms are in Ontario and Quebec, 13% in the Western provinces, and 6% in the Atlantic provinces.</li><li>Average annual production of a Canadian dairy cow in 2005 - 9,422 kg.</li><li>Main breeds : Holstein (black/white, 93%), Jersey (brown, 4%), Ayrsh

- A. TMR - Total mixed ration
- B. DMI - Dry Matter Intake
- C. CDC - Canadian Dairy Commission
- D. SCC - Somatic cell count
- \* E. BCA - British Cow Association

<b>Breed Class Average (BCA)</b> is a milk, fat and protein production index used by all milk recording programs across Canada. The BCA index allows fair evaluation and comparison for cows of different breeds, ages and seasons of calving. BCA deviations provide an easy way to compare cows. Normally cows with a large negative deviation should be considered for culling. <p><b>DMI - Dry matter intake</b> - Quantity of dry matter ingested by a cow in a 24 h period. Usually 2-4% of body weight during lactation.<p><b>SCC - Somatic Cell count</b> - The number of somatic cells in one milliliter of milk. Somatic cell count increases when the udder is infected (mastitis). Mastitis is the costliest disease of the dairy industry today. It can decrease total milk production by 15 to 20% - as much as \$200 per cow annually.<p><b>TMR - Total Mixed Ration</b> - Mixture of the forages, concentrates, minerals and vitamin supplements of a ration. The total mixed ration has the advantage of offering a balanced ration at each

173) With respect to mastitis, which of the following statements is INCORRECT?

A. The California Mastitis Test (CMT) is a rapid, accurate, cow-side test to help determine somatic cell counts (SCC) in a specific cow.

B. New infections are the highest during the first two weeks of the dry period and the last two weeks of the dry period.

C. It is the costliest disease of the dairy industry today. It can decrease total milk production by 15 to 20% - as much as \$200 per cow annually.

D. About 95% of all infections are caused by *Streptococcus agalactiae*, *Staphylococcus aureus*, *Streptococcus dysgalactiae*, *Streptococcus uberis*, and *Escherichia coli*.

\* E. Mastitis organisms enter the body when poorly kept feed is fed to lactating cows

Mastitis organisms enter the udder through the teat end and streak canal. About 95% of all infections are caused by 

- Contagious - *Streptococcus agalactiae*, *Staphylococcus aureus*, *Streptococcus dysgalactiae*
- Environmental - *Streptococcus uberis*, and *Escherichia coli*.

 New infections - are the highest during the first two weeks of the dry period and the last two weeks of the dry period. New infection rates are also high in early lactation and diminish as the lactation proceeds.