The University of Melbourne
Land and Food Resources

Semester 1, 2004
June 11, 2004

208263 Animal Science & Nutrition

Reading time: 10 minutes
Writing time: 2 .5 hours

This paper has sixteen pages plus the multi-choice answer sheet at the end.

Authorised Materials:

Apart from writing materials, students may bring a simple calculator, which does not have a text storage function.

Instructions to Invigilators:

1. Each student should receive a question paper, an answer sheet for Section A and three written answer booklets for Section B
2. All calculations and other "scrap" writing must be written in the answer books provided and submitted.
3. The question paper must be submitted with the answers.
4. Supervisors at remote locations may contact the subject coordinator on 0419516135 or via reception, Dookie on 0358 339200

Instructions to Students:

1. Total marks 100: Section A - 50 marks. Section B - 50 marks
2. Answer all questions in Section A on sheet provided (back page)
3. Answer questions in Section B in the booklets provided
4. Section B: answer each question in a separate booklet.

Section A Multiple choice (50 marks)

This section has 50 questions. There are four options for each statement – A, B, C, D. Indicate the best option by crossing on the answer sheet provided –

A ~~B~~ C D indicates that you have selected option B

If there is any doubt about the option you have selected, it will be marked incorrect. If there is likely to be any doubt, write the option you have chosen to the right of the answer box.

Select the BEST option

Feed	DM	Analysis of Dry Matter g/kg				
	g/kg	CP	EE	CF	NFE	Ash
1	100	75	10	0	825	55
2	850	85	16	328	496	74
3	230	83	26	365	448	78
4	250	136	40	248	464	112
5	128	266	305	0	375	55
6	860	22	17	402	501	57
7	860	108	17	53	795	26
8	900	212	484	63	194	46
9	900	413	34	104	366	82

Consider the feed table for questions 1 to 3

1. Of the following feeds, which is likely to be a moderate quality grass hay:

   A. 2
   B. 4
   C. 5
   D. 7

2. Which of the following feeds is likely to be the cheapest source of fibre, which might be used to prevent acidosis

A. 3
B. 6
C. 7
D. 9

3. Which of the following feeds is most likely to be whole milk?

A. 1
B. 3
C. 5
D. 9

4. The daily dry matter intake of a 70 kg , ewe is most likely to be:

A. 500 g/d
B. 750 g/d
C. 1000 g/d
D. 1750 g/d

5. Limestone is sometimes added to high cereal grain diets to:

A. decrease the production of ammonia in the rumen
B. increase the palatability
C. increase the calcium level
D. decrease the acidity of the diet

6. Intake of a feed which is high in rumen degradable protein and low in energy may result in:

A. faster rumen turnover
B. greater production of propionic acid
C. a decrease in essential fatty acids
D. increased ammonia absorption

7. Which of the following lists contains only animals where the hindgut is the major site of microbial fermentation?

A. camel, elephant, kangaroo
B. buffalo, horse, rabbit
C. human, horse, rabbit
D. pig, kangaroo, camel

8. Ruminants differ from monogastrics in that:

A. digestion is aerobic in monogastrics and anaerobic in ruminants
B. only ruminants have microbes in their digestive tracts and monogastrics use enzymes to digest food
C. only monogastrics produce hydrochloric acid and ruminants produce

pepsin to digest protein

D. monogastrics use glucose and ruminants use fatty acids as their major energy source

9. One nutritional advantage for pregastric fermenters is:

A they are able to convert cheap, non-protein sources of nitrogen into protein
B. they are able to increase the efficiency of glucose synthesis for production
C. they can utilise high quality protein more efficiently
D. they can produce their own minerals, reducing the occurrence of deficiencies

10. One reason that fibre is required, even on high grain feeds is because:

A. when fibre is chewed, saliva, which contains buffers, is produced
B. fibre scratches the omasum, stimulating contraction
C. the fibre has a higher pH
D. fibre contains special vitamins that stimulate rumen microbes

11. The addition of a high oil supplement to ruminant diets would be limited to low levels because:

A. lipids reduce the energy value of the feed
B. the energy in lipids causes rapid production of lactic acid
C. lipid is rapidly metabolised to ammonia which is toxic
D. rumen microbes are inhibited by lipids

12. Which of the following statements about young ruminants compared to adults is true

A. In young ruminants the abomasum is the major stomach and their digestion is more like that of a monogastric
B. Young ruminants have different microorganisms which digest milk much more efficiently than adults
C. Young ruminants need more fibre to scratch their rumen
D. A), B) and C) are all true

13. In horses, microbial digestion is achieved by:

A. a large sac in the proximal end of the abomasum
B. a large and complex caecum and colon
C. an additional caecum
D. an extended rectum with sacculated pockets

14. Given that a sample of triticale has an energy value of 12.5 MJ/kg DM and a sample of lucerne hay has an energy value of 8.5 MJ/kg DM . What percentage of triticale would give a mix with an energy value of 11 MJ/kg DM

A. 37.5
B. 50.0
C. 62.5
D. 77.5

15. What is a reasonable recommendation for crude protein % DM in a diet fed *ad lib.* to rapidly growing lambs?

A. 5%
B. 15%
C. 25%
D. 35%

16. In a trial with sheep, the diet dry matter (DM) was found to contain 850 g DM / kg fresh weight. The faeces contained 350g DM / kg fresh weight. The sheep ate 1000g of the fresh ration per day and 800g of "wet" faeces were collected each day. What is the dry matter digestibility of the diet?

A. 20%
B. 33%
C. 44%
D. 67%

17. "Metabolisable Energy" in ruminants refers to the energy available after losses in:

A. faeces
B. faeces, and urine and heat
C. faeces, urine and gas
D. urine, gas and heat

18. Rumen Undegradable Protein is :

A. non protein nitrogen
B. protein which stays in the rumen
C. microbial protein which is found in the small intestines
D. dietary protein which is found in the small intestines

19. Fibre length is important in ruminant nutrition because:

A. very short fibres will move through to the omasum too quickly
B. small fibres will not produce sufficient amino acids
C. long fibres cannot be digested
D. long fibres will be regurgitated and lost from the animal

20. Compensatory gain is:

A. the advantage in weight of the heavier animals at the beginning of a growing period.

B the ability of animals which have been restricted in growth to grow more rapidly than better fed animals, when placed on good feed
C. the gain which cannot be measured until the end of the growing period
D. the difference in weight between well fed and poorly fed animals

21. Which of the following is *NOT* a measure of female fertility?

A. ovulation rate
B. pregnancy rate
C. number of offspring born per animal served
D. condition score

22. Which of the following does *NOT* have the potential to improve reproductive efficiency?

A. AI
B. sex determination
C. embryo transfer
D. good management

23. Which of the following will respond to $PGF_2\alpha$?

A. a cow on day 8 of her oestrus cycle
B. a cow on day 2 of her oestrus cycle
C. a cow with a Graafian follicle
D. a cow that is not cycling

24. Which of the following hormones is used for super-ovulation?

A. prostaglandin $F_2\alpha$
B. pregnant mare serum gonadotrophin
C. progesterone
D. oestrogen

25. Which of the following is a long-term behavioural response?

A. orientation reaction
B. startle response
C. flight reaction
D. stereotypy

26. What is a typical response to pain?

A. increased appetite
B. anthropomorphism
C. withdrawal reflex
D. narrowing of pupils

27. Beef with a pH around 5.5 can have better flavour and keeping quality because at this pH

A. proteases such as cathepsins prefer this pH and spoilage microbes do not
B. acid breaks down the connective tissue and releases lipids
C. spoilage microbes reduce lactic acid by breaking down glycogen
D. cold shortening at this pH reduces spoilage and enhances quality

28. Carcass temperature at the start of *rigor mortis* is important because:

A. the strength of rigor contraction is greater below 10 ^{0}C
B. there is more glycogen at higher temperatures
C. carcases at temperatures above 15 ^{0}C do not begin *rigor mortis*
D. calcium is released at temperatures above 5 ^{0}C

29. Pre-slaughter stress or malnutrition can cause dark, firm and dry meat. This is due to:

A. depletion of lactic acid reserves pre-slaughter
B. depletion of glycogen reserves pre-slaughter
C. accumulation of lactic acid post-slaughter
D. depletion of glycogen post slaughter

30. Young calves produce veal which is tender, despite the high concentration of connective tissue.. This is because young animals have

A. more muscle fibres than old animals
B. more glycogen than older animals
C. more soluble connective tissue than older animals
D. less exercise than older animals

31. Myoglobin is

A. a protein which holds water strongly
B. a breakdown product of ageing enzymes
C. a muscle protein which is red when it binds oxygen
D. a compound which bind muscle to bone

32. For a specified market fatness (e.g. fat depth) ewe lambs would be saleable at:

A. similar weights to cryptorchids, but heavier than wether lambs
B. heavier weights than both wether and ewe lambs
C. similar weights to wether lambs, but heavier than cryptorchid lambs
D. lighter weights than cryptorchids or wether lambs

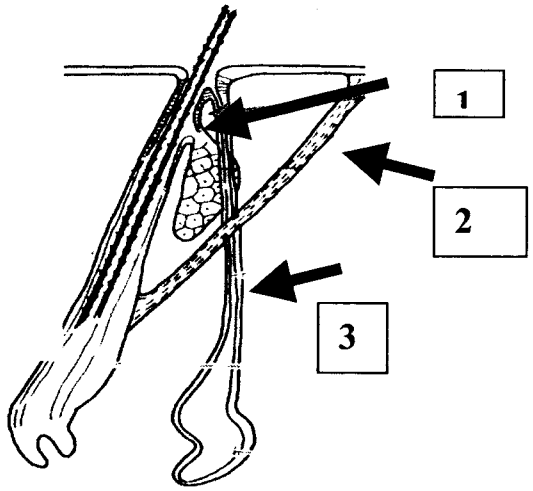
33. The true wool fibre may be described as:

A. a non-medullated fibre
B. a medullated fibre
C. a fibre with a discontinuous medulla
D. a fibre with a secondary medulla

34. Nutrition can affect follicle size, although changes in follicle size are slow. In general, larger follicles produce:

A. fibres with a stronger cuticle
B. fibres with lower staple strength
C. fibres with a thinner cortex
D. fibres with a higher fibre diameter

For Q35 and 36, Consider the following diagram of a fibre producing structure in the skin of a sheep



35. This is a diagram of

A. a hair follicle
B. a primary follicle
C. a secondary follicle
D. a primary and a secondary follicle combined

36. Label 3 indicates

A. a sebaceous gland
B. a suint gland
C. a muscle
D. a medulla

37. After shearing growth in wool length:

A. is increased due to the stress of shedding
B. is depressed due to the removal of follicles
C. is increased due to increased intake
D. is depressed due to reduced intake

38. When suckling or milking occurs, cows "let down" their milk. This is a result of:

A. rising adrenalin levels cause the milk cistern to contract
B. rising oxytocin levels cause the contraction of myoepithelial cells
C. falling prolactin levels stimulate the teat sphincter to relax
D. an increase in both oxytocin and prolactin cause secreting cells to contract

39. Casein is an important protein of milk, which is used in cheese production. It also has a high nutritive value for animal feeding. Casein is:

A. dissolved in milk, and remains after whey proteins have been precipitated
B. precipitated under acidic conditions
C. a lactalbumin which passes on immunity
D. a protein which is precipitated in the presence of immunoglobulin

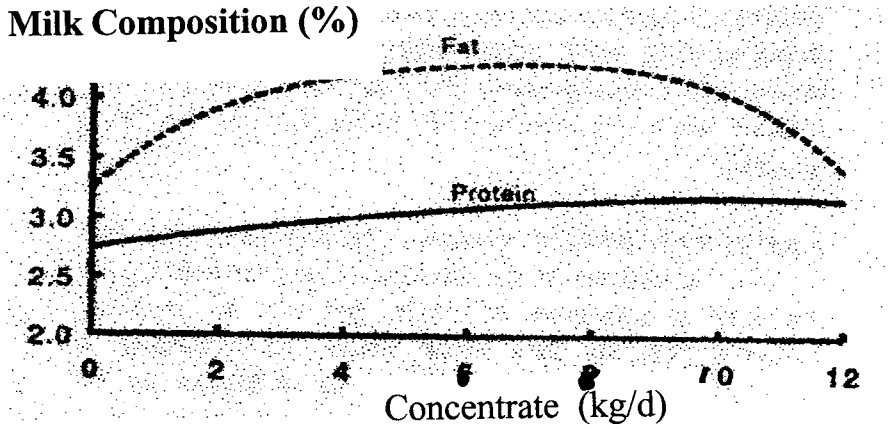
40. When milk yield rises

A. lactose production falls as does the concentration of lactose
B. both lactose production and lactose concentration fall considerably
C. lactose production is not likely to change with milk yield
D. lactose production rises but lactose concentration tends to stay the same

41. Dairy cows in early lactation are likely to lose weight because:

A. they produce colostrum
B. they have depressed intakes while their production increases
C. the fat % in their milk rises up to peak of lactation, increasing energy requirements for production
D. the protein % of their milk rises up to peak of lactation, increasing amino acid and energy requirements for production

Response of dairy cows on pasture and fed increasing levels of concentrate supplement



42. Consider the diagram above. This diagram suggests that
    A. the response of protein to concentrate feeding is less than that of fat at low levels of supplementation
    B. at high levels of concentrate feeding, pasture increases fat and protein percentages
    C. at high levels of concentrate feeding, fat is converted to protein
    D. concentrate should be fed at 6 kg/d

43. After a cross between a homozygous male (***AA***) and a homozygous female (***aa***), one of the male progeny is selected. The gametes of this male will be:
    A. a mixture of sperm with ***A*** and sperm with ***a***
    B. sperm with ***A*** only
    C. sperm with ***Aa*** only
    D. a mixture of sperm with ***AA*** and ***aa***

44. The "Polled" (no horns) allele is dominant in cattle. In the calf crop of a large herd of cattle – 1000 calves – approximately 40 calves are horned. What is the probability that a male calf selected for breeding will be a polled, heterozygous carrier of the horns allele. (Using Hardy-Weinberg assumptions)

    A. 4 in 100
    B. 16 in 100
    C. 32 in 100
    D. 64 in 100

45. **"Naked calf syndrome" or AED** (anhidrotic ectodermal dysplasia), is an X-linked recessive disease which occurs primarily in Holstein cattle. Calves are born with no hair, deformities of the mouth and a lack of sweat glands. These calves die or a culled before mating.

A small number of calves were born with this defect when semen of a normal bull was used over normal cows. We would conclude that:

A. The bull is a heterozygous carrier of the disease
B. The mothers of affected calves are heterozygous carriers of the disease
C. Both sires and dams of affected calves must be heterozygous carriers
D. Both sires and dams of affected calves must be homozygous recessive

46. A gene, which controls coat colour in cattle, has 2 alleles; C^R (red) and C^W (white). The heterozygotes have a roan colour. If roan cattle are crossed to white cattle the following phenotypic ratios would be expected in the offspring:

A. 3 red : 1 white
B. 1 red : 2 roan : 1 white
C. 1 white : 1 roan
D. 1 white : 1 roan : 1 red

47. Given that the population mean for a given trait is 100, and the mean of the selected group is 110, and that the heritability of this trait is 35%.A mating of the selected parents would be expected to produce progeny with a mean of approximately:

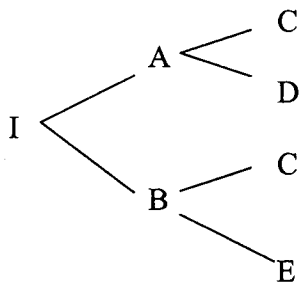
A. 100
B. 104
C. 110
D. 135

48. Given that P = G + E, heritability is an estimate of the proportion of:

A. P controlled by E
B. G controlled by E
C. P controlled by G
D. G controlled by P

(Where P = phenotype and G = genotype)

49. What is the inbreeding coefficient (Fx) in the following pedigree
(Note: $F_X = \Sigma (1/2)^{n+1}$ assuming that C,D and E are not inbred)



A. 0.125
B. 0.250
C. 0.375
D. 0.500

50. In terms of a measured trait, heterosis may be defined as:

A. the proportion of superiority of both parents which is inherited in the progeny
B. the average performance of the progeny
C. the average performance of the progeny divided by the average performance of the parents
D. the difference between the average of the parents and the average of the progeny

END OF SECTION A