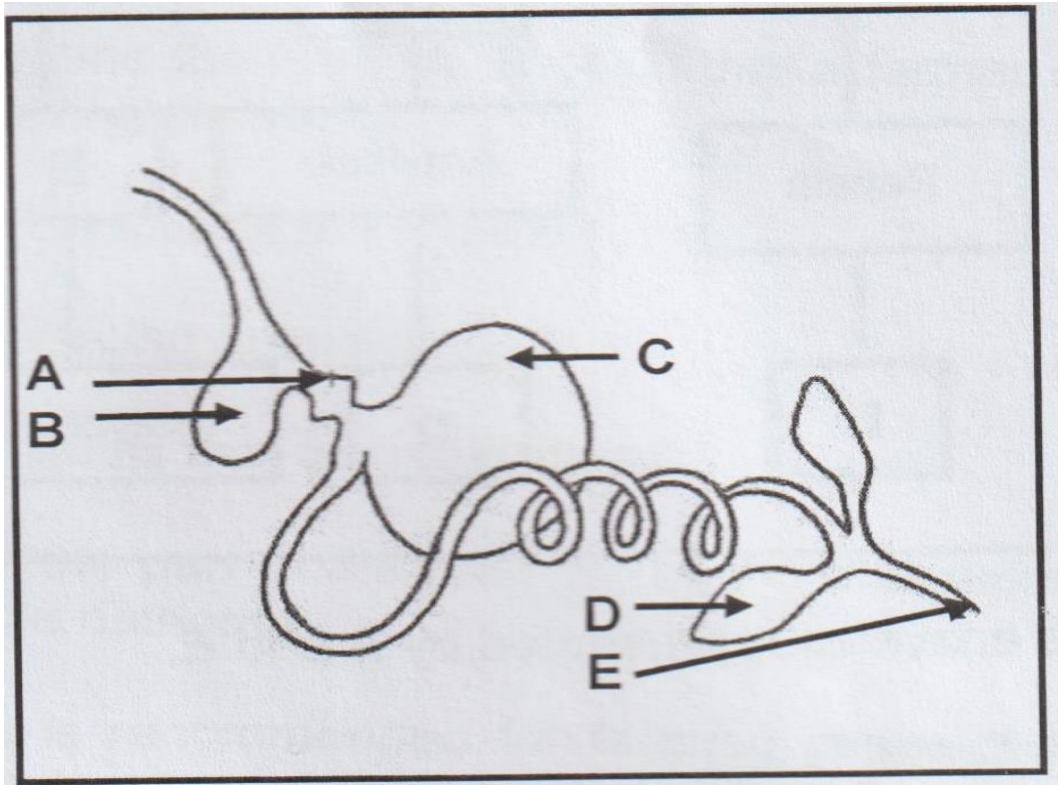
Agricultural Sciences

2020 Autumn camp material

Topic : Animal nutrition

Activity 1 (alimentary canal)

1. The diagram below shows the alimentary canal of a farm animal.



1.1 Name the farm animal represented in the diagram above

Fowl/ Chicken/ poultry √ (1)

1.2 Write down the letter (A-E) of the part of the alimentary canal where EACH of the following occurs:

(a) Physical digestion ---------- (1)

(b) Egestion of undigested food ---------- (1)

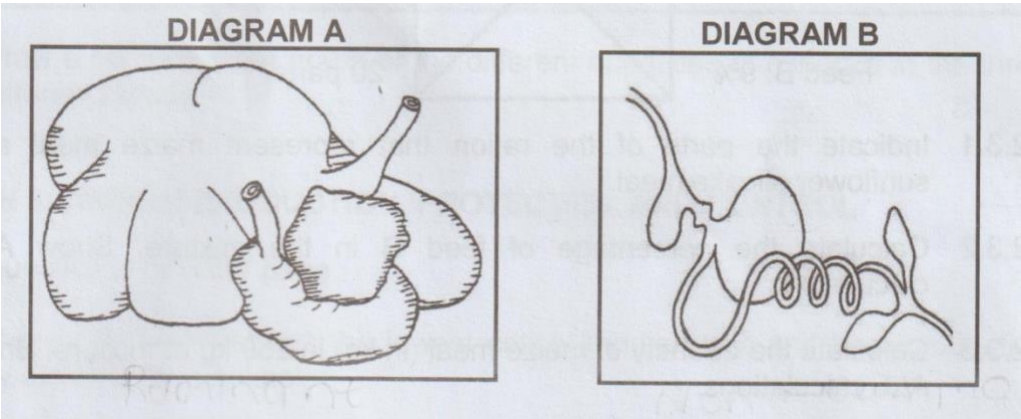
(c) Chemical digestion ---------- (1)

1.3 State the role that part B plays in the digestion of food

---------- (2)

1.4 Write down the letter of the part that corresponds with the stomach of a pig ---------- (1)

2. The diagram below show the alimentary canals of farm animals



2.1 Classify the TWO animals represented by DIAGRAM A and DIAGRAM B respectively. A----------

B---------- (2)

2.2 Name TWO adaptation features of the animal in DIAGRAM A that enables it to survive by feeding primarily on hay.

a----------

---------- ----------

b----------

---------- (2)

2.3 Give a reason why the animal in DIAGRAM B cannot be fed a ration that is high in crude fiber content. ----------

---------- (1)

2.4 Explain how the animal in DIAGRAM A benefits from the consumption of a non- protein nitrogenous substance such as urea ----------

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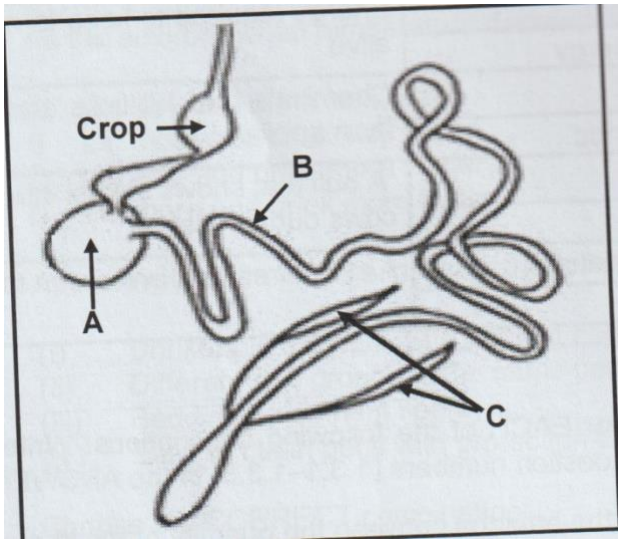
---------- (2)

3. Below is the schematic representation of the alimentary canal of poultry



3.1 Identify part A and B

A ----------

B ---------- (2)

3.2 Name the part of the fowl that fit the following descriptions:

a The joint opening of both the digestive and urogenital canals

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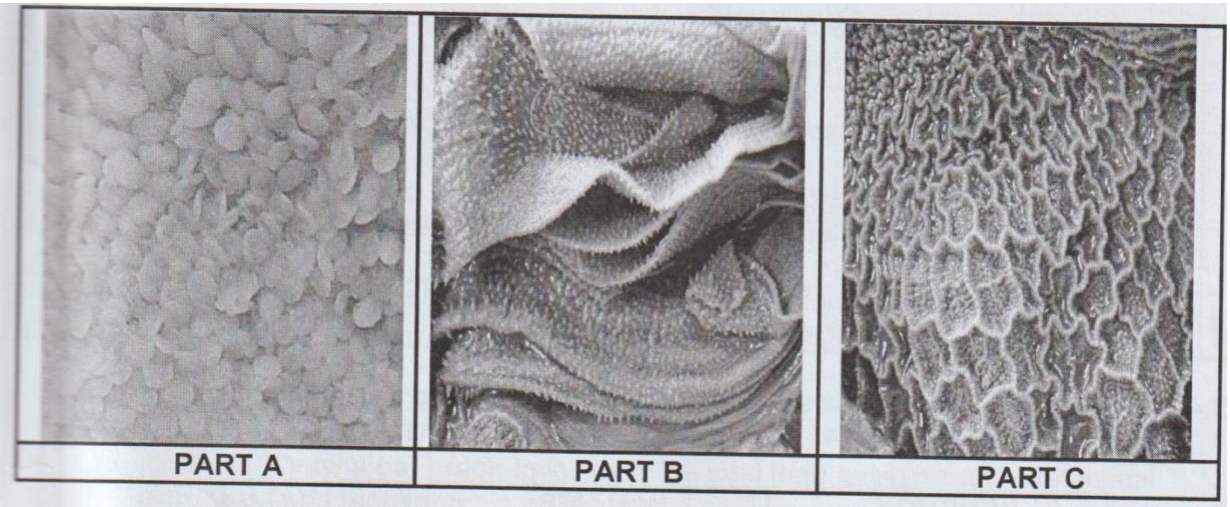
b Where digestion of food by enzymes take place

---------- (2)

4. The photographs below show the internal parts in the alimentary canal of ruminants



4.1 identify part A and C

A ----------

B ---------- (2)

4.2 Briefly describe ONE function of part B ----------

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---- (1)

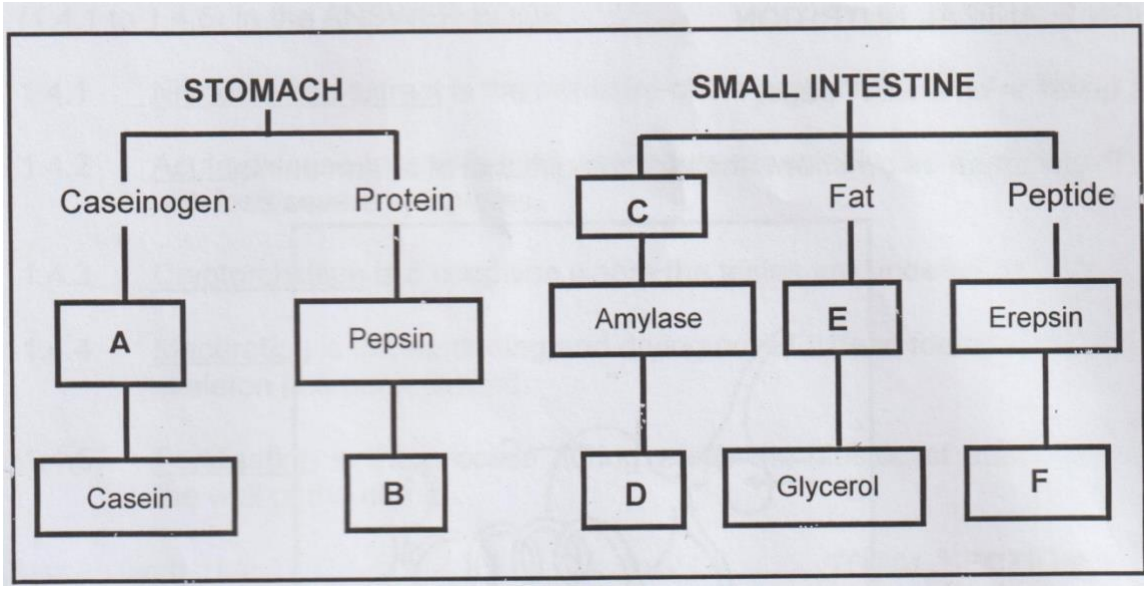
4.3 Name the structures in part A responsible for the production of heat

---------- (1)

4.4 Nam ONE requirement of rumen microbes ----------

---------- (1)

5. Study the schematic representation below which illustrates the digestion of nutrients in the stomach and small intestine.



5.1 Name the enzymes represented by A and B

A ----------

B ---------- (2)

5.2 Identify B,C and F

B----------

C----------

F---------- (3)

5.3 Name the part of the small intestine where the digestion illustrated above occurs ---------- (1)

5.4 Explain the importance of fat emulsification by bile during digestion

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(1)

Total========== {30}

ACTIVITY 2 (digestibility coefficient and types of feed)

1. The information below shows the composition of the ration for farm animals:

Maize meal= 12%

Sunflower oilcake meal= 18%

Lucern hay= 60%

Oats hay = 10%

1.1 From the information above, identify the feed that is an example of EACH of the following:

(a) Carbohydrate rich roughage ---------- (1)

(b) Protein rich---------- (1)

1.2 Tabulate at least TWO differences between roughages and concentrates

(4)

1.3 Why is the ration in QUESTION 2.2 NOT recommended as the only source of feed for lambs less than two weeks old? ----------

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---------- (2)

1.4 State ONE important point about grass hay in rations for mature ewes ----------

---------- (1)

1.5 Briefly explain the term " digestibility coefficient'----------

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---------- (2)

2.

The digestibility coefficient of feed is that portion of feed that is taken in by animal, digested, absorbed and used for body functions. It is not excreted in the manure and is expressed as a % of dry matter(DM). A cow eats 15kg of concentrate with moisture content of of 10% and 16kg material is excreted in the manure with a moisture content of 35%

2.1 Use the appropriate formula to calculate the digestibility coefficient of this feed. Show ALL your calculations.

(5)

2.2 Give the implication of the digestibility coefficient of a feed above

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---------- (2)

3. The table below represents the nutritional information of four feeds labeled A to D.

FEED	DM%	TDN%	DP%	CF%
A	89	68	28	13
B	88	88	9	2
C	89	76	13	11
D	24	55	11	20

An animal ingested 30kg of Feed D in a digestion experiment. The amount of manure released from this feed was measured as 8kg with moisture content of 45%. Calculate DC of feed D . Show ALL calculations.

(5)

3.1 A sheep consumed 10kg of Lucerne with moisture content of 20% and excreted DM of 5kg. Calculate DC. Show ALL calculations.

(3)

3.2 Briefly explain why Feed B can be recommended for non-ruminants---------- (1)

4. Briefly explain how the following factors influence digestibility of feed:

(a) Age of plant---------- (2)

(b) Quantity of feed taken in ---------- (2)

5. Indicate TWO ways on how to increase productivity of feed

(a) ----------

(b) ---------- (2)

TOTAL========== {30}

ACTIVITY 3 (Pearson Square)

1. Briefly explain the term Pearson Square. ----------

---------- (2)

2. The table below represents the nutritional information of four feeds labeled A to D.

FEED	DM%	TDN%	DP%	CF%
A	89	68	28	13
B	88	88	9	2
C	89	76	13	11
D	24	55	11	20

2.1 A herd of dairy cows have a nutritive requirement of 14% digestible protein (DP). Use the Pearsos Square method to calculate the ratio in which Feed A and Feed B need to be mixed to meet this requirement.

2.2 Calculate the percentage of both feeds.

A

(2)

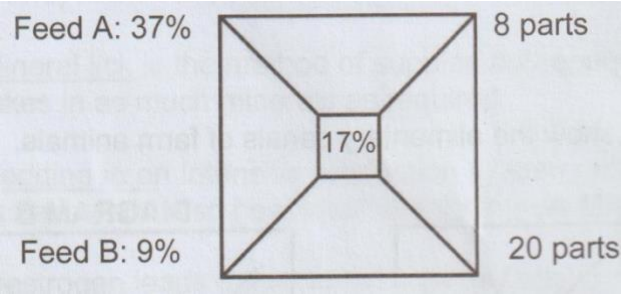
B

(2)

3. A farmer has maize and peanut oilcake meal available for blending a balanced mixture for a dairy ration. The digestible protein requirement for these dairy cattle is 25%. The digestible protein content of maize is 9% and that of peanut oilcake meal is 38%. Use the Pearson Square method to determine the ratio of the maize and peanut oilcake meal in a mixture that will be use to meet the feeding requirements of the dairy cattle

(4)

4. Two feeds (maize and sunflower oilcake meal) are mixed to obtain a ration with the desired protein content.



4.1 Indicate the parts of the ration that represent maize meal and sunflower oilcake meal

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--- (2)

4.2 Calculate the percentage of Feed B in the mixture. Show ALL calculations

(2)

4.3 Calculate the quantity of maize meal (in kg) in 250kg mixture. Show ALL calculations

(2)

5. The table below represents feeds used by farmer to compile a ration to fulfill the protein requirement of dairy cattle

Protein value in the final ration(%)	FEED	Digestible Protein (DP) %
17	Maize meal	9
	Oil-cake meal	44

5.1 Use the Pearson Square method to balance the ration

(3)

6.

A farmer used the maize meal and sunflower oilcake meal to prepare a ration containing 16% DP. The DP of maize meal is 14% and the DP of sunflower oilcake meal is 45%

6.1 Name a feed formulation method used to prepare a ration that contains a DP of 16% by mixing maize meal and sunflower oilcake meal ---------- ---------- (1)

6.2 Use the method in 3.1 to calculate the ratio of maize meal to sunflower oilcake meal

(4)

6.3 Calculate the percentage of sunflower oilcake meal in the mixture

(2)

Total ========== **{30}**

ACTIVITY 4 (nutritive ratio)

1. Briefly explain the term Nutritive Ratio----------

   ---------- (2)

2. The table below shows the composition of two feeds A and B

COMPONENT	FEED A	FEED B
Digestible protein (DP)	8%	12%
Carbohydrates	50%	40%
Fats	22%	5%
TDN	-	67%
NR	-	1:5

2.1 Calculate the percentage of DNNS

(2)

2.2 Calculate the Nutritive Ratio (NR) of feed A

(2)

2.3 Identify the fed (A or B) that is most suitable for fattening animals. Justify your answer.

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---------- (2)

2.4 Indicate the feed A or B that is most suitable for young growing animals. Motivate your answer

----------, ----------

---------- (2)

2.5 State the type of NR for both feed A and B and motivate your answer for each type

A ----------,----------

---------- (2)

B ----------,----------

---------- (2)

3. The table below shows the nutritional composition of two feeds

Nutrient composition	Feed A (%)	Feed B (%)
TDN	80	55
DP	18	5
NR	1:3,4	1:10
CF	9	17

3.1 Identify the feed A or B that will be the most suitable for young growing farm animals

---------- (1)

3.2 Give a reason for the answer to

---------- (1)

3.3 Feed B cannot be recommended as a main feed for non-ruminants. Justify the statement by using the data above

. ----------

---------- (2)

3.4 Briefly explain the relationship between the CF content and the TDN of feed A

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(2)

4. The following are the NR in different feeds:

Feed A= 1:4

Feed B= 1:10

Feed C = 1:8

4.1 Recommend feed (A,B or C) that a farmer can use in EACH of the following situations;

(a) Animals that are fattened ----------

(b) Lactating animals ----------

(c) Animals that are maintained ---------- (3)

4.2 Indicate the part of the ratio in Feed C that represents non- nitrogen digestible nutrients ---------- (1)

4.3 Feed A is recommended for feeding a one- month-old calf. Justify this statement

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---------- (2)

5 Tabulate TWO differences between narrow and wide NR

(4)

TOTAL ========== {30}

ACTIVITY 5 (components of feed, energy levels, BV and a graph)

1. The table below indicates levels of different feeds

TYPE OF FEED	PROTEIN VALUE%	ENERGY VALUE (MJME)
Maize	9	14
Urea	75	0
Lucern	25	8
Barley	12	13

1,1 Identify, from the table above, the feed that is best:

a. as a natural source for young growing calves ----------(1)

b. for finishing off old dairy cows---------- (1)

c. available and cheaper energy source in the North West Province ---------- (1)

d. utilized as the most balanced feed---------- (1)

2. Choose ONE mineral or vitamin from the list below that matches the following description. Write only the mineral or vitamin next to the question numbers (3.1,3.2,3.3,3.4)

Iron,zinc,phosphorus,vitamin B1, vitamin A, vitamin K

2.1 A deficiency of this causes parakeratosis ----------(1)

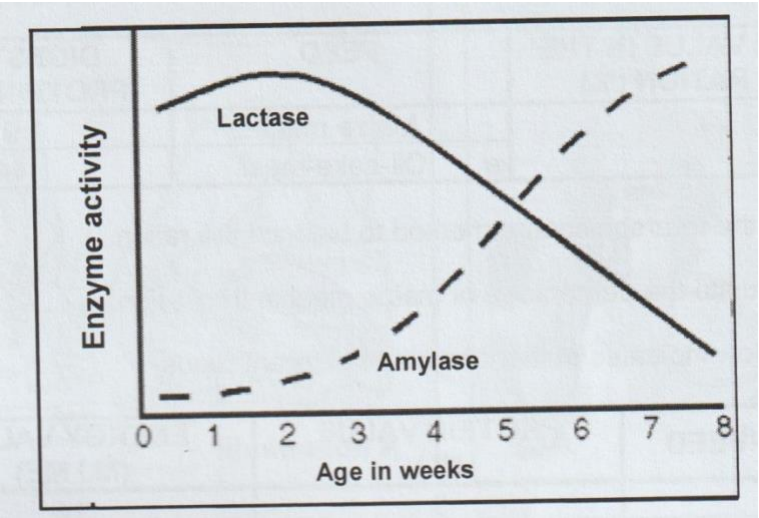
2.2 Improves vision, especially at night---------- (1)

2.3 A deficiency of this causes animals to chew dry bones

---------- (1)

2.4 Necessary for blood clotting in chickens---------- (1)

3. The graph below indicates the relationship between enzyme lactase and amylase activity at different ages of weaner pigs.



3.1 Indicate the type of digestion where lactase and amylase are involved.---------- (1)

3.2 Explain why the levels of lactase enzyme activity are so high during the 2nd and 3rd week. ----------

---------- (2)

3.3 Give TWO reasons why a protein concentrate is fed to young weaner pigs ----------

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---------- (2)

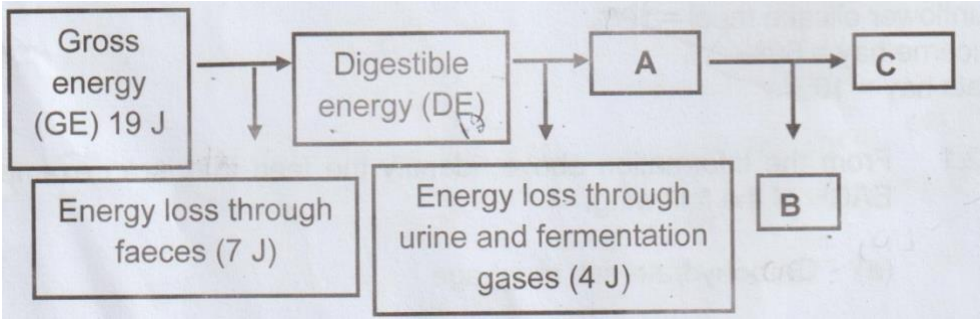
4. The table below shows the quantities of minerals in the three different rations prepared for animals.

RATION	Ca(mg/kg)	P (mg/kg)	Mg (mg/kg)
A	7.9	4.5	6.5
B	0.5	1.5	3.0
C	3.5	5.0	2.0

Draw a combined bar graph of the different quantities of minerals in the three different rations

(6)

5. The diagram below shows the energy values of a feed



5.5 Calculate the energy value represented by A. Show ALL calculations.

(2)

5.2 Identify the energy loss of B---------- (1)

5.3 Give TWO reasons why energy in C is important to farm animals

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---------- (2)

6. The table below shows the gross energy value and the energy losses after 1kg and 5kg of a feed were consumed by a farm animal

ENERGY	VALUES (joule/1kg)	VALUES (joules/ 5kg)
Gross energy	18.5	92.5
Energy lost in manure	8,5	42.5
Energy lost in urine	1,2	6
Energy lost as heat	1,8	9
Energy lost as methane	2,8	12,5

6.1 Indicate the energy lost in manure if the farm animal consumed 5kg of feed.

---------- (1)

6.2 Identify the gas with the highest energy loss in the table above

---------- (2)

6.3 Calculate the amount of energy that will be available for growth and production in 1kg of feed (3)

TOTAL ========== {30}

ACTIVITY 6 (fodder flow, supplements and graphs)

1. The feed flow program below is for a period of one year.

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Veld (ton)	-	-	-	10	12	20	20	15	13	12	-	-
Forage (ton)	-	-	-	-	30	30	38	39	43	44	44	-
Lucern (ton)	40	45	55	45	30	25	20	10	-	-	10	30
Total feed available(ton)	40	45	55	55	72	75	78	64	56	56	54	30
Animal feed requirement (ton)	63	65	66	60	56	56	49	49	49	49	54	30
Feed deficit(ton)	23	20	-	5	-	-	-	-	-	-	-	29
Feed surplus(ton)	-	-	-	-	16	19	29	15	7	7	-	-

1.1 Calculate the feed deficit for September

(2)

1.2 Draw a bar graph to indicate the total feed available and the animal feed requirements for the year

(6)

1.3 State the TWO roles of a good fodder flow programme

---------- (2)

1.4 State TWO reasons why there is feed available in June ----------

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---------- (2)

2. The table below indicates a fodder flow plan for 50 beef cattle

	MONTHS OF THE YEAR					
FEEDS	JAN	FEB	MARCH	APRIL	MAY	JUNE
Natural veld (ton)	160	160	140	120	80	60
Supplementary feed (kg/animal/day)	0	0	0	1	2	4
Feed requirements (ton)	140	140	140	140	140	140

2.1 Calculate the total shortage, without supplementation, for the whole period, January to June if surplus was stored in other months.

(3)

2.2 Indicate :

(a) The month with the highest feed shortage----------(1)

(b) TWO sustainable measures a farmer could take to solve the problem of feed shortage ----------

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---------- (2)

2.3 Use the data from the table above to draw a combined bar graph of the feed available and the feed required for January to June

(6)

3. What are supplements?

---------- (2)

3. Give ONE word / term for each of the following descriptions by choosing a word9s) from the list below. Write only the word(s) next to the question numbers (3.1 to 3.4)

Licks, soil sods, urea, implants, supplementary rations, drinking troughs

a. Iron supplement for pigs in concrete floor pens

---------- (1)

b. Cheapest protein supplement in ruminant rations during winter

---------- (1)

c. Growth- promoting hormones to increase the rate of feed conversion

---------- (1)

d. Supplementation of water- soluble vitamins---------- (1)

TOTAL========== {30}

Designed by : Sebogo DPT (2020)