Dairy production

Level- III

Learning Guide-23

Unit of Competence: Implement feeding plans for dairy animals

Module Title: Implementing feeding plans for dairy animals

LG Code: AGR DRP3 M06 LO1-LG-23
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LO1: Determine dairy animal condition and nutritional requirements

Instruction Sheet	Learning Guide 23

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Monitoring and reporting dairy Animals condition
- Identifying dairy animals physiological and production status.
- Sourcing animals nutritional requirements and the nutritional value of feedstuffs.
- Referring feeding plan for adjustment
- Reporting or separating animals that are in a typical condition, injured or diseased.
- Identifying daily feed requirements

This guide will also assist you to attain the learning outcome stated in the cover page.
Specifically, upon completion of this Learning Guide, you will be able to:

- Monitor and report dairy Animals condition
- Identify dairy animals physiological and production status.
- Source of animal feedstuffs, nutritional requirements and the nutritional value.
- Refer feeding plan for adjustment
- Report or separate animals that are in a typical condition, injured or diseased.
- Identify daily feed requirements

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 5.
3. Read the information written in the information Sheets (1, 2, 3, 4,5 and 6) in page **3, 6,11,16, 19 and 21** respectively
4. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them
5. Accomplish the "Self-check 1, 2, 3, 4, 5 and 6" **in page-5, 10, 15, 18, 20 and 31**respectively.
6. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1and 2 **in page 33 and 34** respectively.
7. Do the "LAP test" **in page – 35** (if you are ready).

Information Sheet-1	Monitoring and reporting dairy Animals condition

1.1. Monitoring of dairy animals condition

Body condition influences productivity, reproduction, health, and longevity of dairy cattle. Thinness or fatness can be a clue to underlying nutritional deficiencies, health problems, or improper herd management. If done on a regular basis, body condition scoring can be used to troubleshoot problems and improve the health, longevity, and productivity of the dairy herd.

Over conditioning, or fatness, may result from poor nutrition or reproduction management. A fat cow is more susceptible to metabolic problems and infections, and is more likely to have difficulty at and after calving. Over conditioning usually begins during the last three to four months of lactation, when milk production has decreased, but dietary energy and total nutrient levels have not been reduced accordingly. Other common causes of over conditioning are prolonged dry periods or overfeeding during the dry period.

Under conditioning, or thinness, can frequently lower production and milk fat levels because of insufficient energy and protein reserves to maintain production. Thin cows often do not show heat or conceive until they start to regain--or at least maintain--body weight. In feeding these animals, care must be taken to maintain production while increasing body reserves.

Body condition scoring is also useful in dairy heifer feeding management. Thin heifers may not grow rapidly enough to reach puberty by 11 to 13 months of age. They may also be too small to calve at 22 to 24 months or to carry enough weight to maintain a normal first lactation production. On the other hand, fat heifers have been shown to be difficult to breed, and if fat when they are near calving, have difficult calving and produce less milk when they enter the milking herd, especially if they have been fat at puberty.

1.2. Importance of Body Condition

The important stages of production are:-

Pre-calving (drying off)

Condition should be “fit not fat”, and should be such to allow a moderate level of supplementation to prepare cows for early lactation

At calving

Cows should not calve in an excessively fat condition. Fat cows may develop fatty liver disease or ketosis and are more prone to milk fever, mastitis, lameness and infertility.

Early Lactation

Dairy cows are under considerable nutritional stress and adequate feeding is essential to avoid excessive weight loss. Excessively thin cows can suffer discomfort in a housing environment such as cubicles.

At service

Dairy cows should not be in energy deficit by this stage as this may result in low fertility.

The technique links together three major factors:

- Good Welfare
- Good Husbandry
- Good Performance

1.3. Keeping farm record on dairy animal condition:

This record help farmers keep a track of the amount of feed that is provided for the animals. It could be anything like the amount of supplements fed to a cow, or the total amount of concentrate fed for pasture-grazed cows, and so on.

Feeding records can be utilized both for every day administration and change of the feed proportion. If a milking cow requires more concentrate, or help in choices about inspecting animals which appear to not develop, but rather still eat a lot.

Some of the records mainly important for the expression of animal conditions:

- Helps in detection of abnormal conditions or disease status of the herd that leads to loss in body weight, loss in milk production etc.
- Helps in finding the commonly occurring diseases in the herd and thus to formulate in time precautionary measures like vaccination, deworming
- Animal welfare and environmental sustainability policies etc. are identified and reported to the concerned body.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the influences of body condition of dairy animals? (4points)
2. Mention some of the records mainly important for the expression of animal conditions.(3 points)

Note: Satisfactory rating – 7 points Unsatisfactory - below 7 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

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Information Sheet- 2	Identifying dairy animals physiological and production status.

2.1. Dairy animals physiological and production status

Dairy animals have different nutrient and amount of nutrient based on their Different stages of growth, production and reproduction. Generally the highest nutrient requirements are during lactation. The lowest nutrient requirements are during dry and mid to late gestation of the mature female. Growing animals and producing animals have different needs to those of animals that are simply meeting their maintenance requirements. To be profitable in livestock production these different dietary requirements need to be met as inexpensively as possible.

This nutritional requirements for dairy can be subdivided as follows:

1. Maintenance
2. Production
   - ➢ Growth
     - ✓ to reach maturity
     - ✓ during lactation to reach majority
     - ✓ to improve condition
   - ➢ Pregnancy
   - ➢ Milk production

1. Maintenance requirement

In the end, feeding animals is as much an art as a science, and requires skilled care by the livestock keeper. If the animals are losing weight and succumbing to disease, then they clearly need more feed. It is likely that it is energy that will be limiting. If the supplementation of the diet with energy (e.g. from cereal grains) overcomes the problem, that is good. If not, some other strategy must be considered, which may be to consider whether it is protein (supplied by leguminous forages or from oilseed residues) or vitamins and minerals that may be limiting. If none of these strategies work, then there maybe some underlying disease, which cannot be corrected by better feeding, that is affecting the livestock and that will need to be treated before the livestock will be able to thrive.

In general, Nutrients are needed to keep the life processes (heart beating, liver functioning, etc.) going. The amount of feed needed to meet these "maintenance" requirements depend, obviously, on the quality of the feed (less high quality feed needs to be eaten to provide the same amount of nutrients as a large amount of poor quality feed). However, the amount of nutrients needed to maintain the animal depends mostly on its size. A large animal clearly needs more feed to keep it alive than does a small animal. However, an animal that weighs twice as much as another does not need twice the nutrients.

2. Production

When livestock are not just surviving, but growing or producing milk or rearing young, they need extra feed to meet these increased requirements. There is a limit to the amount they can produce, which is determined by their breeding, but it is unusual for any animal to be limited by its breeding and much more usual that its feed supply is limiting its production. Feeding them more will therefore make them produce more, but eventually each increase in feed results in a smaller increase in animal production.

Production is divided into **growth, pregnancy and milk production**.

2.1. Growth, to reach maturity

An animal obviously needs more feed when it is growing, and again it is usually energy that is limiting but extra protein is needed as well. If the animal is overfed then it will lay down fat rather than lean meat, but this may be wanted if the market is for fat animals. Giving the animal extra feed for a month or two before it is sold may help to increase the sale price, but the cost of that extra feed has to be compared with the increased sale price to decide whether it is worth the investment.

In dairy animal production, the Growth allowance depends on the policy of age at first calving (required growth rate per day) and consequently required bodyweight at age of first service.

a. Growth allowances during lactation till maturity

Lactation : Lactation is the time of greatest feed requirement for the animal. Increasing the quantity and quality of feed offered to lactating females will improve the health, survivability and growth of the young, as well as reducing the time before the lactating animal conceives again. If the milk is being sold, then the amount of saleable milk that is produced will be increased by improving the animal's diet. Energy is nearly always the first limiting nutrient preventing further

increases in milk yield, but the requirement for protein increases substantially during lactation as well.

In animals calving for the first time at ± 24 months of age, the development of the body continuous. Maturity is normally reached at the end of the second lactation (at an age of ± 4 years). The extra nutrients required for continued growth (growth allowance) till maturity for these animals are:

- during first lactation: 600 FUM and 80 DCP extra per day
- during second lactation: 300 FUM and 40 DCP extra per day

If an animal calves for the first time at 36 months, an extra growth allowance is only required during the first lactation until the animal reaches maturity at 4 years of age. This growth allowance during this first lactation is 10 % of the total maintenance requirement.

The growth allowances during lactation come on top off normal maintenance and production requirements.

b. Growth to improve condition

Due to the energy-gap (negative energy balance) incurred during early stage of lactation, causing loss of condition, requires regaining of bodyweight. This loss of body weight is to be gained during the middle and late stage of lactation and possibly during the dry period.

C. **Requirements for Breeding**

Healthy, well-fed livestock are much more likely to breed successfully than those that are weakened by disease and/or poor nutrition. If the animal has to use its feed to fight off disease, it is not able to use that feed to produce healthy young. The housing and the conditions under which the animal is kept therefore need to be as clean as possible. Energy is also used to keep the animal at a comfortable temperature, and so if at all possible, the animal should be protected from very high or low temperatures, and great changes in temperature. This will often not be possible, and so the animal needs to be provided with enough feed to cope with these environmental challenges, as well as sufficient feed to enable it to breed successfully.

2.2. Pregnancy Allowance

❖ **Females**

A. Mating

B. Mid pregnancy

If the pregnancy is divided into thirds, then in the second third the foetus is much less vulnerable. Provided the mother does not suffer a major disease, or becomes extremely

malnourished, it is likely that the foetus will survive. The amount of feed given to pregnant animals in mid pregnancy can therefore be reduced a bit to conserve feed resources for a time of greater need.

C. Late pregnancy

In the last third of pregnancy, the foetus nutrient allowance during the last two months of pregnancy (months 8 and 9). Fetus development (including fluids and placenta) is ± 20 kg at 7 months, 35 kg at 8 months, and 65-70 kg at 9 months. In lactating cows, this pregnancy allowance will coincide with the dry period after the previous begins to grow extremely quickly. It also occupies much more space in the mother's abdomen so that there is less space for her gut. There is therefore insufficient space for her to eat large amounts of bulky, fibrous feed to meet her increased requirements, and the only way that her requirements can be met is to feed more concentrated (higher quality) feed. Disease or malnourishment at this time can also lead to abortion. However, some care must be taken when increasing the amount of concentrated feed offered

It is common to include some extra lactation (last two months before calving). The amount for pregnancy-allowance depends on the condition of a cow after completing her lactation.

2.3. Nutrient Requirement for Milk Production

The total amount of nutrients required for milk production depends on the actual or desired amount of milk production in kg/day and on the quality of the produced milk (butterfat %).

The requirement per kg milk with 4 % fat is:

- 0.37-0.41 kg DM
- 460 units FUM
- 63 gram DCP

In Poland, energy requirements are expressed in FUM (Feed Units Milk)* per day:

Where DM – Dry matter, FUM – feed unit milk, DCP – digestible crude protein

❖ **Males**

The amount of energy and protein needed to produce sperm is extremely small and so extra feed is not required for this. However, adult male animals have much higher metabolic rates than adult females and so need more feed just for maintenance than a dry, non-pregnant adult female does.

Keeping adult males for breeding is expensive in terms of the resources needed, and they are usually the most aggressive members of the flock or herd and so require more skilled management.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Mention the division of nutritional requirements for dairy animal (5 points)
2. Describe the impact of overfeeding at late pregnancy period. (3 points).

Note: **Satisfactory rating – 8 points** **Unsatisfactory - below 8 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

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Information Sheet-3	Source of animal feedstuffs, nutritional requirements and the nutritional value

3.1. Classification of Animal Feeds and their nutritive value.

There are various types of animal feeds available for livestock feeding. Based on the amount of specific nutrient they contain (CF in this case) these livestock feeds are generally classified in to two broad categories Roughage and concentrate. CF is hard to digest part of the food and includes cellulose, a variable portion of hemicelluloses and lignin. It is found in plant material.

3.1.1. Roughage:

Roughage is feed stuffs that contain relatively large amount of CF (more than 18%). These feed stuffs are mostly bulky feeds with lower amount of T.D.N (Total digestible nutrient) which is less than 60 % and they are usually of very low digestibility.

Examples or Source of Succulent feeds: The following are the major examples of Succulent feeds are Pasture, Cultivated fodder crops, Tree leaves, Root crops, Silage and examples of Source of dry roughage are Hay and Straw

3.1.2. Concentrates:

Concentrates are feed stuffs containing relatively lower amount of CF, which is less than 18 %. They are more digestible than roughages and generally contains higher amount of T.D.N that is greater than 60 %. Concentrates are a feed material either high in protein or energy (carbohydrate and fat).

Concentrates are again sub divided into two groups based on their cp (crude protein) content. When the CP is greater than 18 % they are termed as protein supplements or protein rich concentrates and when the CP content is less than 18 % they are termed as energy rich concentrates.

Protein source/ rich supplements:

Protein rich concentrates are derived from plants and animals. Protein concentrates of plant origin are mostly by products of the oil extraction industry. Oilcakes are produced when oil from seed is extracted mechanically while oil meals are the byproducts of the solvent extraction process. Compared to oil meals oilcakes are low in protein and high in residual fat. They generally include the fibrous part of seeds. Among the available oilcakes, cottonseed cake and maize oilcake have high protein value for ruminants due to their low ruminal degradability as compared to mustard seed cake which is highly degradable. Generally all animal origin proteins

are less degradable in the rumen and therefore are good sources of protein for ruminants. These include blood meal, fish meal, bone meal, meat meal, feather meal. But concentrates of animal origin are normally not recommended in ruminant's feeding

Energy Rich Concentrates:

Cereal grains (wheat, maize, barley, oats, sorghum, rice), wheat bran, rice polishing, molasses, and sugar beet pulp are characterized as energy rich concentrates. Although cereal grains are mainly used as human food and not included in the feed of dairy animals but their by products like rice polishing, maize bran and wheat bran are commonly used as animal feed.

Molasses is by product of sugar industry. It is a thick viscous material which is high insoluble carbohydrates and some minerals. Although molasses is a cheap and energy rich feed but still it is not commonly used by local farmers. Molasses can be included in the diet by mixing it with other concentrates, spraying it on dry roughages or providing it as a free lick or as solidified molasses urea block. The palatability and consumption of poor quality roughages are increased by the use of molasses

3.2. Nutritional requirement of animal

The term feed nutrient may be defined as any food or feed constituent be it organic or inorganic that has the same general chemical composition and aid in the support of animal life. Nutrient requirement of domestic animals could be obtained from NRC (National Research council of USA) and ARC (Agricultural research council of Great Britain) by referring to different text and handouts. This refers to the different types of nutrients required by the animal of different spices, age, sex, production status and other factors.

For example - daily nutrient requirements of a calf growing at the rate of 0.5kg per day during first two years and reaching adult body weight at the age of approximately 3 years.

Body Wt (kg)	DCP (kg)	TDN (kg)	ME (kcal)	Ca (g)	P (g)	Vit. A (I.U)
45	0.17	0.9	3290	7	6	2000
70	0.22	1.3	4680	12	10	3000
150	0.35	2.6	9360	13	12	6500
200	0.40	3.0	11500	13	12	8500
300	0.47	4.0	12600	13	12	12500
450	0.48	5.0	13600	12	12	17000

Nutrient requirement is a statement of what animal on average require for a particular function allowance is greater than the amount by safety margin designed principally to allow for variation

in requirement between animals. Feeding standards may be expressed in quantity of nutrient or in dietary proportion. The major classes of these feed nutrients are Carbohydrates, proteins, lipids, vitamins and minerals.

Function of nutrients for dairy animals

Feeding dairy cows for efficient production involves supplying the five classes of nutrients in proper amounts. These include

1. **Energy**

The so-called energy contents of a feedstuff can be subdivided into two groups: Carbohydrates and Lipids (fats) Dairy cows demand a large supply of energy for maintenance, milk production, reproduction, growth, and weight gain. High producing cows usually cannot consume enough feed during early lactation to meet their requirements. The energy deficiency is made-up by converting body fat to energy. However, this loss of body weight should be kept to a minimum to avoid metabolic disturbances.

The main sources of energy are provided by carbohydrates and fats. Protein can be metabolized for energy, but it is an expensive source of energy. The carbohydrates of feedstuffs include starch, simple sugars, and cellulose in the crude fiber.

2. **Protein**

Proteins are the building blocks in an animal. Protein is needed for growth, maintenance, reproduction and lactation. In general, every animal must have a constant supply of protein in order to remain healthy. A shortage will result in small calves at birth and/or slow-growing young stock (retarded growth). Other effects due to shortage of protein are:

- Low milk production
- Less protein in the milk
- Loss of body weight in (early) lactation
- Increased risk of infections and metabolic diseases
- Low fertility (longer calving interval)

3. **Minerals:**

The major minerals not adequately supplied by most feedstuffs are (1) calcium, (2) phosphorus, and (3) salt. In certain localities, magnesium may need to be supplemented and rations containing extremely large amounts of grain and small amounts of forage may need supplemental potassium. Calcium and phosphorus are necessary for maintenance, milk

production, reproduction, and growth. Most rations will require supplementation with calcium and phosphorus.

Consequences of a shortage of minerals can be:

- Low fertility
- Poor growth
- Diseases
- Deformation of the skeleton
- Low production

4. **Vitamins**:

With the exception of vitamins A and D, the other vitamins needed by dairy cows are generally believed to be present in adequate amounts in normal feedstuffs or are manufactured in adequate quantities by microorganisms in the rumen.

Vitamins are indispensable, but the animals need them only in very small quantities. The most important vitamins are:

- Water soluble vitamins(B complexes and C)
- Fat soluble vitaminsadequate.(A,D,E and K)

5. **Water:**

Although not thought of as a nutrient, large quantities of water are required by dairy cows for normal metabolic functions. Depending upon the temperature and the moisture content of feed stuffs, dairy cows will consume from 3 to 5 pounds of water for each pound of milk produced.

Dairy cattle require water for:

- Chewing and swallowing (saliva)
- Transport of nutrients around the body
- Formation and maintenance of body tissues
- Disposal of waste products
- Regulation of the body temperature
- Milk production

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Mention the generally classification/ broad categories of animal feeds. (2points)
2. Mention the Consequences of a shortage of minerals. (5points)

Note: **Satisfactory rating – 7 points** **Unsatisfactory - below 7 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

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Information Sheet-4	Referring feeding plan for adjustment

4.1. Adjustment of feeding plan

Some rules of adjusting and confirming good feeding plan

Rule 1: Water is always available

- Cows need a lot of water.
- It should be available at all time, clean, tasty and fresh

Rule 2: Feed forages *ad libitum*

- Forages should always be available in the feeding trough
- If there is no feed, dry matter intake is low and they produce less milk

Rule 3: Provide concentrate in small amounts

- Too much concentrate at one time is not healthy for a cow
- Concentrate should be provided at least 3 times per day
- It is best way to mix forages and concentrate

Rule 4: Always provide a mineral block

- Cows know when they need more minerals
- A mineral block guarantees that cows take up sufficient minerals

Rule 5: Increase forage intake as much as possible

- The more they eat, the more they produce
- Forage are cheap, concentrates expensive
- WHAT you give and HOW you give it will largely determine the feed intake!

Rule 6: New feedstuff or ration should always be introduced gradually

- The rumen bacteria change according to the diet
- New feeds need to be introduced step by step, a little bit more every day for 7 to 10 days

4.2. Preparation of feeding budget

In preparing feeding budget developing action plan is also important. No two periods of feed shortage are the same or the choice of the course of action will depend on :

1. Current price for stock
2. Amount of fodder on hand
3. Funds available for purchase of fodder
4. Availability and reliability of sock water

Courses of action

Action has to be taken in the face of drought to prevent cruelty to animals and promoted accepted farming practices for the welfare of livestock. Cattle must not be left to strive to death or die to thrust. The following CA are open to producer

- Move stock
- Sell stock
- Feed stock

1. Moving stock - on contract grazing area. This is the cheapest solution.

Before moving to the new contracted pasture area, check the following.

- Secured fencing & handeling facilities
- Good quality and quantity feed is available or not
- Availability of good water supply.
- Supervision to minimize death and theft
- Stock need to be identified

2. Sell stock - if this CA is chosen, crucial management decesion will be:

- Timing of the sale
- Type and number of cattle to be sold. The best policy is sale the less productive and care of high producing ones

3. Feed stock - according to their nutritional requirement.

Feed budgets may include pasture-based farms as well as housed livestock. Feed quantities could be described in units relevant for the system being budgeted, and may include dry weight of feed (for example, kilograms of dry matter or kg DM), energy content (for example, estimated metabolisable energy or MJME). etc

:

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Mention some of rules followed while adjusting and confirming good feeding plan (6 points)
2. Before moving the animals to the new contracted pasture area mention the important points to be checked. (5points)

Note: **Satisfactory rating – 11 points** **Unsatisfactory - below 11 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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Information Sheet-5	Reporting or separating animals that are in a typical condition, injured or diseased

Animals arriving at shelters as a result of a natural disaster need special care. Because they may have been exposed to contaminated water and may not have had access to safe food and fresh water, many are stressed and dehydrated and some may be injured and/or ill. Stressed animals may or may not show signs of illness and may also exhibit behavioral disorders. Following some simple animal management and disease control guidelines can help improve animal health and reduce the risk of disease transmission and injury between animals and people.

5.1. Reporting

If you observe some abnormality signs and animals are coming from other place, before mixing with other farm animals it is important to report or consult the veterinarian or the farm manager or other concerned body.

5.2. Separation of Animals

- Animals should not be housed or permitted in food or break areas.
- Separate newly arriving animals from animals that have been housed one week or longer.
- Animals of different species should not be housed together
- If animals of unknown origin must be housed together, care should be taken to not mix genders for unneutered animals.
- Routinely monitor animals for signs of illness.
- Separate sick animals from healthy animals, especially animals with diarrhea or signs of upper respiratory disease
- People assigned to care for sick animals should care for those animals only, and should not move between sick and healthy animals.
- Limit contact of young children, the elderly, pregnant women, and immune compromised people with rescue animals, particularly animals that are ill.

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Mention 5 guidelines under which separation of dairy animals takes place (5 points)

Note: **Satisfactory rating – 5 points** **Unsatisfactory - below 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

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Information Sheet-6	Identifying daily feed requirements

6.1. Identifying daily feed requirements

In analyzing and providing a ration / feed as a supplementary feed to the dairy animals the important information needed are:

- Nutrient requirement of the animal
- Nutrient composition of available feedstuffs
- Nutrient availability (Bioavailability)
- Non nutritive characteristics of the feedstuffs
- Costs of available feedstuffs
- Expected daily feed intake

In formulating ration for cattle and providing, the prime consideration is to ascertain & meet up the total requirement in terms of:-

- Dry matter (DM)
- Digestible crude protein (DCP)
- Energy i.e. Total digestible nutrient (TDN) for 24 hours.

The most basic ones are:

✓ High energy roughage—To provide higher concentration, and possibility of higher feed intake.

✓ High-energy concentrates—Concentrates should contain a lot of energy and should be chosen based on structure and primary product. Fat is a good energy feedstuff in this phase of lactation

6.1.1. Requirement of Dry matter-

Total DM ----- 2/3 (as roughage) - 2/3 dry roughage or 3/4 if sufficient legume is available
- 1/3 Green roughages or if green fodder is legume, this proportion may be only 1/4 of the total roughage ration

---- 1/3 (as concentrate)

Example - 1. Calculate DM Req't for a dairy cow weighing 400 kg, the dry matter requirement will be provided as indicated below.

- Total DM requirement (kg) = 400kg * 3% = 12kg
- DM as concentrate (kg) - 12kg * 1/3 = 4kg
- DM as roughage (kg) - 12kg * 3/4 = 8kg
- DM as dry roughage (kg - 8kg * 3/4 = 6kg
- DM as green roughage (kg) - 8kg * 1/4 = 2kg

Example 2. Calculate the feed requirement on DM% bases of a 500kg live body wt dairy cow yeilding 15 liter milk daily. Then the daily feed requirement of a cow will be 3% * BWt + 10 % M. yield

3/100* 500kg +10/100 * 15 lt

15 +1.5 = 16.5 kg/day/cow

Then, calculate

A. Feed requirement for one cow per year

B. Daily feed requirement for 50 cows/day.

C. Feed requirement for 50 cows/year.

6.2. How many pounds of feed does a cow eat in a day?

High producing dairy cows will eat 110 to 120 pounds of wet feed a day or 50 to 55 pounds of dry matter (DM) a day. As cows produce more milk, they eat more. A typical diet for a dairy cow could include about 30 to 35 pounds of baled hay (26-30 pounds DM) and 25 pounds of grain mix (22 pounds DM). Grain includes corn, soybean meal, minerals, and vitamins.

a. Dry Cows that are Pregnant:

May be fed 3 ½ kg. Of concentrate feed plus 20-25 kg. of green fodder per day.

b. Recent Calvers:

May be feed on the basis of their milk yield. For example: a cow giving 10 to 15 kg of milk per day must be feed with immediate effect 61/2 kg of concentrate feed plus 35 kg of green fodder a cow giving 15 to 20 kg, milk per day must be given 8.1/2 kg of concentrate feed and 40 kg of green fodder. In fact for every rise of 5 kg of milk yield an additional quantity of 2 kg. Concentrate feed may be given.

Add 1.5 per cent mineral mixture and 0.5 per cent common salt in the feed.

To help cow reach high energy intake, some general conditions have to be established:

1. Feedstuffs of a high hygienic quality; and

2. Free access to clean water.

.6.2. Ration formulation

Objective of ration formulation

- Provide a balanced nutrition (forage/concentrate ratio)
- Provide a diet that meet the requirement at the different period of the lactation
- Provide a diet that allows the cows to reach high peak production and maintain a high production for a long period
- Provide the nutrients in the cheapest way possible
- Provide a diet that will result in a high feed intake

Calculations the simplest formulation is when two ingredients are being mixed to balance one nutrient.

Using a Pearson's square method allows blending of two feedstuffs or two mixtures. Remember your steps:

Step 1: Set up and label your square: the labels stay the same going across

Step 2: Subtract going ACROSS the square

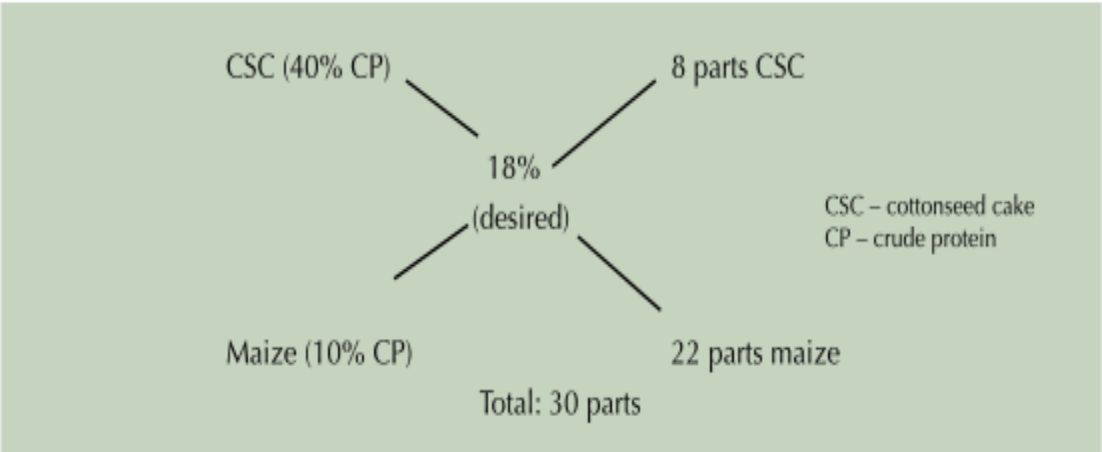
Step 3: Get your total parts

Step 4: Find the % of each feed required

Step 5: Find the total pounds needed of each feed

Step 6. Check your answer!!

E.g1. illustrates how to make a ration with 18% crude protein using cottonseed cake (40% crude protein) and maize (10% crude protein).



Steps

- ✓ Subtract the lesser value from the larger diagonally. (Hence from the given: 40 minus 18 = 22 and 18 minus 10 = 8.)
- ✓ One ingredient must have a higher nutrient content than the desired and the other must have a lower value.
- ✓ no ration can be formulated with a higher nutrient content than the highest of the ingredients or vice versa. (You cannot make ration of 15% crude protein if both ingredients are higher than 15% or lower than15 %.)
- ✓ Therefore: if 8 parts of cottonseed cake are mixed with 22 parts of maize, the mixture will have 18% crude protein. If expressed as percentage (100 kg feed) then8/30 x 100 = 26.7% cottonseed cake 22/30 x 100 = 73.3% maize
- ✓ Confirm CP contents; Corn crude protein content the cottonseed cake content in the ration is 26.7%, crude protein 40%; therefore it contributes 26.7 x 40/100 = 10.7. The maize contributes 73.3% of the mixture, crude protein 10%; therefore it contributes 73.3 x 10/100 = 7.3.

E.g.2. Formulate 1000 lb. of a complete dairy diet containing 14% CP. Use corn (9% CP) and a supplement (44% CP).

E.g.3. A cow is on a feed that requires a ration containing 55% CP. The CP of the two feeds being used, corn and soybean meal, are 22% and 89%. Determine the amounts of feed necessary to form a 300 lb. ration that meets the requirements of your cow.

Overview of different steps:

1. Estimate Total DMI
2. Check % forage DMI
3. Check the CP% of total diet
4. Check total energy in the diet
5. Adjust if needed and repeat step 3&4
6. Convert DM

STEP 1: Estimate total DMI

Use table below to estimate Total DMI based on the body weight and milk production.

Milk(kg/day)	% of body weight					
	350 kg	400 kg	450kg	500 kg	550 kg	600 kg
10	2.6	2.4	2.3	2.2	2.1	2.0
12.5	2.8	2.65	2.5	2.4	2.35	2.15
15	3.0	2.9	2.7	2.6	2.5	2.3
17.5	3.2	3.1	2.9	2.75	2.65	2.4
20	3.4	3.3	3.1	2.9	2.8	2.5
22.5	3.6	3.45	3.25	3.05	2.95	2.6
25	3.8	3.6	3.4	3.2	3.1	2.8
27.5	3.95	3.7	3.55	3.35	3.25	2.95
30	4.1	3.8	3.7	3.5	3.4	3.1
32.5	4.3	4.0	3.85	3.65	3.5	3.25
35	4.6	4.2	4.0	3.8	3.6	3.3
37.5	4.85	4.4	4.15	3.95	3.75	3.4
40	5.1	4.6	4.3	4.1	3.8	3.5
45			4.7	4.4	4.1	3.7
50			5.0	4.7	4.4	3.9

Table 1: Total Dry Matter Intake (as % of body weight)

- **Total DMI = body weight * %body weight (from Table 1) /100**

STEP 2: Check the minimum % forage

- Check the minimum % of forage needed in the diet based on milkproduction and phase of the lactation in Table 2.

Milk production	0-70 DIM	71-200 DIM	200-305 DIM
Below 20kg	55%	60%	70%
20-25kg	52%	57%	65%
25-30kg	48%	53%	60%
above 30kg	45%	50%	55%

Table 2: % forage in DMI

- Calculate % forage DM and concentrate DM
- Forage DM = DMI (see step 1)* % Forage (from Table 2)
- Concentrate DM = DMI (see step 1)* (100- %forage)

STEP 3 Check CP of total diet

Check if the CP% of the total diet is in line with the needs accordingthe phase of the lactation *in Table 3.*

Phase	**Days in Milk (DIM)**	**CP% needed**
Early	0-70	17.5 – 19.5%
Mid	71-200	15 -17%
Late	200- end of lactation	14 -15%

Table 3: CP% according to phase in lactation

- CP% diet = ((DM forage * CP forage) + (DM conc * CP conc))/ Total DMI
- Compare the result with data in Table 3

STEP 4: Check the Energy content of the diet

- Calculate the total energy needed for maintenance according tothe body weight (Table 4)

Body weight (kg)	ME (MJ/day)
350	39
400	43
450	47
500	51
550	55
600	58

Table 4: Energy for maintenance according to body weight

- Calculate the energy needed for the milk production: kg Milk/day * 5MJ
- Note: This is based on milk with 3.5 -3.7 % fat.
- If the milk has high fat the energy per kilogram of milk is higher 4.0%fat: 5.3 MJ/kg;4,5% fat 5.5MJ/ kg
- Calculate the total energy needed by adding energy for maintenance and milk production
- Energy needed (MJ) = Maintenance (Table 4) + kg milk * 5MJ
- Calculate the total energy in the diet:

- MJ in diet= (DM forage * MJ forage) + (DM conc * MJ conc)
- STEP 5: Adjust and recalculate if needed
- If CP or energy in the diet is too low:
- Increase forage feed intake
- Use forage with higher CP % and/or energy
- Use concentrate with higher CP% and/or energy
- Use urea up to 90gr/cow/day to correct a too low CP
- For small difference, increase or decrease the amount ofconcentrate.
- Repeat step 3 & 4 after you made the adjustments.

STEP 6: Convert DM

- Divide the calculated kg DM forage and concentrate by the known DM%.
- Forage: kg DM forage/%DM of forage = fresh kg forage
- Concentrate kg DM concentrate/%DM conc = kg concentrate

Summery

Step 1: Total DMI = body weight * %body weight (from Table 1) /100

Step 2: Forage DM = Total DMI * % Forage (from Table 2)

- Concentrate DM = Total DMI * (100- %forage)

Step 3: CP% diet = ((DM forage*CP forage)+(DM conc * CP conc))/Total DMI

- Compare with Table 3

Step 4: MJ in diet= (DM forage* MJ forage) + (DM conc * MJ conc)

- Compare with: Maintenance (Table 4) + kg milk * 5MJ

Step 5: Adjust if necessary

Step 6: Forage: kg DM forage/%DM forage = fresh kg forage

- Concentrate: kg DM conc/%DM conc = kg conc

Example 1: Cow 600 Kg, 18 Kg milk/day, 180 days in milk, AM(DM: 15%, CP: 14%, ME: 8.5MJ) , concentrate (DM: 87%, CP:18%, ME: 12.5MJ)

Step 1: Total DMI

- 600kg cow with 18L milk = **2.4%**
- 600* 0.024 = 14.4 kg

Step 2: % forage

- 180 DIM with 18kg = 60% forage

- Forage: 14.4 * 0.6= 8.6 kg DM forage
- Concentrate: 14.4 * 0.4 = 5.8 kg DM concentrate

Step 3: Check %CP

- CP needed: 180DIM = 15 -17% CP
- CP% = ((8.6*14)+(5.8*18))/14.4= 15.6% **OK**

Step 4: Check Energy

- Energy needed = 58 + (18*5) =148 MJ
- Energy available = (8.6*8.5)+(5.8*12.5)= 145.5 MJ **OK**

Step 5: Adjust

- Not needed.

Step 6: Convert DM into fresh

- Forage: 8.6 kg DM / 0.15 DM/kg AM = 57 kg fresh

Concentrate: 5.8 kg DM/0.87= 6.7 kg concentrate

Example 2: Cow 450 Kg, 14 Kg milk/day, 210 DIM, Forage mixof guinea and para grass (DM: 2 0%, CP: 13%, ME: 8.0 MJ),concentrate (DM: 87%, CP: 17%, ME: 12,5 MJ)

Step 1: Total DMI

- 450kg cow with 14L milk = **2.6%**
- 450* 0.026 = 11.7 kg

Step 2: % forage

- 210 DIM with 14kg = 70% forage
- Forage: 11.7 * 0.7= 8.2 kg DM forage
- Concentrate: 11.7 * 0.3 = 3.5 kg DM concentrate

Step 3: Check %CP

- CP needed: 210DIM = 14 -15% CP
- CP% = ((8.2*13)+(3.5*17))/11.7= 14.2% **OK**

Step 4: Check Energy

- Energy needed = 47 + (14*5) =117 MJ
- Energy available = (8.2*8.0)+(3,5*12.5)= **109.3 MJ** (shortage of 7.7 MJ) x

Step 5: Adjust

- Add 0.5 kg DM concentrate
- Repeat step 3: CP% = ((8.2*13)+(4*17))/12.2= 14.3% **OK**

- Repeat step 4: Energy = (8.2*8.0)+(4*12.5)= 115.6 MJ **OK**

Step 6: Convert DM into fresh

- Forage: 8.2 kg DM / 0.2 DM/kg AM = 41 kg fresh

Concentrate: 4 kg DM/0.87= 4.6 kg concentrate

Example 3: 550kg cow, 35kg milk, 60 DIM , forages: 50/50 mix ofguinea and AM (DM guinea: 2 2%, DM of AM: 15%, CP mix: 14%, ME=8.5 Mj),Conc (DM: 87%, CP: 23%, ME: 12.5MJ)

Step 1: Total DMI

- 550kg cow with 35L milk = **3.6%**
- 550* 0.036 = 19.8 kg

Step 2: % forage

- 60 DIM with 35kg = 45% forage
- Forage: 19.8 * 0.45= 8.9 kg DM forage
- Concentrate: 19.8 * 0.55 = 10.89 kg DM concentrate

Step 3: Check %CP

- CP needed: 60DIM = 17.5- 19.5% CP
- CP% = ((8.9*14)+(10.89*23))/19.8= **18.9% OK**

Step 4: Check Energy

- Energy needed = 55 + (35*5) = 230 MJ
- Energy available = (8.9*8.5)+(10.89*12.5)= **211.8 MJ *(-18.2MJ)***

Step 5: Adjust

- Add 1.6 kg molasses (DM: 63%, CP: 2.5%, ME: 13MJ)
- Repeat step 3: CP (%) = ((1.6 * 2.5) + (8.9 * 14) + (10.89 * 23))/21.4= **17.71 % OK**
- Repeat step 4: Energy = (1.6 * 13) + (8.9 * 8.5) + (10.89 * 12.5) = **232,5 MJ OK**
- **Step 6:** Convert DM into fresh
- Forage: Guinea (8.9 kg DM /2)/ 0.22 = 20.3 kg Guinea
- AM (8.9kg DM /2)/ 0.15 = 29.7 kg AM
- Concentrate: 10.89kg DM/0.87 = 12.5 kg concentrate
- Molasses: 1.6 kg

Example 4: Cow 500 kg, 30 kg milk/day, 50 DIM, Guinea grass (DM: 22%,CP: 11%, ME: 7.5 MJ), Concentrate (DM: 87%, CP: 21%, ME: 12.5 MJ)

Step 1: Total DMI

- 500kg cow with 30L milk = **3.5%**
- 500* 0.035 = 17.5kg DM

Step 2: % forage

- 50 DIM with 30kg = 45% forage
- Forage: 17.5 * 0.45 = 7.9 kg DM forage
- Concentrate: 17.5* 0.55 = 9.6 kg DM concentrate

Step 3: Check %CP

- CP needed: 50DIM = 17.5- 19.5% CP
- CP% = ((7.9*11)+(9.6*21))/17.5= **16.5% TOO LOW**

Step 4: Check Energy

- Energy needed = 51 + (30*5) = 201 MJ
- Energy available = (7.9*7.5)+(9.6*12.5)= **179 MJ TOO LOW**

Step 5: Adjust

- It is impossible to formulate a suitable diet with the available concentrate and forage. Increase CP and energy content of concentrate and/or provide forage with higher protein and energy content.
- **For example:** Replace 3 kg DM of forages with 3 kg DM alfalfa hay in the diet (DM, 90 %, CP 21%, ME 10 MJ) and use concentrate with CP 23% and 14 MJ.
- Repeat step 3: CP% = ((4.9*11)+(3*21)+(9.6*23))/17.5= 19.3% **OK**
- Repeat step 4: Energy = (4.9*7.5)+(3*10)+(9.6*14)=201 MJ **OK**
- **Step 6:** Convert DM into fresh
- Forage: Guinea 4.9 kg DM/ 0.22 = 22 kg Guinea
- Alfalfa hay 3 kg DM/0.9 = 3.3 kg Alfalfa
- Concentrate: 9.6 kg DM/0.87= 11 kg concentrate

Self-Check - 6	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Calculate the feed requirement on DM% bases of a 500kg live body wt dairy cow yeilding 15 liter milk daily. Then the daily feed requirement of a cow will be 3% * BWt + 10 % M. yield. (4points)
2. Mention the objectives of ration formulation.(6points)

Note: **Satisfactory rating – 10 points** **Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1
- _____
- _____
- _____
- _____

2.

Operation sheet -1	Identifying dairy animals physiological and production status

Procedure

Step 1 Wear personal protective cloth

Step 2 Identify materials, tools and equipment used for determining

Step 3 Categorize animals according to their status

Step 4 Restrain animals

Step 5 Mention and describe each animal for its body condition and status

Step 6 Take all necessary information

Step 7 see materials about their feeding requirement

Step 8 Develop your report

Operation sheet -2	Using a Pearson's square method allows blending of two feedstuffs or two mixtures

Steps to be followed

Step 1: Set up and label your square: the labels stay the same going across

Step 2: Subtract going ACROSS the square

Step 3: Get your total parts

Step 4: Find the % of each feed required

Step 5: Find the total pounds needed of each feed

Step 6. Check your answer!!

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 3 hours.

Task1. Perform body condition score.

Task 2. Perform mixing of two ingredients using person's square.

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Thomas H. Herdt DVM, MS, DACVN, DACVIM, Department of Large Animal Clinical Sciences and Diagnostic Center for Population and Animal Health, Michigan State University

Dave Fischer, Extension Dairy Educator, University of Illinois – Illini Dairy NET and Mike Hutjens, Extension Dairy Specialist, University of Illinois – Illini Dairy NET

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Dairy production

Level-III

Learning Guide-24

Unit of Competence: Implement feeding plans for dairy animals

Module Title: Implementing feeding plans for dairy animals

LG Code: AGR DRP3 M06 LO2-LG-24
TTLM Code: AGR DRP3 TTLM 1219v1

LO2: Manage grazing on pasture

Instruction Sheet	Learning Guide 24

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Assessing quantity and quality of available pasture.
- Identifying stocking density for various grasses.
- Implementing and monitoring grazing management is
- Monitoring grazing behavior of livestock.
- Determining and supplementing livestock feeding methods and level of supplementary feeding

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to**:

- Assess quantity and quality of available pasture.
- Identify stocking density for various grasses.
- implement and monitor grazing management is
- Monitor grazing behavior of livestock.
- determine and supplement livestock feeding methods and level of supplementary feeding

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 7.
3. Read the information written in the information Sheet (1, 2, 3, 4 and 5) in page3, 10, 14, 18 and 22 respectively .
4. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
5. Accomplish the Self-check 1, 2, 3, 4 and 5 **in page -9, 13, 17, 21and 24** respectively.
6. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1and 2 **in page 25 and 26** respectively.
7. Do the “LAP test” **in page – 27** (if you are ready).

Information Sheet-1	Assessing quantity and quality of available pasture

2.1. Definitions of important terminologies

Grassland: - is defined as a natural land surface covered mainly by plants of grass family, herbaceous legumes and other herbaceous species (could be either natural or artificial).

Pasture: - is a land occupied by perennial or annual forage species that are used as food by grazing animals.

Forage: - Fresh plant material used as feed for domestic herbivores. Forages can be broadly classified in the two Grasses and legumes

Grasses (Pasture)

Generally, grasses and its products is the main supplier of roughage in most countries with an advanced dairy-farming system. Pasture (grasses) provides a basis for dairy-production. They are abundantly available and with their good quality (usually) the cheapest source of food for cattle. Unfortunately, the quality of grasses in development countries can be rather of poor quality. The availability may be limited due to land pressure (first priority is to provide staple food for human nutrition) and/or high production costs.

2.2. Availability and Classification of pasture

A. Native pasture: consist largely of native or naturally introduced plants growing on uncultivated lands and are useful for grazing. Native pastures that are not divided by fences are called range land. Rangeland is defined as land where the vegetation is composed of native grass, herbaceous plants and shrubs valuable for forage and in sufficient quantity to justify grazing.

The type of grass growing in natural pastures depends to a large extent up on the amount of precipitation and its distribution throughout the year. Tall grass dominates in the wetter areas, and as the climates become drier mixed tall and short grasses are found. In drier areas low grass predominate until it comes to desert areas where the vegetation is characterized by desert shrubs and annual herbs.

B. **Sown pastures**: These are pastures sown by man to forage plants that are particularly adapted to conditions of soil, available moisture, and the object of the pasture seeding.

Sown pastures are of different types:

- Permanent pastures: permanent pastures are those seeded with perennial grasses and legumes that are kept for grazing for a period of 5 or more years. Self seeding annual grasses and legumes may be included with perennial species. Permanent pastures are commonly grown in higher rainfall areas or under irrigation.
- Rotational pastures (Leys): these pastures are similar to permanent pastures but grazed only for 2 to 5 years then plowed to grow other crops. The pasture is rotated with other crops. The word ley is also used for rotational pastures, and refers a period of in a pasture/ cropping sequence.
- Annual pastures: these are grown to annual forage plants and used for grazing for one season. They are mainly used to provide supplementary forage for animals grazing on natural or permanent pastures. Seedlings of rapid growing forage like Sudan grass, millets and rape for grazing are of this type. Grazing the stubble of crops provides supplementary forage to range livestock during dry seasons.

2.3. Monitoring quantity and quality of Pasture

Pasture expressed in two ways:

1. Pasture conditions (Excellent, good, moderate, poor)
    - **Excellent - b**enchmarks/ with full basal cover
    - **Good** - undergrezed but with potential basal cover
    - **Moderate** - grazed but with fair basal cover
    - **Poor** - overgrazed and degraded with few basal cover

2. Utilization/ management aspects which will be described in the next information sheet.

Pasture conditions can vary. Forage quantity and quality are both part of the condition.

GOOD PASTURE

Conditions are where water is readily available to the animals, and there is a good system of cross fencing so pastures can be rotationally grazed.

Pasture Quantity– Good forage quantity is described as a condition where there is readily available amount material for grazing (proper plant height and plant spacing). The height of the forage is maintained between **3 and 8 inches** during the pasture season. Cattle are let in at the

8-inch height and moved out of the pasture at the **3-inch height** so that animal performance is not limited by amount of feed available. That is, they do not have to work hard to graze the forage. Plants fill in all the space of the field, without lots of bare spots or weeds. Low quantity forage conditions are when over grazing has plant height very short (<2") and forage plants are sparse in the field because of bare ground without plants or because weeds are prevalent.

Pasture Quality - High quality forage is described as being **high in protein and energy, and is easily digested by the animals**. High quality forage is actively growing, lush forage (that is, it is in a vegetative phase of growth and has lot of green, leafy material). Low quality forage is slow growing, dry forage (that is, it is in a reproductive phase of growth, has mature seed heads, and contains a lot of stems compared with leaves). It is low in protein and energy, and is not very digestible - like straw). Low quality forge limits animal performance (calving rate or weight gains).Pasture quantity and quality are the two most important factors in maximizing the amount of nutrients obtained from pasture. Just like harvested forages, the nutritional quality of pastures is related to the maturity of the forage when harvested. Dairy producers strive to achieve legume forage with 20-23% crude protein (CP), 26- 30% acid detergent fiber (ADF), 38-42% neutral detergent fiber (NDF), and net energy for lactation (NEL) of 0.60 – 0.68 Mcal/NE/lb when harvested as stored forage. With GOOD grazing management, grasses harvested by cows should be in a vegetative state and an approximate height 8 to 10 inches, depending on the type of grass. Grasses harvested as hay or silage are typically more mature than when harvested as pasture, thus pasture will be of higher quality than stored forages. Likewise, legumes such as clover or alfalfa are usually grazed at an earlier stage of growth than when harvested as stored forage. Therefore, with excellent grazing management we should expect to have higher quality forage when harvested as pasture than when harvested as stored forage.

However, pasture quality will depend on many factors, including geographic environmental conditions (temperature, humidity, and precipitation), types of grass and/or legume, and grazing management.

2.4. Assessing Pasture intake

Pasture assessment is the key to making better grazing decisions. To get the benefit of feed budgeting you need to know:

Quantity: the mass of pasture available to your livestock; and

Quality: the feed value of your pasture.

From this you can estimate the number of stock you can carry, for how long, and how well they are likely to grow. With feed budgeting you can determine when and how many stock you need to buy or sell with changing seasonal conditions; or alternatively how much supplementary feed will be needed.

- ❖ **Pasture mass (kg green DM/ha)**

The quantity of green feed on offer has a big effect on how much pasture an animal can eat. If there is not enough pasture available (i.e. it is too short), animals spend more time and energy walking and grazing but may not be able to eat enough to achieve the performance you want. In contrast, when there is too much pasture for the number of grazing animals, pasture is wasted and quality declines. This reduces future intake and therefore the future performance of your stock. The amount of green material present in a pasture is measured as kilograms of green dry matter per hectare (kg green DM/ha). This amount also affects the ability of the pasture to grow to its potential. When pastures are too short, there is insufficient leaf to capture sunlight and the energy for growth. If it is too long the lower leaves are shaded and plant growth declines. The quantity of green feed on offer is related to a combination of pasture height, pasture density and percentage of dry matter (the non-water component). This has the following benefits

- Increase your productivity by making better grazing decisions.
- Better manage stock numbers to increase the utilization of available pasture.
- Learn to use the MLA Pasture Ruler to predict animal performance and dollar returns.

- ❖ Pasture height

Simply by measuring pasture height an estimate can be made of the amount of green feed available in a paddock. Although approximate, this is a quick and easy way to assess the pasture mass. The MLA Pasture Ruler is specifically designed to help with this assessment. With practice, this assessment can be made ‘by eye’, assessing the height and density of the pasture and estimating the amount of available herbage (kg green DM/ha). If pasture height is measured in an un grazed area of the paddock at intervals of a week or so, an estimate can be made of how fast the pasture is growing.

- ❖ **Pasture density**

The MLA Pasture Ruler is a guide to pasture quantity for a moderately dense pasture. Adjust the estimate of pasture mass (up or down) according to the pasture density. Very dense, closely grazed pastures will have a high (up to 25%) kg green DM/ha at the same height. Conversely with lightly grazed open pastures

- **Dry matter percent**

The amount of moisture in plant material varies between species, growth phases, seasons and even weeks. There is a tendency to overestimate herbage mass in young actively growing pasture that may contain over 80% water (i.e. less than 20% dry matter), but as plants mature, dry matter content increases.

- **Pasture quality and animal needs**

When pasture mass is assessed, stock numbers can be managed to increase the utilization of available pasture as long as the quality and quantity is at or above the minimum benchmark for that class of livestock or performance level. Pasture quality directly influences animal intake and production. This occurs in two ways: by influencing the amount of pasture consumed; and through determining how much of the feed consumed is converted into animal product. There is no single measure of pasture quality. It is a combination of the proportion of legume, green and dead material, and digestibility – all of which affect pasture energy content. Pasture energy content is the main driver of animal production and is measured as mega joules (MJ) of metabolisable energy (ME) per kilogram of dry matter (and is related to digestibility of the pasture). The higher the quality (and therefore energy content) the less the amount animals need to eat to achieve the same growth rate or level of milk production

In general, the poor quality is mainly due to:

1. Type of grass (varieties, species). Tropical grasses and natural grasses in temperate climates have often a lower protein content and the CF contents is (much) higher than in well managed special selected temperate grasses.
2. Maturity is usually reached earlier and flowering may be continuous, also due to climatic and soil factors.
3. Quality of grass is affected by management factors, such as:
    i. Fertilizer input. Low or non N input results in lower CP contents and lower quantities of product.

ii. Stage ad method of harvesting. Late harvesting (over-mature) provides more bulk but the product will be of poor quality (CF).

4. Method of conservation. Usually, warm and humid climates provide a rather poor environment for conservation (hay making, silage making), while similar factors contribute to losses during storage (mould due to moisture).

All in all, the net result often is a rather poor quality and yield. Grasses and its conserved products do have often a much lower digestibility and feeding value.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. **What do we mean pasture condition? (4 points)**
2. **Mention some of the reasons for poor quality pasture. (6 points)**

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1.
   - _____
   - _____
   - _____
   - _____
2.
   - _____
   - _____
   - _____
   - _____

Information Sheet-2	Identifying stocking density for various grasses

2.1. Stocking rate

Stocking rate refers to the number of livestock (AU) on a paddock or a whole farm and is expressed as an indication of number of a particular type of animal per unit area. The usual measure is dry sheep equivalents (DSE) per hectare (ha), however, this may also be expressed in terms of cattle per unit area, such as breeders (cattle) per ha or square kilometre.

2.1.1. Stocking rates for different grasses

Stocking rate is the number of animals (animal unit) for which a grassland unit (hectare) can provide adequate dry-matter forage for a specified length of time. Stocking rate influences animal performance, pasture recovery, long-term pasture production and long-term pasture species composition. Stocking rates should represent a balance between grazing pressure (pasture demand) and carrying capacity (pasture supply). The ultimate goal should be to optimize both animal and pasture production over the long term, as opposed to maximizing only one or the other. In general, improved pastures can support higher stocking rates than native or unimproved pastures.

Table 3.1. Recommended stocking rates

Grass type	Stocking rate (MLU/acre per year)
Cenchrus ciliaris (blue buffalo grass)	0.4–1.2
Panicum maximum (white buffalo grass)	1.2–2.4
Chloris gayana (Rhodes grass)	1.6
Pennisetum clandestinum (Kikuyu grass)	1.2–3.2

MLU – matured livestock unit, equivalent to 500 kg non-lactating bovine

2.2. Dry sheep equivalent (DSE) and stocking density

Stocking density (head/ha) refers to the number of stock per hectare on a grazing area or unit at any one time and is usually used to describe the number of stock per unit area in a high-density grazing situation. This term is often used in intensive grazing management systems.

A **DSE** is used as a method of standardizing an animal unit and is the amount of feed required by a two year old, 50kg Merino wether to maintain its weight. Applying this principle, one 50kg dry goat is equivalent to one DSE and one yearling steer is equivalent to about 8 DSE, whereas a lactating cow may be equivalent to as much as 25 DSE.

2.3. **Animal Units and Animal Unit Months**

Stocking rate and carrying capacity are often expressed as **animal unit months** (AUMs). The original definition of an AUM was the amount of forage a cow and her calf would consume in 1 month. This definition worked reasonably well for several years until cows started getting bigger and calf weaning weights increased. To accommodate bigger cows and calves the definition of an AUM was put on a weight basis. Today an **animal unit** (AU) is commonly defined as 1000 lbs of body weight and an AUM is the amount of forage that an animal unit will consume in 1 month. If the cow and her calf weigh 1000 lbs then they are still 1 animal unit. More likely the cow weighs 1200 lbs and her calf grows to 400 or 500 lbs by weaning. So the cow without a calf is 1.2 animal units. However, by weaning time the cow and her calf are around 1.6 or 1.7 animal units. The 1000 lb animal unit can be applied to most large herbivores to get a rough estimate of stocking rate. However, tables of animal unit equivalents are often used to provide a more precise estimate that recognizes interspecies differences in metabolic and intake rate. For example, a mature sheep has an animal unit equivalent of 0.20. This means a sheep eats about 20 percent of the forage a cow will eat in one month. Occasionally you will see the term ***animal unit year*** (AUY). An AUY is 12 AUMs or enough forage to feed an AU for 12 months.

2.4. Tropical Livestock Units (TLU)/ha

- Grazing capacity of native pastures

Grazing studies on native pastures at Holetta Research Center indicate that well-managed natural pastures could be stocked at 2 Tropical Livestock Units (TLU)/ha from July to end of December and 10 sheep/ha for year-round grazing with hay supplementation during the dry season. Cutting or grazing at 2-week intervals reduced total dry matter to about 50% of that obtained from a 4-week grazing interval, indicating that a rest period of at least 4 weeks was important.

2.5. Identifying and implementing stocking rates

Identifying the stocking rate and stocking density that an enterprise can sustain to maximise green pasture utilisation is important in increasing the profitability of an enterprise. The number

of animals will depend on the nature of the enterprise eg breeding or trading, but should be sufficient to ensure high utilisation of the pasture grown while maintaining the long-term sustainability of the pasture and the grazing system.

Summary of High Stocking Rate Effects

- Animal performance reduced.
- Intake and forage quality reduced.
- Desirable forage plants replaced by less desirable species.
- Overall forage productivity reduced.
- Increase in bare soil and preferred grazing areas become degraded.
- Increased supplemental feed costs.
- Potential for water quality impacts due to increased bacteria, sediment, and nutrient loading.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define stocking density. (3points)
2. What does DSE and interprate in dairy animal. (4points)
3. Mention the summarized effects of high stocking rate? (7points)

Note: **Satisfactory rating - 14 points** **Unsatisfactory - below 14 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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Information Sheet-3	Implementing and monitoring grazing management

3.1. Introduction

Grazing management: - is defined as manipulation of grazing animals to accomplish desired results in terms of animal, plant, land or economic reasons. In terms of animals, it is mainly designed to increase animal production per given area of grazing land. This is usually expressed in animal production per hectare of grazing land (Ani. Prod. /ha.)

Grazing management is one of several tools available to land managers to manipulate vegetation, livestock performance and ecosystem processes. The response of vegetation, livestock and ecosystems to grazing is complex and significant knowledge gaps exist because of this complexity. In the face of incomplete knowledge grazing managers need to equip themselves with existing knowledge about grazing management effects and they need a management process that allows them to assess the effectiveness of practices and adapt to changing conditions.

Adaptive management is a process of planning, implementing and learning to progressively improve knowledge and evaluate the success of management practices and strategies as well as the validity of assumptions underlying management direction (Boyd and Svejcar 2009). Monitoring provides feedback about the effects of management and the success of practices.

Grazing managers are confronted with a variety of grazing strategies or systems that are sometimes hard to compare or evaluate. These grazing systems can be better understood if they are described and compared in terms of four components or principles of grazing: **intensity, season**, **frequency** and **duration of grazing**. Grazing researchers have compared one or more of these four components of grazing in controlled experiments to understand their effects on vegetation and livestock production. The results of these controlled experiments sometimes conflict with the experiences of grazing managers. We will discuss why grazing management research results sometimes conflict with experience. First we will discuss the adaptive management process of planning, implementation and learning that grazing managers can use to help them cope with complexity and knowledge gaps.

3.2. Ensure the sustainable stocking capacity of pasture

3.2.1. Intensity of Grazing

Grazing managers can influence or control the four components of grazing, season; frequency; duration and intensity. Intensity of grazing or stocking rate is most important of the four. It is a fundamental variable determining the sustainability and profitability of pasture (Smith 1899; Sampson 1923).

In determining stocking rate, grazing managers attempt to balance the forage demand of grazing animals with forage production over the changing seasons. The estimation of carrying capacity and stocking rate, describe how stocking rate can be monitored and review the effects of stocking rate on production and species composition.

3.2.2. Carrying Capacity and Stocking Rate

Carrying capacity: is defined as the average number of livestock that may be sustained on a management unit compatible with management objectives for the unit (Appendix A, SRM 1998).

Stocking rate: is often defined as the number of animals grazing an area of land for a specified period of time. It may be expressed as animal units per unit of land area over a described time period/area of land. Light, moderate and heavy grazing are relative terms often used for comparative purposes but are often not well quantified. In the annual grasslands moderate grazing is around 50 to 60 percent utilization but for many rangeland ecosystems moderate grazing is less than 50 percent utilization (Holechek 2004).

In general, grazing management approach based on predicted seasonal plant growth patterns can help achieve optimal stocking rate and pasture utilisation.

This should involve:

- Grazing enough animals to fully utilise available pasture without depressing animal intake to below target requirements or grazing new plant growing points.
- Timing grazing to begin just before first leaf senescence (dying-off) occurs for desirable pasture species.
- Monitoring grazing and removing livestock before critical limits for minimum pasture mass, height and ground cover are reached.
- Accurately assessing the re growth period before the next grazing occurs by monitoring pasture growth rates and the number of leaves per tiller.

The careful management of less intensively grazed land using the same approach leads to further gains in productivity.

The aim is for a sustainable production system that:

- Operates at a stocking rate that optimises production
- Remains weed-free
- Has stable pastures
- Has sufficient ground cover (generally greater than 70%) on flat land and low slopes to reduce run-off
- Prevents erosion
- Improves the quality of water entering waterways

3.3. Fodder budgeting

Fodder budgeting is the practice of matching feed supply and animal demand.

It aids calculation of short and long-term stocking rates and answers the following questions:

- How long will a paddock last with a particular number of livestock in it?
- How many livestock can I put into a paddock while maintaining a residual pasture cover?

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Mention what points are the fodder budgeting calculation answers.(3points)
2. Mention the four components or principles of grazing that are described and compared during grazing systems. (4points)
3. Mention the points involved under grazing management approach based on predicted seasonal plant growth patterns to achieve optimal stocking rate and pasture utilisation.(4points)

Note: **Satisfactory rating - 11 points** **Unsatisfactory - below 11 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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   - _____
3.
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Information Sheet- 4	Monitoring grazing behavior of livestock.

4.1. Introduction

Grazing is the natural feed intake behaviour of a cow. However, in the last century, intensive confinement systems with silage feeding and concentrate supplementation have replaced many extensive pasture-based milk production systems. Grazed grass is now acknowledged as the cheapest feed available as a consequence of rising machinery, labour and feeding costs. Thus there is a renewed interest in intensive pasture-based milking systems. In addition, policy objectives, societal expectations and environmental concerns have all supported reconsiderations for pasture-based milk production. Novel technology to aid measuring and managing grassland and cow grazing behaviour have the potential to facilitate improved performance

4.2. Identifying shy or problem feeders

4.2.1. Sickness behavior

Abnormal feeding and drinking behaviour and decreased activity are indicative of general malaise

4.2.2. Predictive value of behaviour

- Some behavioural patterns may have predictive value in identifying risk of various health disorders
  - ✓ We can often identify environmental (housing, feeding, and management) factors which may influence the expression of that behavior

So….some behaviours may then…

- Be used to identify something wrong with the animal
  - ✓ Use to identify the need for treatment
- Indicate a problem in the environment
  - ✓ Use to identify need to make changes

What are we going to look at today?

- Examples of behaviour and health issues related to nutrition and nutritional management
- Sub-acute ruminal acidosis
- Subclinical ketosis
- Mastitis

Sub-acute ruminal acidosis (SARA)

- No clinical signs, difficult to diagnose
  - ✓ Fluctuating feed intake
  - ✓ Reduced digestibility
  - ✓ Loose manure
  - ✓ Low milk fat
  - ✓ Laminitis
  - ✓ Decreased rumination?

What else can monitoring sorting tell us?

- Dairy cows will select a diet to reduce effects of low rumen pH
  - ✓ Long alfalfa over pelleted alfalfa
  - ✓ Long forage particles
  - ✓ Sodium bicarbonate

Behavioural patterns and risk of mastitis

- Environment is a potential risk factor for acquiring infection
  - ✓ environmental bacteria
- Standing and lying behaviour patterns have potential to influence the risk of such infections

Identifying cows at risk for subclinical mastitis…

- Greater risk in…
  - ✓ Those that lay down immediately after milking (within 30-60 min)
  - Longer for 3x milked cows
  - ✓ Those that wait for extended periods of time (2 hours and beyond) following milking prior to lying down

Take home messages…

- Behaviour can be used to identify dairy cattle experiencing, or at risk for, illness
  - ✓ Important to watch cows!
  - ✓ Visual detection of changes in behaviour is sometimes difficult
- But…technologies do exist to help monitor behaviour!
  - ✓ Changes in a behaviour do not always identify the problem
  - ✓ Housing and management changes can be made to change these behavioural patterns and reduce risk

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Mention the indicative of sickness behavior (2points)
2. Mention the indicative expression of Predictive value of behavior.(3points)

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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Information Sheet- 5	Determining and supplementing livestock feeding methods and level of supplementary feeding

5.1. Introduction

Supplementary feeding at important stage aims to make better use of this feed by supplying those nutrients that the pasture is deficient in, so that animals can be cheaply maintained while decisions are being made. Supplementary feeding is an option only when there is paddock feed available. When availability of paddock feed becomes limited, survival feeding or production feeding must be implemented. 'Survival feeding' means providing an animal with the minimum feed it needs to stay alive; 'Production feeding' means, for adult stock, sufficient food for successful breeding or, for younger animals, sufficient food to meet growth and/or market targets.

5.2. Supplementary feeding principles/methods

To be effective, the supplement you choose must make up for the main nutrient deficiencies in the paddock feed. Dry feed is often deficient in protein and sulphur. In cases where the feed is green but very short, it is the low energy intake which limits production.

The following principles for efficient use of supplements should be followed.

- Identify the most limiting components, usually protein, sulphur and/or metabolisable energy.
- Select supplements containing high levels of the identified limiting components.
- Balance the supplement to ensure efficient rumen function
- Young and lactating animals have a greater need for protein.
- Choose feeding techniques which minimise disruption to the animals' digestive system.
- Cost out the program, taking into account alternative measures.
- Start feeding those animals with the greatest needs, for example pregnant cows of low fat score, or weaners below critical live weights.
- Monitor feed consumption, live weight and condition; so that you can confirm that your strategy is working.

Outcomes of feeding supplements to stock

When supplements are fed to stock, there are three possible outcomes, depending on whether energy supplements or protein supplements are used and on how the pasture and supplement interact during digestion:

- **Supplementation**. The supplement is eaten and pasture intake is unchanged. This is a rare event.
- **Substitution.** The supplement eaten causes reduced pasture intake. This usually occurs when pasture is supplemented with a high-energy feed.

- **Complementation.** The supplement is eaten and pasture intake increases. This occurs when stocks are grazing on dry pasture or crop stubble and the supplement improves the animal's ability to utilise the feed.

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

3. Mention the three possible out comes when supplements are fed to stock on how the pasture and supplement interact during digestion.(3points)
4. Mention at least 5 principles for efficient use of supplements when animals fed in paddock.(5 points)

Note: **Satisfactory rating - 8 points** **Unsatisfactory - below 8 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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Operation sheet - 1	Assessing pasture dry matter content. Quality and quantity

Procedures

Step 1. Wear personal protective cloth

Step 2. Identify materials, tools and equipment used for determining

Step 3. Put the quadrate randomly

Step 4. Harvest the forage in the quadrate

Step 5. Weight the harvested forage to estimate the biomass

Step 6. Put the sample in the oven drier

Step 7. After 72 hour measure the weight the sample and calculate the DM

Operation sheet - 2	**Arrange supplementary feeding program**

Procedures

Step 1. Wear personal protective cloth

Step 2. Identify materials, tools and equipment used for determining

Step 3. Sort and specify the supplementary forage

Step 4. Calculate the required concentrate based on the requirement

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 6 hours.

Task1. Assesse pasture dry matter content, quality and quantity.

Task 2. Perform arranging of supplementary feeding program.

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Dairy production

Level-III

Learning Guide-25

Unit of Competence: Implement feeding plans for dairy animals

Module Title: Implementing feeding plans for dairy animals

LG Code: AGR DRP3 M06 LO3-LG-25
TTLM Code: AGR DRP3 TTLM 1219v1

LO3: Manage the feeding of Dairy Animals

Instruction Sheet	Learning Guide 25

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Obtaining roughage feeds and feed to dairy animals.
- Obtaining required supplementary feed.
- Providing supplementary feed to livestock.
- Identifying and assessing Indications of any negative environmental impacts
- Monitoring and reporting condition and live weight response to feeding

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to**:

- obtain roughage feeds and feed to dairy animals.
- obtain required supplementary feed.
- provide supplementary feed to livestock.
- identify and assess Indications of any negative environmental impacts
- monitor and report condition and live weight response to feeding

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information Sheet (**1, 2, 3,4 and 5**) in pages **3, 8, 14,23 and 26** respectively.
4. Accomplish the Self-check (1, 2, 3, 4, and 5) **in page 7, 13, 22, 25, and 29** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1 and 2 ” **in page 30 and 31** respectively.
6. Do the “LAP test” **in page – 32** (if you are ready).

Information Sheet-1	Obtaining roughage feeds and feed to dairy animals.

1.1. Obtaining roughage feeds and feed to dairy animals

As mentioned in the previous learning guide, Roughage is feed stuffs that contain relatively large amount of CF (more than 18%). These feed stuffs are mostly bulky feeds with lower amount of T.D.N (Total digestible nutrient) which is less than 60 % and they are usually of very low digestibility.

Roughage can be divided into seven main groups:

1. Grasses (pasture)
2. Legumes
3. Fodder crops
4. Agricultural by-products
5. Conserved fodders
6. Industrial roughage
7. Miscellaneous feedstuffs

1.1.1. Grasses (Pasture)

Generally, grasses and its products are the main supplier of roughage in most countries with an advanced dairy-farming system. Pasture (grasses) provides a basis for dairy-production. They are abundantly available and with their good quality (usually) the cheapest source of food for cattle. Unfortunately, the quality of grasses in development countries can be rather of poor quality. The availability may be limited due to land pressure (first priority is to provide staple food for human nutrition) and/or high production costs.

The poor quality is mainly due to:

- Type of grass (varieties, species)
- Maturity due to climatic and soil factors.
- Management factors such as: Fertilizer application, Stage ad method of harvesting.
- Method of conservation.

All in all, the net result often is a rather poor quality and yield. Grasses and its conserved products do have often a much lower digestibility and feeding value.

Low digestibility and feeding value affects the DM intake in a negative way, which results in a more than proportional lower intake of nutrients! The limited amount of nutrients obtained from poor quality roughage should be balanced by towering amounts of usually expensive high quality concentrates. This leads to an increased cost-price of milk, as feeding is the main factor in the total cost-price. Sometimes, feeding costs are up to 60% of the total cost-price per kg milk.

Grasses can be used by grazing or zero-grazing (mowing, cutting and feeding in the corrals, yards, barn or shed: the so-called "cut and carry" system) or can be fed after conservation (hay, silage). Every type of utilization results in losses:

- **Grazing**

Losses of 25-30% as a result of trampling, urine/dung patches and refusal will be expected.

- **Zero-grazing**

Selective intake may require 10-35% extra feeding to allow for refusal. If the product is chopped (<5 cm), no selective intake can take place. In this case, the average quality is lower resulting in lower DMI and the need for more and better quality concentrates (Balancing a ration).

- **Conservation**

Losses up to 30% DM in the silage may happen. Losses of nutrients can be even higher (DCP up to 60-70%) due to refusal, soil contamination, side losses in the pit and risk of quality. In hay making there are losses due to weather conditions, leaf losses, storage and refusal.

1.1.2. **Legumes**

The feeding value of legumes (lucerne, alfa alfa, clovers) varies less when compared to grasses. Protein and mineral contents are often higher, whereas the CF content is lower compared with grasses. Legumes have a high calcium, but a low phosphorus content. Some legumes (clover, lucerne) are able to produce large amounts of high quality fodder under intensive management conditions. Legumes differ a.o. from grasses as their growing points are higher above the ground. Legumes do not allow close cutting (or grazing). In order to obtain high yields irrigation may be necessary. Especially to sustain yields during the dry season. Legumes can be conserved as hay, but leaf losses may be very high. They are less suitable for

silage making. The inclusion of some fresh legumes in a diet can be very beneficial for a high yielding dairy cow.

1.2.3. Fodder Crops

The most common fodder crops are: roots, beets, carrots, cassava, turnips, swedes, mangolds, tubers (sweet potatoes + vines, potatoes), fodder grains (maize, sorghum, oats, rye) and Brassica species (kale, cabbages, rape). The main advantage of these fodder crops is, that they are capable of producing high yields per/ha, often during periods when other roughage (grass) are in short supply. Frequently they are produced on irrigated land and can be fed fresh or conserved (maize silage), while some products can be relatively easy stored (tubers, roots).

Roots, tubers and Brassica species have a low DM% (10-20%) and are relatively rich in energy, supplying nutrients like starches and sugars. Their CF content is low which results in a high digestibility (and palatability). Their protein content is generally low, as well as their mineral/vitamin contents with the exception of carrots, which are rich in vitamin A.

Fresh/green fodder crops provide a welcome component in a diet, especially where dried roughage and concentrates are prevailing. Care should be taken with the laxative effect these fodder crops generally have, which may cause diarrhoea (introduce gradually) and may depress the fibre digestibility of other components of the ration.

Fodder grains can give high yields: relatively energy rich roughage per unit land. The feeding value depends largely on the quantity and maturity of the seeds included. Sometimes, seeds are harvested for human consumption. This reduces the feeding value of the remaining plant. The protein content is relatively low. Maize is an excellent product for silage making, sorghum can provide several cuts of fresh material (irrigation and cutting at immature stage).

Sorghum should not be grazed during the first 3-4 weeks after cutting. Sorghum may contain a rather high amount of prussic-acid in the young stage, causing poisoning (death).

1.1.4. Agricultural By-products

Only a part of agricultural products can be utilized by man himself. The amount of byproducts for feeding farm animals can be considerable. There is a considerable variation in quantities and qualities of by-products between crops, influenced by species, varieties, climate, season, region and stage at harvest. The most important parts of roughage are the aerial parts (stems, leaves).

Summarizing, most agricultural by-products (roughage) have a rather low feeding value, which implies that they need supplementation with concentrates to enable high milk production.

1.1.5. Conserved Roughage

Roughage can be conserved into hay or silage. Losses during the conservation process and storage can be 30-50% of the DM, due to continued respiration, leaching by rain, mechanical handling and self-heating. The losses depend on the climate and the success and speed of the conservation process. Generally, losses of energy and DCP are even higher, up to 75%, leaving a conserved product with a low quality compared to the original product. Beforefodder conservation is practised, the real feasibility of conservation should be determined, as well as the extra costs for equipment. Modern conservation methods (wilting, quick harvesting and proper sealing) can reduce losses in silage making considerably (15-20% DM).

1.1.6. Industrial Roughage

By-products from several agricultural industries can be used as roughage for ruminants. Their disadvantages are an often high water content, which affects keeping quality and makes transport more difficult, while the feeding value varies frequently. For those reasons, their use is generally limited to farms in the vicinity of the industrial plants.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Mention how grasses can be used by animals and describe the percentage of losses.(5points)
2. List down the most common fodder crops used in dairy animal feeding.(5points)

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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Information Sheet-2	Obtaining required supplementary feed

Introduction

As mentioned in the previous topic, Supplementary feeding at important stage aims to make better use of this feed by supplying those nutrients that the feed is deficient in, so that animals can be cheaply maintained while decisions are being made. Supplementary feeding is an option only when there is some feed available.

Supplementary feeds can be obtained from different sources. These are:

2.1. Concentrates

Table 5.1. Common energy sources for dairy cattle

Ingredient	Source	Remarks
Maize grain	Whole grain	Rarely used as feed except for high-yielding cows
Maize bran	Outer coating of the maize grain	Has moderate energy, CP 11%, CF 10%
Full fat maize germ	Embryo, which contains a lot of oil	High-energy content
Maize germ meal or cake	Left over after extraction of oil from germ	High-protein content
Wheat bran	Coarse outer covering—the husk and some adhering endosperm	Fibre highly digestible, CP 15%, CF 12%
Wheat pollard (middlings)	Part of endosperm, germ, bran particles and some flour	Not as palatable as bran due to its tendency to form a pasty mass in the mouth, CP 16%, CF 7.5%
Barley	Mostly rejected barley	Low starch content, high fibre. Best fed when steam-rolled to increase digestibility, CP 11%
Multiculms (multisprouts)	Sprouts and rootlets obtained from malted barley	Mostly used as protein supplement, CP 27%, CF 16%

Wet brewers grain ('machicha')	Insoluble residue left after fermentable substrates from barley are removed	High moisture content. Wet grains rapidly become rancid. Use immediately or ensile in absence of air, CP 18%, CF 15%
Sorghum	Resembles maize nutritionally	Should be fed to cattle and horses in ground form, CP 12%, CF 3%
Rice hull	Low nutritive value, very fibrous	Due to the high fibre, these hulls are of low digestibility and therefore of little value
Rice bran	Pericarp, aleurone layer, germ and some endosperm	Very palatable when fresh; CP 12.5%, CF 13%, fat 10–13%. Becomes rancid with storage due to high fat content
Rice polishing	Fine powdered material obtained when polishing rice grain after hulls and bran have been removed	CP 12%, CF 4%, fat 11%

Ingredient	Source	Remarks
Oats	Whole grain	Good cereal for cattle due to high fibre content from the hull, CP 11–14%, CF 12%
Cassava root	Whole	Freshly harvested cassava has a high level of prussic acid; boiling or sun drying destroys the poison
Cane molasses	By-product from sugar cane milling, dry matter 75%, CP 5.5%, CF 0.3%	Provides energy, improves palatability of poor-quality feedstuffs; levels > 25% can cause diarrhoea and reduced feed efficiency. Molasses is of value in reducing dust in feed, as a pellet binder, or as a liquid protein supplement when mixed with urea
Fats and oils	Waste fat from eateries	Used to increase the energy density and to reduce dust. High levels of fat in diets lead to rancidity; > 8% fat in ration can cause rumen disturbances

CP – crude protein, CF – crude fibre

Table 5.2. Common protein sources

Source	Comments
Soybean/ soybean meal	Very palatable and highly digestible. The *whole seed* has 40% CP and 15–21% oil, which is extracted to make the meal. Extracted meal contains 47% CP. *Raw beans* have less nutritive value than heated beans or soybean meal, due to toxic substances. The toxins are especially harmful to young animals (calves)
Cottonseed/ cottonseed cake	*Whole cottonseed* has been used with good results for early lactating cows for its energy (fat), protein and highly digestible fibre. CP of whole seed 23%, of cake 35%. Cattle digest it well
Sunflower cake	In cows has performance similar to soybean and cottonseed cake. CP 26%
Peanut (groundnut) meal	Remains after extraction of oil from groundnuts. CP 45%; aflatoxin contamination may be a problem
Corn gluten feed	Mixture of maize bran and gluten. By-product during wet milling of maize. CP 21–23%
Corn gluten meal	Dried residue from the maize after removal of the larger part of starch and germ and separation with bran in wet milling. CP 40–60%
Coconut (copra) meal	Residue after extraction and drying of coconut meat. CP 20–26%. Has high fat content and may become rancid if stored long
Dried brewers yeast	By-product from brewing. Rich in CP (42%)

Meat meal, meat and bone meal	Made from carcass trimmings, condemned carcasses, inedible offal and bones. High fat content increases energy. Ash content is high: up to 28–36%, 7–10% of this being calcium and about 4–5% phosphorus
Blood meal	Produced from dried (either spray or cooker dried) ground blood. It has a high by-pass rate, thus is good for cows. CP 85%
Dry poultry waste	Excreta collected from caged birds, CP 25–28% (dry basis) of which 30% is true protein
Poultry litter	Mostly from broiler operations. Can be fed as is or ensiled with other products
Fish meal	Clean, dried, ground tissue of undecomposed whole fish or fish cuttings with or without extraction of part of the fat. Locally 'omena' is used as fish meal, CP 55%. High levels of fish meal or fish meal with high oil content may give an undesirable flavour to meat or milk. There is no special advantage in feeding fish meal to dairy cattle unless it is for by-pass protein. This protein, however, is expensive.

CP – crude protein

2.2. Minerals

Minerals make up a small portion of the diet but have a major functional contribution. Often their content in the basal diet is inadequate for high-producing dairy cows and supplementation is required. As roughages and concentrates cannot supply all the required minerals, supplementation with a mineral source is recommended.

Table: Typical levels of minerals in commonly used supplements

Supplement	Dry matter (%)				
	Calcium	Magnesium	Phosphorus	Potassium	Sodium
Sodium chloride	—	—	—	—	39.34
Limestone	34.00	2.06	0.02	0.12	0.06
Magnesium oxide	3.07	56.20	—	—	—
Di-calcium phosphate	22.00	0.60	19.30	0.10	0.10

2.3. Vitamins

Most of the vitamins required by a dairy cow are present in the diet in sufficient amounts. Water-soluble vitamins are synthesized by rumen bacteria. Animals consuming aged grasses or improperly cured hay may require vitamin A supplementation.

2.4. Feed additives

Feed additives are non-nutritive in nature but are used to improve performance through improved feed use or by benefiting in some manner the health or metabolism of the animal. Several additives have been used for dairy cows. Feed additives are, however, neither a requirement nor a guarantee of high productivity or profitability.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Mention the sources of supplementary feeds from which they are obtained (**4 points**)
2. Mention at least four protein source supplements.(4points)
3. List down the sources of energy source supplements (**4 points**)

Note: **Satisfactory rating - 12 points** **Unsatisfactory - below 12 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1.

- _____
- _____
- _____
- _____

2. _____

- _____
- _____
- _____

Information Sheet-3	Providing supplementary feed to livestock

3.1. Providing supplementary feed to livestock based on basis of supplementation

As mentioned in the previous topic, Supplementary feeding at important stage aims to make better use of this feed by supplying those nutrients that the feed is deficient in, so that animals can be cheaply maintained while decisions are being made. Supplementary feeding is an option only when there is some feed available When availability of paddock feed becomes limited, survival feeding or production feeding must be implemented. 'Survival feeding' means providing an animal with the minimum feed it needs to stay alive; 'Production feeding' means, for adult stock, sufficient food for successful breeding or, for younger animals, sufficient food to meet growth and/or market targets.

Energy is the fuel that keeps all body functions going. Just as petrol powers the car, energy in feed powers the dairy cow. Milk production requires a lot of energy.

Too little energy in the diet

If not enough energy is provided by the cow's ration it will lose body condition and become thin and weak. For milking cows, milk yield will drop. Pregnant cows may become ill after calving and the calf is likely to be small. In addition the breath of cows can smell unusual – a fruity chemical smell; this condition (ketosis) is most common soon after calving. And the cow can also develop a disease called fatty liver as a result of making energy available from its own body.

Too much energy in the diet

The most obvious sign is the animal becomes too fat. Cows that are too fat at calving are more likely to have difficult births, retained placenta (afterbirth), displaced abomasums (one of the cows' stomachs) and more often develop the conditions milk fever and ketosis, both of which are dangerous and can cause death.

Sources of energy are explained briefly in the previous topic.

Fats: Fats are energy-rich feedstuffs. Soon after calving, when cows are not able to eat as much feed as their bodies require, fats can be added to their rations. This is only necessary in the highest producing dairy cows. Good sources of fat for dairy cows are oilseed meals. However, too much fat in the diet can prevent cattle from digesting fibre and so no more than five per cent of the dry matter of a ration should be provided by fat. Expert advice should be obtained before fat is included in the ration of cattle. Local needs should be established, as applicable, relative to the kinds and amounts of minerals required

Protein

Proteins provide the essential chemical building blocks for all the body's cells and tissues, including muscles, blood, skin, internal organs, and also to make milk.

People and animals such as pigs and dogs need to eat high quality protein in their diets, for example meat, fish, milk, eggs and pulses. But cattle and other ruminants can also make protein from cheap, nitrogen-containing materials such as the chemical urea and poultry litter as well as digesting the protein contained in their feed.

Milk production and protein

One litre of cross-bred cows' milk usually contains about 35 g of protein (35 g of protein per litre of milk can also be expressed as 3.5% protein content). This means that a cow producing 25 litre of milk per day loses close to one kilogram (actually 25 litres x 35 g per litre = 875 g) of protein in the milk each day. Cows cannot store much protein in their bodies and so it must be supplied in the daily ration in order to maintain high milk production.

Dairy cows can also make protein from materials that contain nitrogen - such as the chemical urea and litter from poultry houses - through the action of micro-organisms in the rumen. However, feeding urea to dairy cattle is potentially dangerous and expert advice should be obtained before introducing urea into a ration

Minerals

Minerals are a small but important component of feeds. They are essential for cattle to remain healthy and for the body to function properly, for the development and maintenance of strong bones and for successful reproduction and production of milk.

The amount of minerals needed by cattle can vary, such as:

- Mineral requirements of young, growing animals are higher than for adults
- Pregnant and milking cows require more minerals

- High yielding cows require especially large quantities of calcium.
- Calcium deficiency is most likely to occur in early lactation.

Macro- and micro-minerals

Minerals are required in much smaller amounts than other nutrients, such as energy or protein. But dairy cattle need more of some types of minerals, called macro-minerals, than they do of others, known as micro-minerals which they require in only very small amounts. On average, about one thousand times more of the macro-minerals are required in the ration as compared to the micro-minerals.

Mineral supplements

Although forages and concentrates contain some minerals, the types and amounts vary widely and not all minerals naturally present in feeds are available to cattle. Since feeds cannot be relied upon to supply all the required minerals, extra supplementation should be provided in the form of a mineral mixture, to which cattle should have regular access. A good quality mineral supplement will contain all the micro-minerals and most of the macro-minerals a dairy animal will require to remain healthy and productive.

It is recommended to construct a box to hold the mineral mix and place it in the housing unit or at a convenient place in the grazing area. Ideally, the box should be raised from the ground with a roof to protect it from rain so the minerals are not washed away.

There are many cheap salts and mineral mixtures for sale but their quality is often doubtful so:

- Purchase mineral supplements from well known manufacturers
- Make sure the package has a label clearly indicating the mineral content and the identity of the manufacturer
- Ask your feed or agro-vet supplier or animal health adviser about mineral mixtures specially made for your local conditions.

Calcium and phosphorus

Two macro-minerals are of particular importance. These are calcium and phosphorus and special attention needs to be given to them when formulating rations. Calcium and phosphorus are naturally found in grasses, legumes, cereals and concentrates and are added to commercially produced dairy meals, but:

- Most tropical soils are deficient in phosphorus and forages grown on them will also be low in phosphorus

- Pastures grown on acid, sandy or peaty soils in humid areas tend to be low in calcium
- During prolonged dry seasons, when there is a shortage of green leafy material, the amount of phosphorus in forages decrease
- Legumes tend to be have more calcium and phosphorus than grasses
- Grains are low in calcium
- Calcium deficiency is most likely to occur in early lactation (milk fever)
- Young, dark green forage tends to contain more minerals than old, dry, yellowing forage

Extra calcium and phosphorus usually need to be provided in the ration over and above that naturally present in the feed and mineral mix, especially for high yielding animals. Good sources of calcium and phosphorous include:

- Steamed bone meal
- Mono calcium phosphate
- Calcium chloride.

Other macro-minerals

Common salt (sodium chloride) should also be given to provide sodium and chlorine. Magnesium is also required in relatively large quantities by high yielding dairy cows. Good sources of magnesium include magnesium oxide and magnesium sulphate. Forages will usually supply enough potassium.

Mineral feeding methods

A. Force-feeding

Force-feeding is recommended for feeding minerals to dairy cows as it eliminates palatability problems, daily and cow-to-cow variation in intake, and over-consumption of minerals. The best method of force-feeding is in a total mixed ration. Another commonly used method is to use a grain carrier. This method is suitable where the requirements can be predicted fairly accurately.

B. Free choice

The free choice method is not as accurate as force-feeding but is very practical. The mineral supplement, which is usually in powder or block form, is purchased and placed in a mineral box. Construct a mineral box and place it in the housing unit or at a strategic place in the grazing area. The box should be raised from the ground and covered with a roof to protect the mineral from the rains. Animals consume the mineral ad libitum (as much and as often as desired).

C. Topdressing

The topdressing method is often used for stall-fed cows where individual feeding is practised. The mineral mixture in powder form is sprinkled on the chopped material and the animal consumes it as it feeds. The problem is the minerals may separate and settle at the bottom of the trough.

Water

All animals need water for their bodies to function normally. Without water animals die quickly, within a day or two– much more quickly than they would without food. Water is needed to make saliva to enable feed to be swallowed and for chewing the cud, for food to be digested, to cool the body when it is too hot and to remove waste materials from the body in the urine and faeces. In addition a milking cow needs water for milk production: it takes about five litres of water to produce each litre of milk.

Cross-bred dairy cattle are not well adapted to heat stress and it is therefore especially important to make sure that water is available to them at all times. The amount of water a dairy animal drinks per day depends on many factors, including how much milk is produced, how hot it is, the amount of feed eaten and the water content of that feed.

Select supplementary feeds based on cost.

Productive dairy cows simply cannot eat enough bulk forage to supply all their nutritional requirements. They need to be fed high quality nutrient-rich feeds in addition to the bulk forages that form the largest part of their rations. These nutrient- rich feeds are called supplements and there are two types:

- Supplementary forages
- Concentrates

Supplementary forages

Supplementary forages are fibrous plants similar to bulk forages but they have higher level of protein and energy than ordinary bulk forages. Most supplementary forages are legumes crops, especially grown on the farm to feed dairy cattle.

Supplementary forages can be used in two ways: either to compensate for poor quality bulk forages or to substitute for concentrates: for example three kilograms of fresh calliandra can replace one kilogram of commercial dairy meal.

Supplementary forages can be fed fresh, dried as hay, for leaves of shrub and tree legumes as dry leaf meal, or preserved as silage. But they should be fed with caution as feeding large amounts of some supplementary forages can cause bloat and other problems. Usually supplementary forages should not make up more than 25 to 30 per cent of the ration on an as-fed basis.

CONCENTRATES

Concentrates are nutrient-rich feeds – they provide far more nutrients (energy and/or protein) than an equivalent amount of bulk forage. They include compound feeds manufactured by milling companies, such as dairy meals, cubes and pellets, as well as single ingredients, such as brewers' waste, maize germ meal or molasses.

Concentrates differ from supplementary forages in two main ways: they usually have little or no fibre and also usually have a higher dry matter content.

Advantages of concentrates:

- Supply concentrated nutrients.
- Contain very little fibre.
- Have high dry matter content.
- Are palatable (cattle like to eat them) and easy to digest

Disadvantages of concentrates:

- Are expensive.
- Quickly break down in the rumen forming acid which can prevent effective digestion of forages.
- Can cause health problem if too much is eaten, for example where concentrates form 60 to 70 per cent (dry matter) of a ration or more than 14 kilograms is fed per day

Economics of feeding concentrates

Failure to feed enough supplements, especially early in the lactation, is the main reason why many cows give much less milk than they are capable of, which reduces the profit the farmer could have made. Also, soon after calving cows cannot eat enough bulk to provide all the nutrients they need and supplements, including concentrates, are especially needed at this time.

As much forage as possible should be fed before supplementing the ration with concentrates. Too little forage in the ration can also lead to a decrease in milk fat content. Concentrates are

expensive – more expensive than forages - and they should therefore be used to support additional milk production. This means that the farmer will get a return on the money spent on concentrates. If the rules of concentrate feeding are followed (see below), money spent on concentrates will lead tohigher milk yields and higher profits.

How to feed concentrates

The type and amount of concentrate to feed an individual cow will depend on the quality of forage the cow is given and the level of milk production. Forages vary in quality: generally legumes are of high quality, fresh grasses medium and crop residues, such as straw, low quality, containing high, medium and low levels of protein, respectively.

If the milking cow is fed on forage with a low protein content, such as tall, overgrown Napier grass or dry maize stalks, then concentrates with a high protein content need to be given to provide a balanced diet and support a high milk yield. If the cow is fed on high protein forages, such as good quality pasture, or also receives supplementary forages, such as lucerne, lower protein concentrates can be used – or no concentrates may be needed, depending on the cows' milk yield.

How much to feed?

Concentrates are expensive and therefore should be fed carefully to get the best return on your investment. The amount of concentrates fed should depend on the level of milk production and the quality of forage. The most economical level of feeding concentrates is the point at which the last amount of additional concentrate added to the ration is just paid for by the extra milk produced by that unit of concentrate. But this point may be difficult to determine for individual cows

- it requires careful measurement of the amount of concentrate given and milk produced. Also, it is influenced by changes in milk and feed prices
- if the milk price drops, it may no longer be economical to feed as much concentrates.

Alternative approaches to feeding concentrates

Challenge feeding: This method of concentrate feeding is traditionally recommended for cows in early lactation. Begin with a low level of concentrates, such as four kilograms of dairy meal

per day, and gradually increase the amount of concentrates fed each day until the point is reached when adding more concentrate does not result in an increase in the next day's milk production. Continue with this level of feeding for the first 12 weeks of the lactation. After 12 weeks, the amount of concentrates fed should depend on the milk yield. If the cow is fed on good quality forage it should be able to produce five to ten litres of milk per day on forage alone. For every litre of milk produced over and above five litres, feed half to one kilogram of concentrate. So, for a cow producing eight litres of milk per day after 12 weeks, feed one to two kilograms of concentrate per day.

Flat rate feeding: Feeding a constant amount of concentrates, for example two kilograms per day, throughout the entire lactation is not recommended. During early lactation the concentrate fed is insufficient, while during late lactation it will be too much.

Targeted concentrate feeding: If financial constraints mean it is not possible to feed as much concentrates as would be ideal, then it is best to feed all the concentrates available during early lactation. Cows produce more milk during early lactation and they need plenty of nutrients to support this. Also, the amount of milk they produce during this period influences the amount of milk they will produce later in the lactation - the more milk they produce in early lactation, the more milk they will give in late lactation.

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Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. write the advantages and dis advantages of concentrate feed supplementation?(5points)
2. Mention 4 energy source concentrates of dairy animal feed (**4 points**)
3. Describe the methods of mineral feeding.(3points)

Note: **Satisfactory rating – 12 points** **Unsatisfactory - below 12 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1.

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3.

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Information Sheet-4	Identifying and assessing Indications of any negative environmental impacts

4.1. What is an Environmental aspect? Simply put, an environmental aspect is any part of your company's activities that can interact with the environment, either positively or negatively.

Overuse is associated with high stocking rates and the increasing use of chemical fertilisers, pesticides and mechanisation and business specialisation. Its main impacts are on soil, water, air, biodiversity (including the diversity of farm stock) and non-renewable resources, often imported. Soil is affected by nutrient contamination, trampling and subsequent erosion. Drainage is simplified, reducing hydrological inertia and contributing to flooding. Ground water is polluted with nitrates and pesticides, surface water is eutrophicated and emissions of ammonia methane increase the burden of greenhouse gases. Neglect is associated with the abandonment of dairying, leading to scrub encroachment, and the extension of commercial forestry, both of which simplify the structure of the landscape by displacing the open habitat mosaics associated with traditional farmland. Not surprisingly, these processes can reduce biodiversity throughout the ecological hierarchy, not least because of the loss of locally adapted breeds of crop and stock. Given the comprehensive influence of the intensification process on the environment, it is understandable why something as simple as changing in the level of exploitation may have long-term and complex implications for the environment, and in particular for those processes that affect food security, human health, and climatic stability.

4.2. Making amendments to the feeding method.

Feeding during drought and feed scarcity

Drought increases the risk of unacceptable residues in stock. Risk includes contaminated feed, increased intake of contaminated soil and animal loss condition and many other causes follow. So the following are important managements and amendments are required:

- ★ When it is too expensive to feed all cattle, the most voluble cattle should have first priority and reducing the number of stock and feed the nucleus cows (4-7 yrs) that are pregnancy tested heifers

- ★ Proper use of water in troughs is the best way of water contamination
- ★ Cattle need to be trained to eat grains & meals in a fixed area.
- ★ Reducing of the chemicals used in dairy farming.
- ★ Storing feeds as a form of hay and silage.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Mention the negative impact feeding dairy cows on environment (4points)
2. Write the most important managements and amendments required during dry period.(4points)

Note: **Satisfactory rating – 8 points** **Unsatisfactory - below 8 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1.

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Information Sheet-5	Monitoring and reporting condition and live weight response to feeding.

5.1. Monitoring and reporting condition and live weight response to feeding condition scoring of dairy cows

5.1.1. Why condition score?

Condition scoring is a technique for assessing the condition of livestock at regular intervals. The purpose of condition scoring is to achieve a balance between economic feeding, good production and good welfare. Condition scoring is particularly useful as an aid to dry cow and pre-calving management. The objective is to ensure that cows calve down safely whether they are on a controlled diet indoors or outdoors at grass. Subsequently in early lactation the cow is under considerable nutritional pressure and body condition is a vital indicator of excessive weight loss. This can lead to metabolic disorders and other welfare problems and should be avoided

5.1.2. How to Body Condition Score

Scoring consistently requires handling cattle in order to assess body reserves but an overall visual inspection is also important. The scoring system is designed to cover all cattle but some allowance should be made for different breeds.

- The scoring method involves a manual assessment of the thickness of fat cover and prominence of bone at the tail head and loin area.
- You should stand directly behind the cow to score both areas and always handle the animal quietly and carefully using the same hand.
- The tail head is scored by feeling for the amount of fat around the tail head and the prominence of the pelvic bones.
- The loin is scored by feeling the horizontal and vertical projections of the vertebrae and the amount of fat in-between.
- Assessment relies mainly on the tail head but is refined by the loin score if both are very different. On a scale of 1-5, a score of 1 is extremely thin and a score of 5 is extremely fat. If possible assess the scores to the nearest half point.
- Consistency in the technique is the key to good condition scoring.

Note : A management programme that allows time for any corrective action to be taken is essential.

5.1.3. Feeding

This record help farmers keep a track of the amount of feed that is provided for the animals. It could be anything like the amount of supplements fed to a cow, or the total amount of concentrate fed for pasture-grazed cows, and so on.

Feeding records can be utilized both for every day administration and change of the feed proportion. If a milking cow requires more concentrate, or help in choices about inspecting animals which appear to not develop, but rather still eat a lot.

a. Feeding record format

Table Feeding record format

Date	No. of Animals	Silage/Green Fodder (Kg)			Concentrate (Kg)			Any other Feed Ingredient		
		Received	Issued	Balance	Received	Issued	Balance	Received	Issued	Balance

5.1.4. Reporting

Animal feeding operations are the most likely type of animal agriculture operations to be subject to rules and regulations. Most of these briefly, they include

- the manure handling and storage practices,
- daily feed requirement,
- herd/ flock health and condition and live weight,
- nutritional requirements,

- animals that require individual treatment,
- negative environmental impacts of feeding,
- biosecurity and
- animal welfare and environmental sustainability policies.

Record keeping and inspections is the cornerstone of compliance efforts by livestock and poultry producers.

.Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. While monitoring and reporting condition and live weight response to feeding mention at least 6 important points included in report? (6points)
2. Describe the purpose of condition scoring.(2points)

Note: **Satisfactory rating – 8 points** **Unsatisfactory - below 8 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1.

- _____
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2.

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Operation sheet -1	Body condition score

Techniques of body condition score as follows:-

Step 1.Wear personal protective cloth

Step 2. Identify materials, tools and equipment used for determination BCS

Step 3. stand directly behind the cow to score both areas and always handle the animal quietly and carefully using the same hand.

Step 4. Score the tail head by feeling for the amount of fat around the tail head and the prominence of the pelvic bones.

Step 5: score the loin by feeling the horizontal and vertical projections of the vertebrae and the amount of fat in-between.

Step 6. scale of 1-5, a score of 1 is extremely thin and a score of 5 is extremely fat.

Operation sheet -2	Record feeding

Steps to be followed to measure feed provided

Step 1.Wear personal protective cloth

Step 2. Identify materials, tools and equipment used for determination

Step 3. Develop feed record format

Step 4. Prepare different feed ingredients and animals supplemented.

Step 5. Weigh the feed received, issued and balance for silage/green feed (kg), concentrate and other feed ingredients

Step 6. Evaluate the weight gain/daily/ annually and etc

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 3 hours.

Task1. Perform body condition score.

Task .2. Perform recording of feed

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https://www.thecattlesite.com/articles/813/supplementary-feeding-of-cattle/

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https://www.beefresearch.ca/research-topic.cfm/environmental-footprint-of-beef.

https://en.wikipedia.org/wiki/Environmental_impact

Trainers prepared the TTLM with their full address

No	Name of trainer	TVET Represent	Occupation	Mob.	E-mail
1	Addisu Desta	W/Sodo ATVET College	Animal and range science(B.sc)	0913270120	addiserahel2701@gmail.com
2	Ayele Mengesha	Holeta Poly tech. College	An. Nutr.(MSc)	0911802467	ayelemengesha@ymail.com
3	Sead Taha	Agarfa ATVET College	Animal science(Bsc)	0920356174	tahasead@gmail.com
4	Sisay Fekadu	Gewane ATVET College	BVSc, Animal Prod. (MSc)	0913115358	sisrobel09@gmail.com
5	Tesfahun Kebede	Alage ATVET College	Animal breeding & Genetic (MSc)	0910618584	praiselord21@gmail.com
6	Ybrah Weliyergs	Michew ATVET College	Livestock production &pastoral Dev't (MSc)	0910569723	ybrahababa@gmail.com
7	Sintayehu Belina	Assossa ATVET College	Animal Science Bsc	0953307311	Sintayehubelina@yahoo.com
8	Tesfu Abtie	Burie Poly TVET college	Animal Science	0910162233	tawe2111@gmail.com
9	Tamirat Chanyalew	Bako ATVET College	Animal and Range science(Bsc.)	0942922400/ 0917819403	tamiratgeletac@yahoo.com