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Silage Making and its Importance for the Livestock of Ladakh

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SUMMARY

Livestock husbandry is an important sector of agriculture economy. It plays a vital role more particularly in cold desert of Ladakh where agriculture is constraints by many factors viz. shorter cropping season, harsh climate, marginal land holding and many more. The performance and production of livestock in Ladakh region is greatly affected due to unavailability of green forages in winter season for a period of about six months from Oct- March. Due to the harsh climatic condition there is no green forage production to feed the animals. Silage is produced by harvesting a forage crop at a high moisture content and subsequently fermenting that crop in pit, trench or plastic silos. The feeding of silage is popular because it minimizes the loss of nutrients from harvest through storage, easy to feed and allow greater efficiency and timeliness of feeding mixing and handling of the farm then dry forage. Silage can provide better consistency of nutrient content compared with other forages.

INTRODUCTION

Ladakh region that comprises of Kargil and Leh district is a cold arid region having its stable production environment to the particular crop-livestock scenario. Livestock husbandry is an important sector of agriculture economy. It plays a vital role more particularly in cold desert of Ladakh where agriculture is constraints by many factors viz. shorter cropping season, harsh climate, marginal land holding and many more. The performance and production of livestock in Ladakh region is greatly affected due to unavailability of green forages in winter season for a period of about six months from Oct- March. Due to the harsh climatic condition there is no green forage production to feed the animals.Thus due to unavailability of green forage the performance of the animals in this region is greatly affected. Regarding the history of silage making there is pictorial evidence on an Egyptian mural in the museum at Naples dating from 1000 to 1500 BC, showing farmers filling a silo with a sorghum-like crop. Silos were also encountered in the ruins of Carthage dating to around 1200 BC. The Roman historian and agricultural writer Cato (100 AD) referred to the Teutons storing green fodder in pits covered with dung. Silage making is an old practice that started more than 3000 yr ago (wilkison et.al., 2003).The production of high quality silage depends upon both controllable and uncontrollable factors. Silage management factors that are under the control of farmers are forage species and agriculture background, stage of maturity, moisture concentration at harvesting, method of harvesting and ensiling methods,type of storage structure, use of silage additives (Mahanna and Chase,2003) The importance of anaerobic conditions (airtight storage) and the danger to health of entering a newly opened silo were already known in ancient times. Although grass was still the most common type of forage ensiled, maize was first ensiled in Hungary in around 1860. In the Netherlands silage was first made from the crop of spurrey (Spergulasativa) in 1845. The crop was harvested as it began to set seed and put into a water tight circular pit in layers of about 10 cm. Silage is the process of preserving green fodder in its original condition with minimum deterioration and minimum loss of nutritive constituents of fodders. Silage is the conserved green fodder having moisture content between 65 to 70 percent. Fodder crops which are rich in soluble carbohydrates are incubated after chaffing for 45 to 50 days under anaerobic conditions. The sugars present in the fodder are converted into lactic acids which act as a preservative and a good source of readily fermentable sugars for the rumen microbes. Under proper storage conditions silage can stored even up to two years. Good quality silage should not have any butyric acid. If proper anaerobic conditions are not maintained the butyric acidcontent will be higherwhich gives off flavour to the silage.Silage is produced by harvesting a forage crop at a high moisture content and subsequently fermenting that crop in pit, trench or plastic silos. The feeding of silage is popular because it minimizes the loss of nutrients from harvest through storage, easy to feed and allow greater efficiency and timeliness of feeding mixing and handling of the farm then dry forage. Silage can provide better consistency of nutrient content compared withother forages.Silage blends well with other feed supplements to form a total mixed ration (TMR) that efficiently meets the nutritional needs of the animal. Nutrient levels in pastures often vary from week to week throughout the grazing season, which makes it difficult for the manager to maintain the appropriate feed supplement for consistent animal production. The content and fermentability of silage fibre,

starch and protein together with fermentation and products influence dairy cattle feeding behaviour and DMI.Thus in order to combat this problem silage feeding is an alternative in which the green forages can be preserved in the form of silage so that the animal can able to get the green fodder during the winter period to maintain the better performance of the livestocks in Ladakh region.

Different Phases of Silage making

Aerobic phase:- This phase normally take few hours.It includes the wilting period and the time between sealing and when anaerobic conditions are achieved. In this phase the atmospheric oxygen present between the plant particles is reduced and the enzymes break down more complex carbohydrates into simple sugars.If the aerobic phase continues for a long period after sealing having inadequate sealing or a hole develops in the plastic which allows air and aerobic micro-organisms such as yeast and mould results in increasing the DM and energy losses due to spoilage.

Fermentation phase:-This phase starts when the silage becomes anaerobic. During this phase the lactic acids production is increased which causes lowering in the silage pH and prevent the silage from further microbial activity thus preserve the silage. A successful fermentation will be seen when the number of lactic acid producing bacteria dominates resulting in reducingthepH (3.5 to 4.5). Mixing of molasses @ 3–5% as asubstrateencourages the lactic acidfermentation.The silage will not be deteriorated until it is exposed to oxygen.

Stable phase:-When the pH level is dropped, air and water is not permitted to enter the silage pit resulting in reducing the number of unsuitable microorganisms. To maintain this phase the sealing of the silo should be airtight, the holes if noticed should be repaired as soon as possible to maintain the quality of silage.

Feedout or aerobic spoilage phase:-This phase begins when holes are made in the storage site by mice, birdsor other agents or it becomes uncovered for feeding out. Theaerobicspoilagebegins through degradation of the preserving organic acids by yeasts and occasionally acetic acid bacteria results in raising the pH. This phase is also associated with increasing in the temperature of silage and activity by spoilage microorganisms such as bacilli, moulds and enterobacteria.

Crops suitable for silage making:-Crops rich in carbohydrates/sugar are suitable for silage making e.g. Maize, Jowar, bajra along with hybrid napier grass, tree leaves etc. Quality of silage can be improved by adding feed additives such as Molasses, urea, salt and formic acids.

Time of harvesting:- Between flowering and milk stage with thick stem.

Methods of Silage Making

Using Polythene bag

In this method polythene bags of 45x65 cm size is used as shown in Fig 1. The crops using for silage is chaffed upto 2-4 cm by maintaining the DM to 35%.Crops are mixed properly by adding molasses @ 3.5-4% to ensure the availability of CHO for better bacterial fermentation. Urea is added @0.5-1% to maintain the nitrogen content. Salt may be added to improve the palatability. After proper mixing the material should be packed in tightly sealed polythene bags. Place the sealed bags in cement tub, plastic or metal cans to prevent from further damage by rodents. The space remaining in the containers should be filled with sand to ensure airtight.

Using surface or Pit silo

Pit silo is more commonly used to make silage in India.In this method a pit of about 3-3.5 m deep is dug having different size as per required as shown in Fig 2(a,b,c). Its considered that one cubic metre of space is required to ensilage 400 kg forage. It should be taken care that the walls of the silo pit should be impermeable so that water cannot be able to enter into the silo. The walls can be made by using cement and bricks. The silo should not be shallow, it should be deep enough and should be constructed on an elevated land. Size of the silo must be

based on the number of animals and period of silage feeding. It should be ensured that the dry matter of the fodder should be around 35%.Fill and press the chopped fodder in the silo layer by layer of 30-45cm.The fodder should be distributed properly throughout the pit with proper trampling to reduce the air space to ensure better anaerobic fermentation. The fodder should be packed 3.5-4 ft above the ground level.Seal the silo with thick polythene sheet and put weight through mud layer/sand bags/tyres on the sheet to prevent air flow beneath the sheet.The silo can be opened after 5-6 weeks for silage feeding. Initially silage can be fed @ 5kg/animal to adjust the animal on silage feeding.

Characteristics of Silage

Sr.No	Item	Very good silage	Good Silage	Fair Silage
1	pH	3.5-4.2	4.2-4.5	4.8 or above
2	Ammonia N_2	Less the 10%	10-15%	20% or above
3	Butyric Acid	Nill	Trace	Some amount

Figures of Silage Making

Fig 1 Silage in Polythene bags

Fig 2 (a) Surface Silo

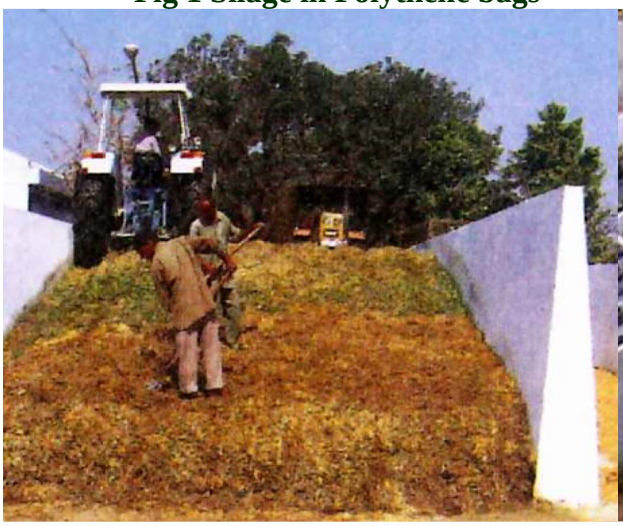

Fig 2 (b) Filling and pressing

Fig 2(c) Sealed silo

Good Quality silage should have

Colour (Yellowish or Brownish green); pH (4-4.2); Lactic acid (3-14%);Moisture content (65-70%); Butyric acid (Less than 0.2 %); Ammonia N2 (10-12%).

Advantages of Silage feeding:

- It ensures regular supply of green fodders to animals even in lean period.

- Surplus green fodders can be conserved by minimising the wastage.
- Silage making minimizes the risk factors associated with the weather condition.
- It enhancesthe livestock productivity by ensuring green fodder supply during winter season.
- Green fodder can be kept in a succulent condition for a considerably long period.
- Silage furnishes high quality forage in any desired season of the year at a low expense when there is an acute shortage of green fodder during the winter as in ladakh region, silage can meet this deficiency during the lean period.
- Silage preserves the nutritive value upto 85 percent or more of the feed .
- It is the most economical form in which the whole stalk of maize or sorghum can be processed and stored. On the other hand, a considerable part of this crop is wasted during the course of feeding in dry condition even if it is of good quality.
- The weed species which tend to make poor hay may produce good quality silage .
- Ensiling process kills practically all weeds that are present in the field.
- Silage is a highly palatable feed and slightly laxative in nature.
- It is a better source of protein and of certain vitamins, especially carotene, and perhaps some of the unknown factors as compared to dried forage.
- There is less wastage of the plant as the whole plant is being used for silage making.
- It helps in minimizing the loss of leave and other nutritive parts of the plant.
- The fermentation during silage making reduces the harmful nitrates accumulated in the plants during drought period.
- It helps or allowsto use the industrial by products or unconventional feeds for its optimal use.
- It has been observed that maize silage has 30-40% more nutritive value as compared to maize grain and maize straw.

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