

Table-12: Acid detergent Fiber

S. No	Varieties	ADF (%) I harvest	ADF (%) II harvest
1	JH-3459	40.80	43.13
2	Parkash	42.87	44.73
3	PMH-2	46.77	45.83
4	J-1006	40.37	45.47
5	African tall	38.27	38.73

Table-13: Total Ash

S. No	Varieties	Ash (%) I harvest	Ash (%) II harvest
1	JH-3459	8.00	6.23
2	Parkash	7.33	6.70
3	PMH-2	6.60	6.10
4	J-1006	7.27	7.43
5	African tall	5.97	6.60

Table 14: IVDMD

S. No	Varieties	IVDMD (%) I harvest	IVDMD (%) II harvest
1	JH-3459	58.23	55.90
2	Parkash	63.73	61.80
3	J-1006	64.33	58.60
4	PMH-2	58.07	52.86
5	African tall	65.00	57.63

The data shows that the nutritional quality of baby corn stalks is almost at par with the maize grown for fodder purpose. Although the biomass of baby corn stalks was little less than the fodder maize J-1006 and African tall, there is little difference in terms of crude protein and IVDMD. The woodiness is also comparable. It means the baby corn maize is as good as fodder maize. We are also analyzing the nutritional quality of sweet corn stalks. Though it is little mature than baby corn, still lot of nutrients are present in the sweet corn stalks which makes it utmost fit for utilization in the form of animal fodder.

Silage making

For dairying to be successful there must be year round fodder supply. In India farmers are routinely faced with an acute shortage of green fodder twice a year particularly during the months of Nov-Dec and May-June, called the lean periods. During this period the farmers have to feed straws and stovers along with the costly concentrates to fulfill the daily dietary requirements of cattle. The straws or stovers are not nutritious feed and is often deficient in some vital nutrients and hence reduce the milk production potential of the cattle, whereas the concentrates are economically

not viable. Therefore, it is important to produce and conserve forages in sufficient quantity and of good enough quality. Conserved forage is needed to maintain milk production over the dry months as well as put the cow into good condition so that she will conceive within four months after she calved and thus have a calf every year.

How maize should be conserved for the dry season: silage?

Maize can be conserved as silage. It has to have 30% dry matter to be ensiled successfully. There is no need to try and dry out the plant material any more than that, so wet weather is not such a constraint as it is with making hay. This means the crop can be cut any time, depending on when it was planted.

What is silage?

Silage is the product from a series of processes by which cut forage of high moisture content is fermented to produce a stable feed which resists further breakdown in anaerobic storage. The objective is to retain or augment the nutrients present in the original forage and deliver a silage accepted by livestock; this is usually attained through an anaerobic fermentation dominated by lactic acid bacterial. A good silage made from tropical forages has a pH less than 5.0, the percent of total nitrogen which is ammonia ($\text{NH}_3\text{N:N}$) of less than 15%, lactic acid which is 50% or more of the total organic acids and butyric acid content of not greater than 0.5% of the total dry matter. When forage is put into a sealed container such as a pit covered with plastic, a drum or a plastic bag, the container is called a silo. A silo has to be



completely sealed against air and the forage material must be chopped and compressed in the silo to ensure the fast development of anaerobic conditions and a rapid fall in pH. In these conditions, lactic acid bacteria, which convert some of the sugars in the plant into the pleasant tasting lactic acid, prevail over undesirable bacterial such as clostridia which produce butyric acid, which is unpalatable to livestock, and moulds, which cause rotting of the silage. A good silage has a sweet smell and cattle, goats and sheep will readily eat it. Silage can be made quite cheaply and easily, provided it is done correctly.

Advantages of silage

Silage acts as a fodder bank which ones made could be used round the year. There are numerous advantages of silage making. Some of these are listed below:

- The most important advantage of silage is that it is used during the scarcity of green forages called lean periods.

- Provides round the year supply of nutritious fodder.
- Silage is as nutritious as green fodders as it preserves the nutrients in their original form and hence it is as good for animal feeding as green forages itself.
- Could help in reducing the shortage of green fodder in the country.
- The labor cost in dairy farming is significantly reduced by using only silage as fodder as 4-5 persons can easily manage a flock of 40-50 cattle heads, since maximum labour is consumed in harvesting the green forages.
- The entire crop is harvested in a single step for making silage as is the case with baby corn and sweet corn. Baby corn as well as sweet corn stalks is the best fit fodder for silage making as the entire field is harvested in one go. One time harvesting is beneficial in many ways since we can harvest the crop at the appropriate time and at the same time the field became available for the timely sowing of the next crop.
- Palatability increases as hard stems when fermented into silage become soft and better utilized by the dairy animals.
- Green forages may possess some anti-nutritional components e.g. HCN in sorghum, oxalate in pearl millet and sometimes nitrate in maize. The anti-quality components are either destroyed or lowered during silage fermentation, for example nitrates, if present, were reported to be lowered in silage as compared to the green forages. HCN is almost destroyed whereas; oxalates were also reported to be reduced to half in silage. During silage fermentation the stem of the crop became soft, which helps in easy digestion by animals.
- Lastly the seeds of the most common weeds are destroyed during silage fermentation thereby reducing the problem of dispersal of these seeds with cowdung as farm yard manure.



Method of silage making:

- *Digging of pit:* A pit is dug up at a suitable position in the farm. The location of the pit is quite important. It should be near to the cattle shed at some higher and sloppy ground so that rain water could not enter the silage and spoil it. The water table of the ground should be deep to avoid seepage. The pit should be little bit slanting so that the rain water could easily flow away to one side to avoid spoilage during rainy season.
- *Size of the pit:* Size of the pit depends upon the availability of fodder as well as size of herd. However, if sufficient fodder is available then the number of animals and time duration for

which the silage is to be used should be considered. The size of some rectangular silo pits along with their capacity is given below:

Length (m)	Breadth (m)	Depth (m) in the pit (q)	Quantity of fodder
3	3	2	95
7	3	2	223
10	3	1.5	350-400

According to thumb rule for determining the capacity of the pit, if an animal need 20 kg silage daily then to feed 5 animals for a period of 90 days, the size of the pit should be 3m X 3m X 2m. In other words one cubic meter pit can accommodate about 5-6 quintals of green fodder.

- *Shape of the pit:* The shape of the pit is also important. It should have slanting walls with narrow base and broad opening. This type of shape is beneficial for filling the pit as this helps in maximum exclusion of air and ease in removing the silage from the pit.
- *Preparation of the pit:* Plaster the walls of the pit with cowdung. The farmers may also prepare a *pucca* silo pit. Cover the plastered



pit with polythene. The base of the pit should not be covered by plastic sheet, rather it should be covered by straw so that the excess moisture, if present, or juice could be absorbed efficiently.

- *Filling of pit:* Chaff the crop into 5-8 cm pieces and start filling the pit. Spread the chaffed fodder upto a height of 1 foot and then press it. This process should be repeated after each

filling. The major precaution during filling the pit is to exclude as much air as possible from the chaffed fodder. This is achieved by pressing the material by manual labor or mechanically by using a tractor. Care should be taken that material on the sides and edges are properly compressed. By doing so, keep on adding the material till the heap is around one meter above the ground level. Finally add some material in the central portion of the heap and then trample it.

- *Sealing of pit:* Now cover the heap with a polythene sheet. Seal the edges of the sheet by cowdung. Spread about 10-15 cm layer of straw on the sheet followed by 5-7 cm layer of earth. It should then be plastered with a layer of clay or cowdung. Any cracks in the cover, which develops subsequently, should immediately be plugged as to avoid entry of air or water into the pit. Prepared in this way, the silage is ready for feeding after 35-40 days of sealing the pit.

Recognition of well-fermented silage:



- Colour:** Properly prepared silage is recognized from its color. The color of the well-fermented silage is bright light green or dull yellow, whereas that of the poorly fermented silage is olive, blue green or dark brown.
- Smell:** The smell of the well-fermented silage is like that of vinegar whereas poorly fermented silage is foul smelling. In the properly fermented silage the soluble carbohydrates are converted to lactic acid, whereas in the poorly fermented silage, butyric acid is the end product of fermentation which is primarily responsible for the bad smell. The poorly fermented silage should not be fed to the animals and should be discarded.

Silage pit



Some exotic silage demonstrations

Storage period

Properly prepared silage can be preserved for a long period. If properly covered silage could be stored as long as 10-12 years or so. Once opened, it should be used regularly, and should be consumed within 3-4 months.

Feeding of silage

Open the pit from one side after removing the earth and straw. Each time, a uniform layer of silage is removed vertically (from top to bottom) depending upon the daily need. Do not open the whole pit at once. Cover the opened side immediately after removing the silage, to avoid any exposure by air/ moisture. The top portion may contain moulds which should not be used for feeding. The animals may take some time (3-4 days) to adapt to the silage feeding, therefore feed 5-7 kg of silage along with some other fodder for the initial period. Once adapted, the cattle can be put on silage exclusively. The approximate quantity of silage to be fed to the animals is given below:

Type of Animals	Quantity of silage /head
Buffalo	25-30 kg
Milch Cows	25-30 kg
regnant Cows	15-20 kg
Bulls	20-25 kg
Heifers	10-15 kg

