

# Silage- A Modern Approach for Cattle Feed

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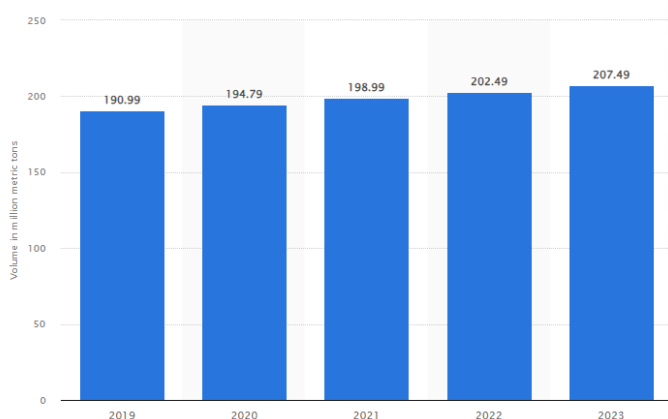
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The primary protein source for millions of lacto-vegetarians in the nation is dairy products. The demand for protein in their diets is largely met by dairy for even greater segments of the population that cannot afford meat. In 2023, almost 207 million metric tons of milk were consumed domestically. Additionally, men and women consumed the same amount of milk each day. (1).

**Domestic consumption of milk in India from 2019 to 2023**  
(in million metric tons)



**Table 1: Milk consumption in India**

The amount of milk consumed domestically in India is growing annually, and to keep up with the growing demand for milk and milk derivatives, commercial dairy production is developing quickly. Even though they are the biggest producers, their productivity per animal (1600 kg/ animal) is much less than the average for the world (2700 kg/ animal). This is primarily ascribed to inadequate agricultural management, horrible nutrition, and limited genetic potential. Inadequate feed management is also greatly influenced by the expense of cattle feed, which makes up between 60 and 70 percent of their daily earnings. In addition, India has a 36% shortfall of green fodder and an 11% scarcity of dry fodder, with the latter being especially hard to come by in the summer and during times when the monsoon rainfall is insufficient.

In this industry, technological advancements like silage feeding have proven to be revolutionary.

Appropriate feed management of dairy animals is essential for the profitable production of milk and dairy products (2).

## What is silage?

Animal feed known as silage is produced from green plants that have been air-tightly fermented in a silo. Crops like sorghum, wheat, barley, and maize are used to make silage. The procedure known as anaerobic fermentation is used to make silage. The process's ability to remove air from the clamp swiftly determines its outcome. High-quality silage can be made from a variety of grasses, including Para grass, guinea grass, bajra, maize, and bean grass. Leguminous fodders, on the other hand, are not thought to be suitable for silage production due to their typically high moisture content, high crude protein content, and low soluble carbohydrate content. The three cultivars of corn (*Zea mays* L.), ie. J 1006, PMH 10 and DKC 9108 were evaluated for their silage production potential. (3)

There are three types of silage based on moisture content,

1. High-moisture silage: (< 30% dry matter)
2. Medium-moisture silage: (30-40% dry matter)
3. Low -moisture silage: (<30% dry matter)

## Constructing a silo

Five of types of silos,

### Small container and bags

Manually filled containers with a 200-liter capacity can function as very efficient silos. Drums, plastic bags, or other containers are utilized for this. In all instances, the material needs to be stored under strict anaerobic conditions that is, no air should be allowed to enter and packed much more securely than in other kinds of silos. You can use plastic bags that need to be tied at the top; the bags should have a thickness of around 0.1 mm. Using bags and containers can save costs. Furthermore, silos may be kept anywhere on the

farm, making it simpler to feed your livestock and resulting in less waste overall.

### Stack silos

Stack silos are wall-free silos that don't need to be built permanently which is more likely to sustain damage to the covering material, opening it up to air exposure? As with all silos, it must be packed tightly and covered with plastic to keep out air. Stack silos have the benefit of being less expensive to build than bunker or trench silos, but they require a larger surface area (piece of land) to stack the same amount of silage.

### Pit/Trench silos

Subterranean bunker silos are known as trench silos. Water can lower the quality of the silage, so make sure these trench silos have adequate drainage. Additionally, a sloping floor will help with drainage. Use a plastic sheet to cover the silage to prevent soil contamination. When compared to bunker silos, trench silos have the benefit of being simpler and less expensive to build.

### Bunker silos

A silo with walls that is open at the top is called a bunker silo. To prevent water damage, excavate a ditch around the wall's base and install drainage. Drainage will also be facilitated by a sloping floor. To withstand the sideways pressure from the silage, the walls must be built firmly. The top of the wall should be somewhat wider than the base to facilitate easier compaction all the way up to the walls. A bunker silo's benefits include simpler filling, less spoiling, and easier feed out. However, compared to most other silos, a bunker silo requires a larger investment (4).

### Tower silos

In regions where groundwater tables are high, tower silos vertical silos are utilized in place of pit silos. Another name for it is "pacca-structure." Adoption of these tower silos is severely hampered by their expense. Every up-right silo is circular in shape and has a set of doors on one side that are spaced about two square feet apart and



positioned every six feet. These are opened when the silo is emptied and closed when the silos are filled. Recent advancements in tower silo building have resulted in bottom unloaders with huge features (24–30 feet in diameter). Nonetheless, the dimensions range from 40 to 80 feet in length and 12 to 20 feet in diameter. In order to effectively preserve silage, the forage should have a dry matter content of 25 to 35 percent (5).

### When is the silage ready?

At least three weeks after preparation, the silage should be ready, but an ideal fermentation is achieved in 60 to 70 days. However, the amount of time before feeding depends on the availability and quality of the meal to be ensiled. For instance, freshly created maize silage has a sugar content of roughly 10%; this could lead to acidosis, so it's crucial to avoid feeding freshly made maize silage too soon.

### Quality assessment

Evaluating the quality of the silage is essential before feeding it to animals. To assess the silage according to its look, feel, colour, and scent. Quality can be impacted by a number of things. Heat, Mold, Rot, Moisture, soil residues, and an unpleasant odour. There should be a lovely acidic scent to the silage, similar to sour milk or yoghurt. An unpleasant smell may indicate the formation of butyric acid, a particular acid. The fact that the silage is frequently sticky and moist indicates that it has not undergone proper fermentation. Mold or rot are signs that air has gotten into the silage. If water is visible through the silage, it may indicate that the forage was very moist when it was ensiled or that water seeped into the pit. Inadequate compacting or sealing may have allowed air to enter the silage, causing it to warm up if the silage is brown or dark brown in colour.

### Opening and closing the silo

Between feedings, try to cover as much of the silo as you can and just open the portion that you will need in three or four days. The area exposed to air during the silage feeding process should be minimized, and the interval between silo opening and closure should be kept to a minimum. To prevent any exposure to air and warmth, only uncover and remove the

silage that you actually need. Mold will grow on the silage if it is exposed to the air and heat too long. Keep the plastic's leading edge adequately weighted down to keep air from escaping after feeding.

## Feeding silage

The majority of silage has a good feeding quality, so feed it first to the animals that produce the most. Cows consume seven to twelve meals a day, indoors, lasting approximately thirty minutes each, for a total of five hours of eating time each day in the optimum scenario. This implies giving out fresh food at least twice or three times a day. When there's around five percent feed remaining, start feeding. Make an effort to feed them at the same times every day. Because of the scent, cows may need some time to become used to the silage during the first few days of feeding; however, this hesitancy frequently goes away. To encourage consumption, mix in some molasses or other desired feed additives with the silage.

## Losses in silage making

The total of the losses from respiration, fermentation, effluent, and extended fermentation and moulding constitutes the losses from silage production.

### Respiration losses

Because the plant is typically still alive at the moment of ensiling, respiration losses occur. Breathing persists as long as air is accessible. In this phase, carbohydrates and oxygen are transformed into heat, carbon dioxide, and water. Thus, the silage pit's airtight closure and solid compaction are crucial elements that prevent and quickly end this process.

### Fermentation losses

Because bacteria primarily convert glucose into lactic acid during fermentation, losses from fermentation do occur during this process. These final products gradually make the microenvironment more unfriendly to those bacteria, which ultimately causes them to stop growing. Bacteria in a silage pit consume 4-5% of the energy contained in the ensiled mass during an average fermentation. Juices will collect on the pit floor and may flow out of the pit, resulting in effluent losses, if the water content is higher than 75% at the time of ensiling. Extended fermentation could

result in further organic material loss in the silage pit if air can get through the silage. As a result, butyric acid and mould are produced, and spoiling may occur.

## The costs and benefits of silage making Costs

Two types of costs need to be taken into account:

- 1. Capital costs:** building the silo, machinery and equipment.
- 2. Running costs:** labour, fuel, materials, silo maintenance.

Include certain losses that happen throughout the silage-making process when comparing the costs and benefits of silage. As a general guideline, figure that the total of all these losses from field to cow – will be at least 20 percent.

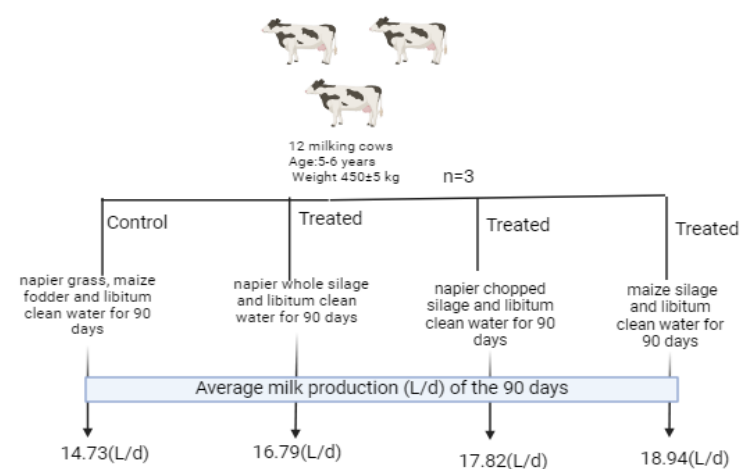
**Note:** If there has been little success with the ensiling process, these losses could be substantially greater.

## Benefits

More superior feed with better digestibility should result from a successful ensiling operation. Because this premium feed is available all year round, there is increased output in all weather conditions. The following are some advantages of feeding your herd quality silage:

1. Higher production (meat, milk)
2. Maintain homeostasis
3. Promotes gut health.

## Case study



**Fig: 1 Graphical representation of cows fed different rations (6).**

### Conclusion

For cattle, silage is an excellent type of feed since it gives them a high-energy diet that aids in milk production and growth. Provide silage, a crucial feed source, throughout the dry season. Silage reduces feed costs, harvest losses, and raises the potential output of nutrients from the available land while also improving the quality of the forage. A reliable feed source for dairy farms is silage.

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