

LECTURE 34

PRESERVATION OF FODDER - HAY & SILAGE MAKING

Hay making

“Hay -refers to cereals, grasses or legumes that are harvested at appropriate stage, dried and stored”

- High quality hay is light grey color
- Leafy, pliable & free from mustiness
- Easy method of storing seasonal excess
 - Only way for farm by-products
- Principle is to reduce water content
- Legume, non-legume & mixed hay are the major three types

Field method

- In field there are two methods
 - Windrows – occupies 1/3rd land area
 - Swath – Entire field
- Drying in ‘Windrows’ faster than swath
- For this, harvest few hrs after dew drying
- Allowed to cure in the field itself
 - Turned after every 4-5 hrs
 - By the evening moisture reduced (75% to 40%)
 - Next day requires 1 or 2 turnings
 - Moisture content in the 2nd day comes to 25%
 - Now ready for storage as bales or in tripod stand
 - End of curing moisture to be reduced to 20%
 - Normally 70-75 sunshine hrs require
- Not suitable for rainy season

Mechanical method

- Fence method – wire fencing with angle iron posts are used
 - More suitable for berseem, Lucerne, groundnut haulms and legume fodders

- Protein loss is minimized (2-3%)
- Forced air batch – developed at IGFRRI
 - Capacity 1 t /day
 - Cost Rs.60/t

Chemical changes in hay making

- Conversion of soluble sugars to CO₂ & H₂O
- Loss of digestibility
- Increase in cellulose and lignin content
- Reduce in nutritive and keeping quality

Loss in fodder value

- Nutrient loss in late cutting
- Shattering of leaves & finer parts (in legumes)
- Fermentation loss leads to dry mass loss by 6%
- Oxidation by sun bleaching leads to
 - Loss of chlorophyll and carotene
 - ◆ Carotene decreases from 150-200 to 5-10ppm
 - ◆ Carotene is to give aroma
 - Animals are color blind
- Leaching leads to loss of
 - Protein, nitrogen free extract (NFE), minerals, and vitamins
 - Consequently crude fibre increases & digestibility decreases
 - In Berseem crude protein loss is from 22% to 16-18%

Ensilage / Silage making

'Silage' may be defined as the green succulent roughage preserved under controlled anaerobic fermentation in the absence of oxygen by compacting green chops in air and watertight receptacles

- Silage leads to fermentation of water soluble carbohydrates to organic acids which increases acidity of the materials (pH – 4)
- Such anaerobic acid (lactic acid) arrests the
 - growth of bacteria
 - Moulds
 - Inactivates putrefying organisms (act as preservative)
 - Consequently reduces nutrient losses and

- Change in nutritive value
- Best method than hay

Crops suitable for silage

- Crops suitable are based
 - Dry matter of 30-45%
 - Soluble sugar 8-10%
 - Ratio between water soluble CHOs and buffer capacity
 - Ratio of sugars to crude protein
 - ◆ All these decide production of lactic acid
 - Crops suitable for cut at 50% flowering and at milking
 - ◆ Crops like sorghum, maize

Points for consideration while ensiling

- Dry matter content for the materials should be 30-45%
- More succulent materials may be taken after field drying only
- Polythene layering on all sides improves the quality
- Filling should be done on a clear day as quickly as possible
- Filling should be in layers of 20-30cm at a time and uniformly
- Compaction must be perfect
- Trampling is useful to remove air pockets
- Top must be convex / dome
- Silage pit size
 - 20 x 20 x 20 c. ft for 50-55 t
 - 5 x 5 x 6 c. ft for 22.5 t
 - 10 x 5 x 6 c. ft for 45.0 t

Characteristics of good silage

- No mould growth
- Golden / greenish yellow
- Pleasant fruity odour or acceptable aroma
- Free flowering and non-sticky texture
- 3-4% increased palatability
- Increased nutritive value
- pH around 4.0 – 4.5
- Lactic acid proportionally more than other acids

- Decrease in nitrate-N and increase in ammoniacal-N
- Ammoniacal N should not exceed more than 15% of the total N

Haylage

- It is low moisture silage (40-45%)
- Made from grass / legume that is wilted to reduce moisture content
- But for moisture it is almost silage

Fortification of Fodder

'Fortification or enriching is the direct addition of feed supplements to the poor quality roughage to improve its fodder value'

- Mixing green legume with fodder
- Mixing liquid ammonia (2.5 to 3.0%)
- Mixing Urea molasses
 - 2-3% for concentrates
 - 1% of dry matter
- After mixing similar to silage

Fortifying materials and usage

- Molasses for rice, wheat
- Mineral mixture and salt for low grade grass hay
- Urea for sorghum & maize green fodder
- Tapioca powder/ maize powder for leguminous fodder
- Bacteria and / fungi for dried ground nut haulms

Advantages of Fortification

- Improves palatability
- Reduces wastage
- Improves rumen environment
- Increases crude protein
- Cleavage of cell wall for increased digestibility
- Neutralize or reduce the concentration of toxic principles
- Increases digestibility
- Milk protein and fat increase

Multiple choice questions

1. Green succulent roughage preserved under controlled anaerobic fermentation
 - a. Forage
 - b. Hay
 - c. Silage**

2. Cool-season grass is _____
 - a. **Rye**
 - b. Bermuda
 - c. Corn
3. Warm-season grass is _____
 - a. Rye
 - b. Blue grass
 - c. **Bermuda**
4. Enriching is the addition of feed supplements to the poor quality roughage _____
 - a. Silage
 - b. Haylage
 - c. **Fortification**
5. Moisture content in silage is _____
 - a. **40-45%**
 - b. 20 - 25%
 - c. 25 - 35%