TO IMPROVE NUTRITIVE VALUE OF SILAGE DURING ENSILING

1. **USE ADDITIVES IN EACH LAYER**
   (WITH TECHNICAL ADVICE!)
   - **MOLASSES**
     - Kg/ton chopped forage
     - 20-50
   - **UREA SOLUTION**
     - 5.0
     - **Assists fermentation**
     - **Increases lactic acid production**
     - **Decreases ammonia %**

2. **ADD OTHER COMPONENTS**

   Example:
   - Chopped forage maize + poultry manure
   - (increases protein & mineral %)
   - 75%
   - 25%

3. **WILTING OF FORAGE**

   Leave the harvested material in the sun for 2-4 hours before chopping. (Assists concentration of plant sugars which aids fermentation).

**NB**

1. Forage maize is low in protein and mineral content
2. Elephant grass is low in soluble carbohydrates

HOW TO CALCULATE THE SIZE OF A SILAGE

Example: for 30 cows eating 20kg/day for 90 days
1. Daily intake: 30 x 20 kg = 600 kg
2. 3 month intake = 600 x 90 = 54000 kg = 54 tons

1m³ of silage weighs approximately 600 kg

\[54000 + 600 = 90 \text{ m}^3\]

The size of the stack silo should be:
- Width 5m
- Height 1m
- Length 15m

\[(5 \times 1 \times 15 = 90 \text{ m}^3)\]

**FORAGE YIELDS:**

<table>
<thead>
<tr>
<th>TONS OF FRESH MATERIAL/HA/CUT</th>
</tr>
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<tbody>
<tr>
<td>Forage Sorghum</td>
</tr>
<tr>
<td>30-50</td>
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For more information visit:
http://www.jddb.gov.jm

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1. CHOPPING
   FORAGE INTO 2-5CM LENGTHS
   - Facilitates good consolidation
   - Reduces nutrient loss

2. COMPACTION
   - To remove the maximum amount of air
   - Use heavy machinery if possible e.g. tractor, car.
   - Roll for up to 10 hours daily during ensiling
   - Roll at the start of each day before adding more material
   - Roll after addition of each layer of 30 cm of chopped material

3. COVER (with PLASTIC SHEET)
   - On completion ensure that the silo is well sealed and airtight.
   - Avoid penetration by air, water, animals
   - Add weights to the surface to aid compaction (earth, tyres, wood).

NB: THE PROCESS SHOULD BE COMPLETED WITHIN 5 DAYS FROM HARVESTING OF FORAGE TO SEALING

**THE FORAGE MUST HAVE:**
1. High percentage of soluble carbohydrates (2.5 – 3.0%) which are used by bacteria in the fermentation process
2. High forage yield/hectare
3. 30 – 40% forage DM at cutting

**FORAGES SUITABLE FOR SILAGE**
- Forage Maize
- Forage Sorgum
- Elephant Grass
- Hybrid forage sorghum

**Recommended stage of growth for ensiling:**
- Elephant grass (60 – 90 days of re-growth)
- Forage Maize (milky cobs)
- Forage Sorghum (immature seed heads)
- Hybrid forage sorghum (45 – 60 days)

**KEY STAGES IN SILAGE**
- **CHOPPING**
- **COMPACTION**
- **COVER** (with PLASTIC SHEET)

**TYPES OF SILOS**
- **VERTICAL** (Tower)
  - High Cost
- **HORIZONTAL**
  - **PIT SILO** Requires a permanent site
  - **STACK SILO** Economical—gives good results
- **BAG** Special equipment needed

**AVERAGE COSTS—STACK SILO (US$)**

<table>
<thead>
<tr>
<th>Forage</th>
<th>Per Ton Silage</th>
<th>Per Cow Day (20kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>20.36</td>
<td>0.40</td>
</tr>
<tr>
<td>Forage Sorghum</td>
<td>17.89</td>
<td>0.35</td>
</tr>
<tr>
<td>Elephant Grass</td>
<td>17.96</td>
<td>0.36</td>
</tr>
<tr>
<td>PMGB-JICA Santa Cruz, Bolivia 1994</td>
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**IT IS:**
THE CONSERVATION OF FRESH GRASS BY ANAEROBIC FERMENTATION
Fermentation takes over 3-4 weeks during which time 2 chemical can processes take place:

**FAVOURABLE**
- Aerobic fermentation (in presence of air)
- Lactic acid production (putrefaction)
- Preservation during storage stage

**UNFAVOURABLE**
- Anaerobic fermentation (in absence of air)
- Must not exceed 5 days (putrefaction)

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