

# What is Haylage?

## An Introduction to Ensiled Forage



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## What's the Difference?

- Hay
  - **Low-moisture** product derived from field curing.
  - Field curing requires **warm, dry** weather.
  - Substantial **nutrient losses** can occur during curing and baling process.
  - Requires **storage** facilities.
  - Uses **traditional** equipment.



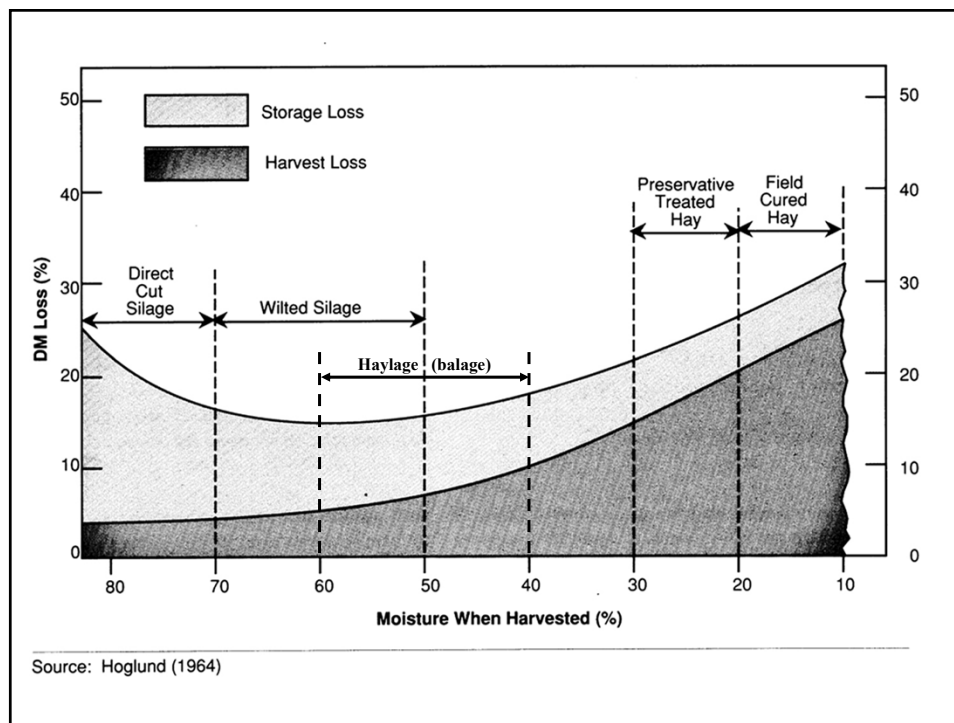
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## What's the Difference?

- Haylage
  - **Higher-moisture** product requires little field curing.
  - Forage can be **conserved** (packaged) under less than optimum weather conditions required for field curing hay.
  - Does **NOT** require storage facility.
  - Requires **additional** and **heavier-duty** equipment.
  - Generally **cannot** be marketed.



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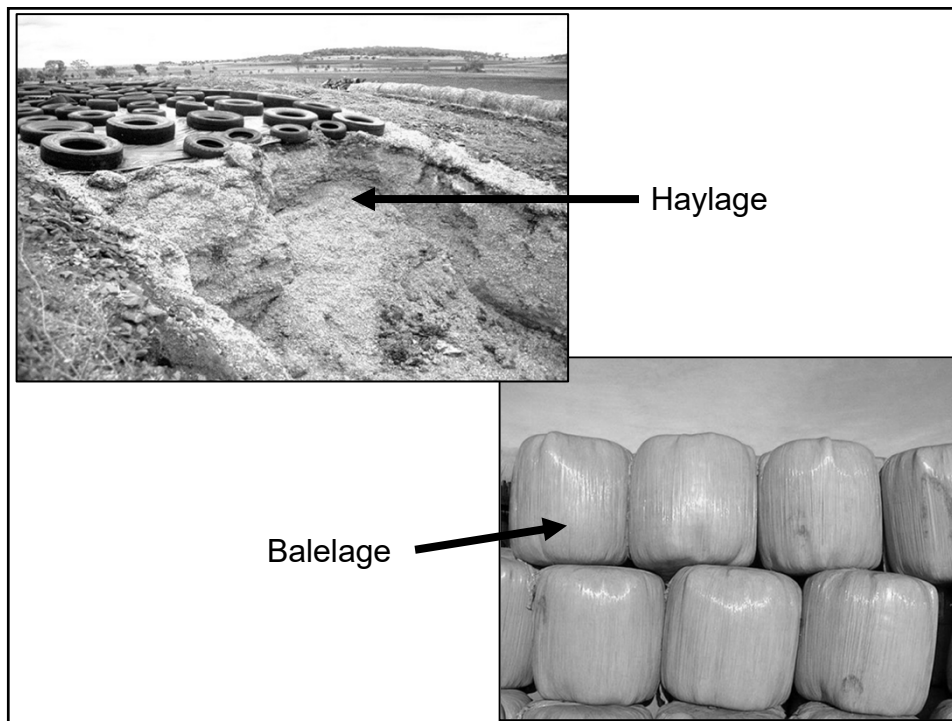


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## Introduction

- **Balelage** = Forage preserved by fermentation in a bale with lesser DM concentration than hay ( $\leq 85\%$  DM) but greater than silage ( $\geq 30\text{-}35\%$  DM)
- **Haylage** = Forage preserved by fermentation with lesser DM concentration than hay ( $\leq 85\%$  DM) but greater than silage ( $\geq 30\text{-}35\%$  DM)
- **Silage** = Forage preserved by fermentation at  $\leq 30\text{-}35\%$  DM

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## Fermentation Process

- Pack into silo (or plastic wrap)
  - Too wet = too little oxygen
  - Too dry = too much oxygen
- Seal the silo (or plastic wrap)
- First Phase:
  - **Aerobic** (oxygen-requiring) bacteria will use up available oxygen in 4-6 hrs in well-packed silo
  - By-products of 1st phase are CO<sub>2</sub> + heat (**80-100° F**)

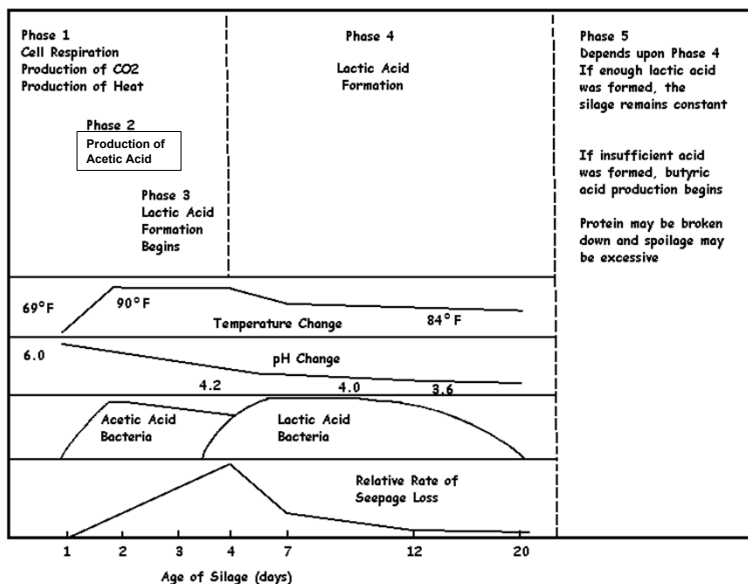
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## Fermentation Process (continued)

- **Too little oxygen** = too little heat produced
- **Too much oxygen** = mold, yeast = spoilage
- 2nd Phase (Anaerobic)
  - Anaerobic bacteria = acetic acid
  - Anaerobic bacteria = lactic acid (2nd or 3rd day)
  - Phase lasts 16-18 days or until forage pH drops to between 3.6 and 4.2
- Bacterial action ceases, silage stabilized

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## What Happens in the Silo



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## Fermentation Issues

- **Poor Pack**
  - **Too much moisture** = too tight a pack = too little O<sub>2</sub>. O<sub>2</sub> is used up too quickly prior to temperature rising to 80°F. **Lactic acid** bacteria are not active below **80°F**, but **butyric acid** bacteria are, use **CHOs** and give silage **foul odor** and **taste**.
  - **Too little moisture** = loose pack = too much O<sub>2</sub>. Aerobic bacteria continue activity for prolonged period of time, use **CHOs** and produce **mold** **reducing** silage **nutritive value**.

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## Fermentation Issues

- Formation of lethal gases
  - What: Two gases recognizable by irritating odor and color: **Nitrogen dioxide** = reddish brown, **nitrogen tetraoxide** = yellow
    - Also a third gas, **nitric oxide**, which is colorless and may go undetected.
  - When: Can occur at any time, but especially **12-72 hours** after filling.
  - Where: Take great precaution when entering silo or silo room.

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## Propionic Acid

Control (Untreated)



0.5% Propionic Acid



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	Propionic Acid (% Green Forage)		
	0	0.5	1.0
DM (%)	27.6	29.4	29.9
pH	5.2	4.6	4.3
Lactic Acid (% DM)	2.10	4.40	3.53
Acetic Acid (% MS)	0.40	0.85	0.77
Propionic Acid (% DM)	0.13	1.15	2.96
Butyric Acid (% DM)	3.59	0.43	0.07
Isobutyric Acid (% DM)	0.24	0.003	0
Ammonia (% N)	14	11	14
Mold and Yeast (log Cfu/g)	1.7	0.3	0.3

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**NOTE: There is **NO** difference in management strategies for producing good quality hay or balelage...**

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## Making & Conserving Good Forage

- Appropriate fertility
  - Soil test
- Stage of maturity at harvest
  - Most dramatic impact on nutritive value

NEITHER PROCESS CAN TURN LOW  
NUTRITIVE VALUE FORAGE INTO  
HIGH NUTRITIVE VALUE FORAGE!

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## Balelage

- Warm-season grasses have undesirable characteristics for successful preservation by fermentation
  - High water concentration
  - Decreased concentration of water-soluble carbohydrates (WSC)
  - The main store of WSC is starch, and lactic acid bacteria do not have the ability to ferment starch directly.

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## Balelage

- **Usually** are forage crops lower in digestible energy than corn
  - Sorghums (forage sorghum, grain sorghum, sorghum-sudangrass hybrids), ryegrass, small grains
  - Dallisgrass
  - Alfalfa
- **Lower moisture content** (40-55%) than silage
  - Will not achieve **as low a pH** as higher moisture silage
  - **Reduced** storage time

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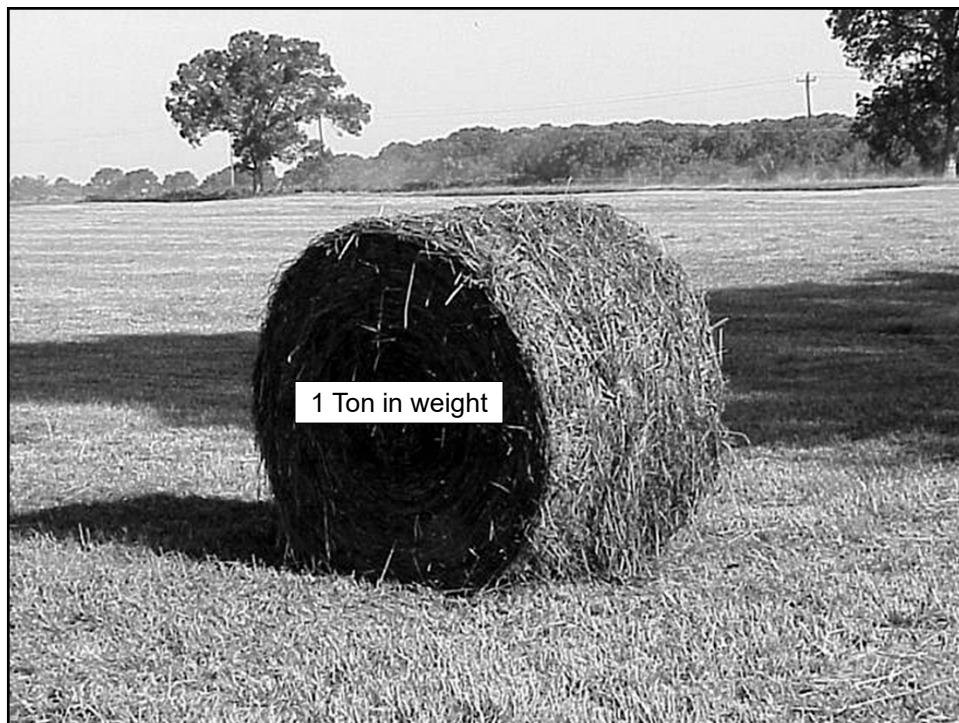
## Balelage

- Generally found as **individually** plastic-wrapped round bales or can be **long tubes** of round bales stacked end-to-end and wrapped with continuous plastic.
- Increased cost compared to traditional round bales associated with equipment & plastic (\$8-10/bale).
  - May be justified for higher-valued forage crops for use in **heifer** development or backgrounding **stocker cattle**

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## Problems with Balelage

- Forage does not store as long or as well compared with silage.
- Plastic wrap is not durable and requires maintenance to preserve integrity of crop. Wrap with a minimum of 6 layers.
- Difficult/impossible to haul; therefore, must be fed on-site.



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## Balelage Rules

- Use the appropriate forage species, fertilized based on soil test recommendations, and harvested at the correct stage of maturity.  
Remember...garbage in...garbage out...
- Wrap up at ~50 DM
- Do not harvest more than you can wrap in a day

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## Balelage Rules

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- Wrap up at ~50% DM
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## DM Concentration is Critical!

- Do not guess DM concentration! Wilting time is different among forage species.
- Use a moisture meter to determine DM concentration.
- Sudangrass, millet, and sorghums require special attention because they take longer to wilt due to thicker stems.

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## Balelage Rules

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- Wrap up at ~50 DM
- Do not harvest more than you can wrap in a day

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- Do not bale forage and leave the bales on the ground because they will pick up moisture and create “hot spots” after ensiling



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## Summary

- Balelage is an alternative method to hay for conserving forage to feed at a later time.
- Balelage has a lower moisture forage content compared with silage with a higher pH and decreased storage properties.
- Balelage requires specialized equipment with higher investment costs compared to hay.