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Proper Silage Management

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How do we (produce) and maintain quality?

Critical Control Points

- Agronomy
- Harvest Moisture/maturity
- Particle length / chop length
- Silo Design & Storage
- Feed-out management

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"Yumm…Sauerkraut – I mean Silage!"

Advantages	Disadvantages
▪ Increase yield of nutrients per acre / forage quality	▪ Storage losses / Feed spoilage
▪ Decrease feed costs	▪ Intensive management
▪ Lower harvest loss	▪ Handling/transportation /storage cost
▪ Flexible harvest	▪ Investment (equipment)
▪ Efficient use of labour	▪ Few off-farm markets

quality to feed at later date?

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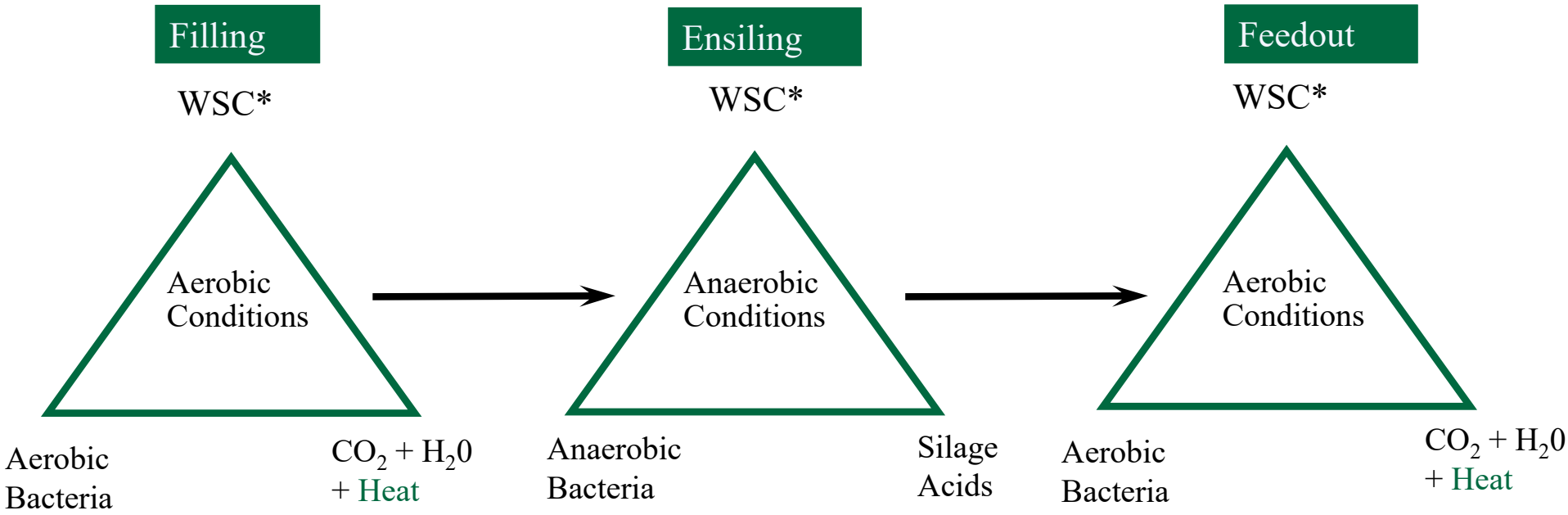
The Ensiling Process



*water soluble carbohydrates

**pH is not the only indicator for quality silage…terminal pH doesn't tell you how much time it took to arrive at that pH (efficiency)

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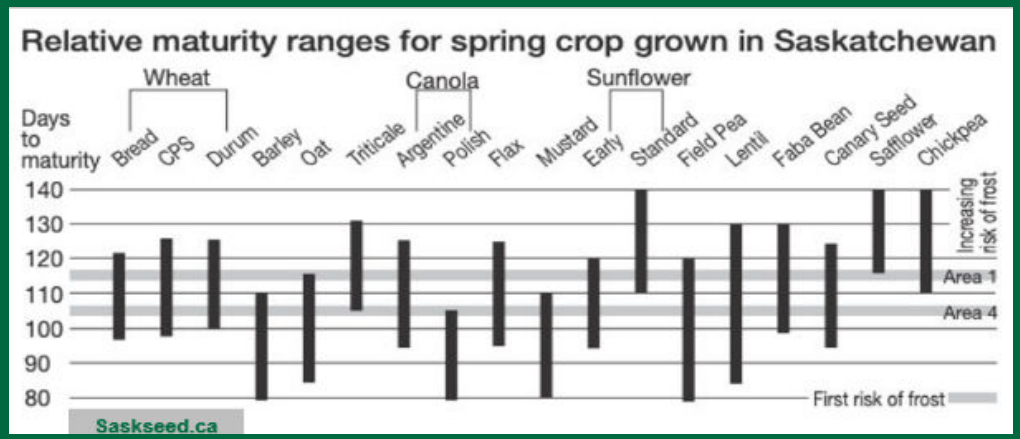
What Can You Control???

- Seeding date
- Seeding rate
- Soil fertility
- Plant Species
- Environmental conditions



Species, hybrid, variety selection → focus on energy production
Protein and fat are secondary selection criteria

Source: Penn State (extension.psu.edu)

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Agronomy: Good Silage Starts with Good Agronomy!

- Check over equipment prior to seeding
  a) Disc openers for wear
- Work with an agronomist
- Fertility and In-crop management

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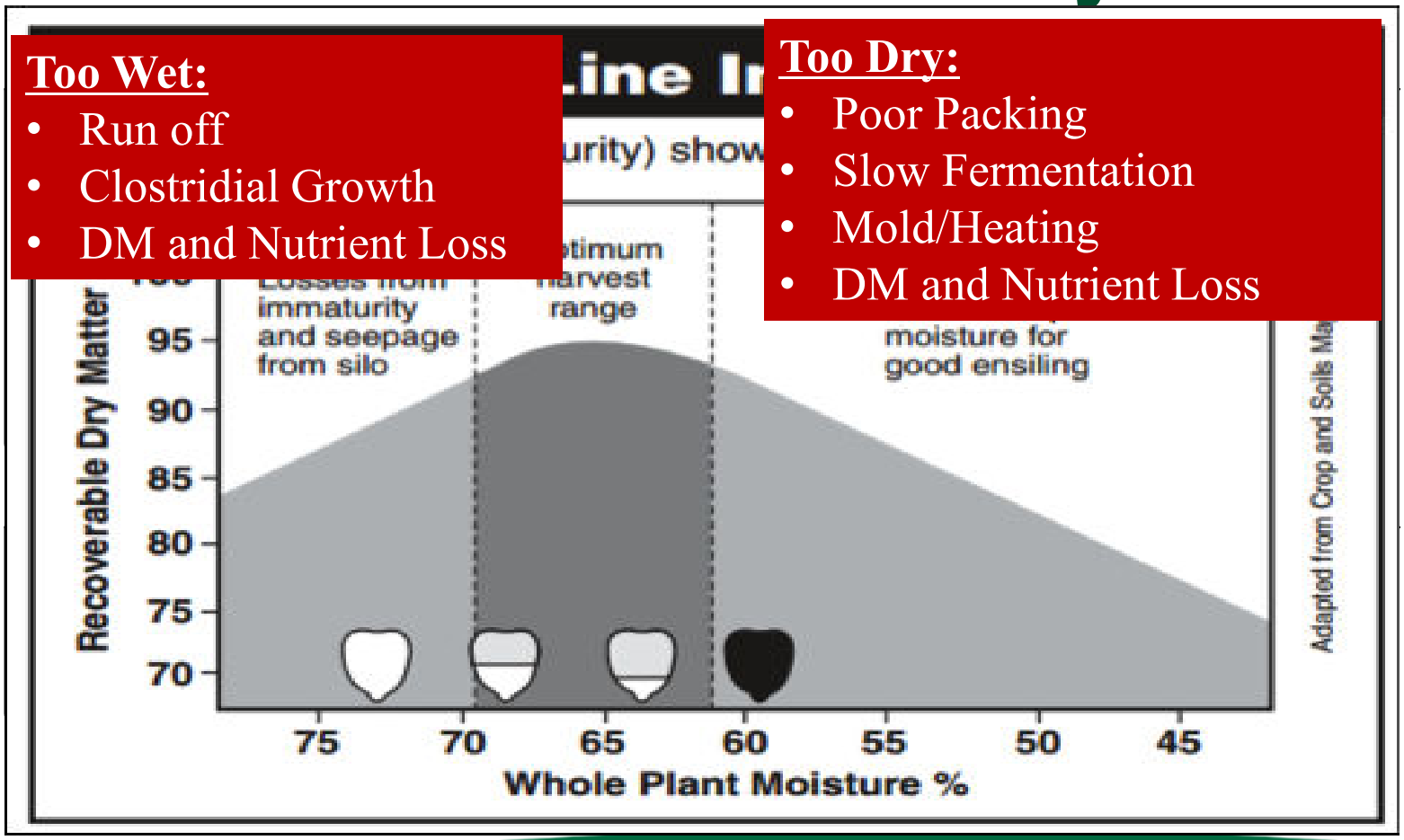
Harvest: Plant Maturity and Moisture

Too Wet:
- Run off
- Clostridial Growth
- DM and Nutrient Loss

Too Dry:
- Poor Packing
- Slow Fermentation
- Mold/Heating
- DM and Nutrient Loss



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BCRC "Stored Forages"

Hey Bree: My Silage is dry, Can I Add Water?

It is practically impossible to add enough water
1 point of moisture / ton of silage = 7 gal of water

Focus on: chop length, pack, inoculant, cover

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Harvest: Particle Length Matters!!

Recommended Chop Length (Inch)		
Alfalfa	**Corn**	**Small Grains**
3/8-1/2	1/4-3/4	3/8-3/4

32 oz cup →

No more than 1-2 whole kernels

Whole Kernels:

Ideal = 1-2

Adequate = 2-4

Inadequate = 4+

Rule #1 of Silage Making

Oxygen is ALWAYS the enemy!

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Storage: Silo Design and Management Tips

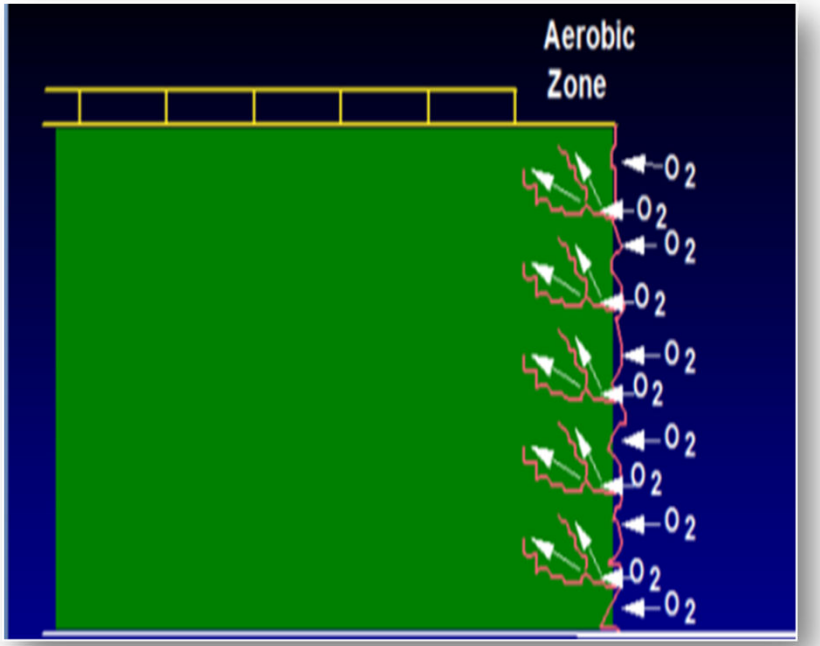
- Site Selection
  a) Good drainage and slope to carry rain and snow melt away

→North or East feed-out

(South or west face exposure maximizes sunlight and can promote reheating)

Storage: Silo Design and Management Tips

- Silo Dimension
  a) Bigger isn't always better!
  b) Goal → get across face each day



← Scan Me!
Silage Pile Sizing Calculator
(University Wisconsin-Madison)

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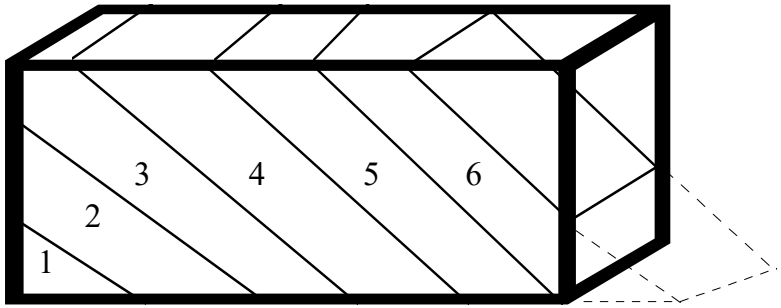
Storage: Bunker Design…

Progressive Wedge Technique

- Better compaction than thick, vertical layers
- 30-40% grade



right

wrong

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Storage: Drive – Over Pile Design…

- Dimensions
  - Wider and lower than bunker
  - Can still use progressive wedge technique
- Slope → 3:1 run to rise ratio
- Height
  - No higher than unloading equipment (18-20 ft?)

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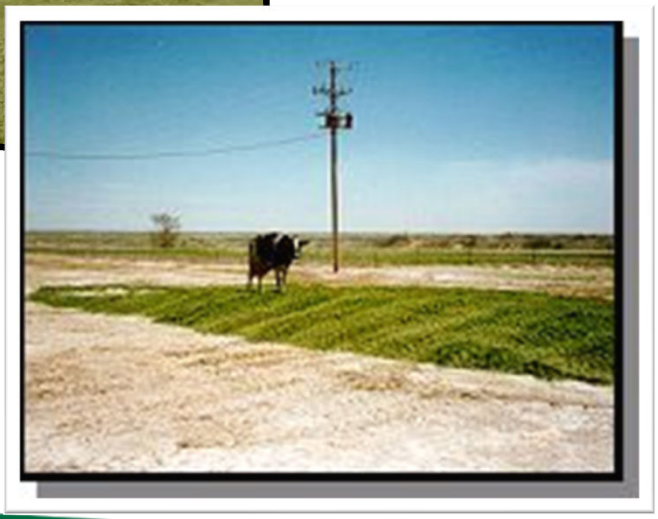
Storage: Bag & Bale Design…

- Requires good integrity of plastic
- Keep area free of weeds (rodents)
  - Inspect for rodent damage
- Drainage away from bag / face of bag
- Packing still important

PACKING AND COVERING SILAGE IS IMPORTANT……
NO MATTER HOW YOU GET IT DONE!!???

- Arguably → THE MOST IMPORTANT JOB
- Avoid "pile-ups"
  a) Never work more than 6 inches at once
  b) Just like building a road → increases density
  c) Don't over pack the top



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Storage: Density is Important!

- **Goal**
  a) 14-16 lb DM / ft^3
  b) Reduce porosity

- Higher density → greater silo capacity → reduced storage cost

Dry Matter Loss as Influenced by Silage Density	
Density (lb DM/ft^3)	DM Loss at 180 Days (% of DM ensiled)
10	20.2
14	16.8
16	15.1
18	13.4
22	10.0

Bolson et al. SRP861 Dairy Day 2000 (k-state.edu)

Hey Bree: Do I have enough Pack Tractor weight?

Need to Know:

Forage Delivery Rate!

Packing Tractor Weight!

More Tractors?

**Tires of pack tractor should pass over entire surface before next layer

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Storage: Matching Packing Capacity to Filling Rates

Rule of Thumb

"X" tons/hour x 800 = Total packing wt. required

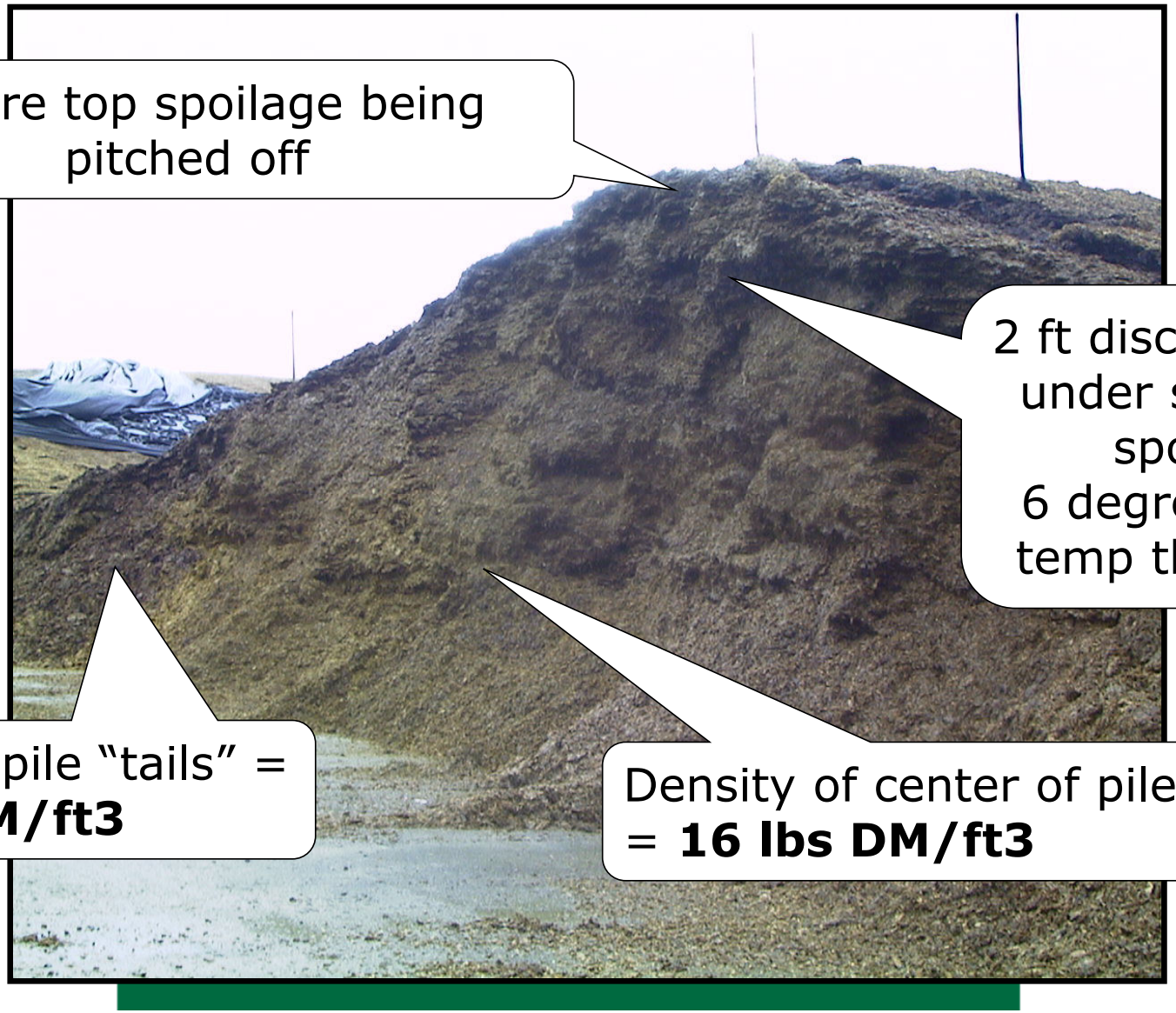
Example

100 tons/hour x 800 = 80,000 pounds (40 tons) of pack tractor(s)

Amount of time on the silage is likely as important as pounds applied/square inch
→ 1-4 min per ton (continual!)

Hey Bree: What do you think of wheels vs. tracks on my pack tractor?

Wheels will concentrate weight over smaller area → more pressure on silage


Severe top spoilage being pitched off
2 ft discolored area under severe top spoilage.
6 degrees higher temp than center
Density of pile “tails” = **8.1 lbs DM/ft3**
Density of center of pile = **16 lbs DM/ft3**

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Storage: Covering Silage Piles

- Cheapest way to protect your investment
- Polyethylene plastic (4-6 mil)
  a) Oxygen Limiting (longer storage over time)
- Cover the pile as quick as possible
  a) Tight along sides and edges
- Adequate number of tires/sidewall (25 tires/100 ft^2)

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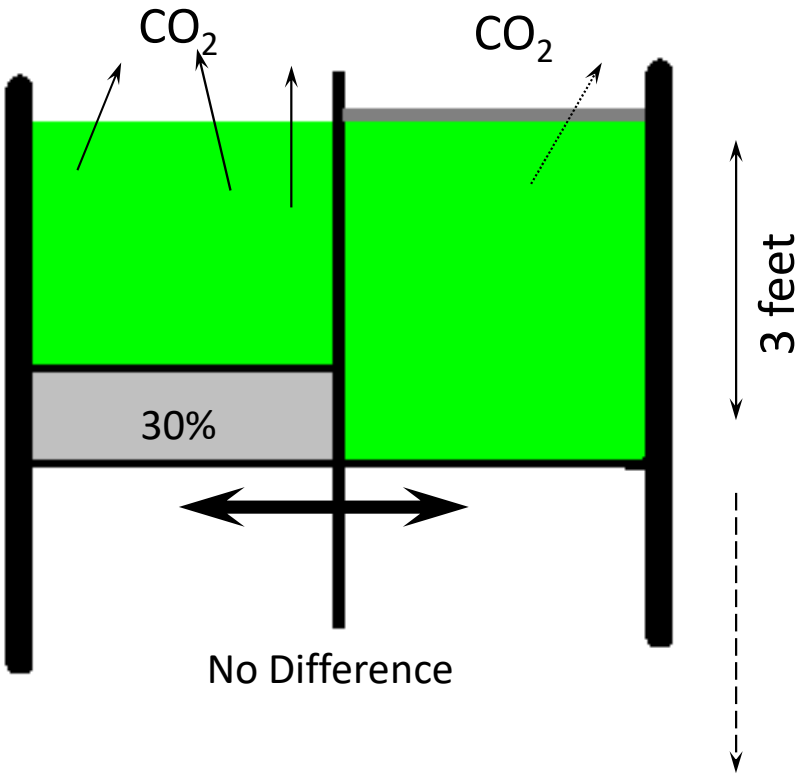
Storage: Why Cover?



Top 1-3 Feet

- 30-60% DM loss could be experienced

You don't see the real DM loss, the spoiled crust is just the start

In all cases the objective is to keep oxygen out

Plastic that moves up and down pushes oxygen further down into the stack

Estimated Dry Matter (DM) Loss in Corn Silage (60-70% moisture)

Hey Bree: Can I cover with something other than plastic and tires?

NO!

27% decrease in DM loss (wheat sod-cover) vs. 10% plastic (Nieto-Ordaz et al. 1984)

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Impact of Shrink on Feed Costs

Original Cost ($/ton)	Feed Cost ($) Based on Percentage Shrinkage			
	12%	20%	30%	40%
$ 30	34	36	39	42
$ 50	57	60	65	70
$ 100	114	120	130	140
$ 150	170	180	195	210
$ 200	227	240	260	280

And replace with high energy feeds? $$

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Silage management can be costly → DM loss, but also lost gain???

Table 3. Effect of the level of spoiled silage on DM intake and nutrient digestibilities.

Item	Ratio of normal:spoiled silage in the diet			
	100% normal	75:25	50:50	25:75
Spoilage layer, %[1]	0	5.4	10.7	16.0
DM intake, lbs/day	17.5[a]	16.2[b]	15.3[b,c]	14.7[c]
	Digestibility, %			
Organic matter	75.6[a]	70.6[b]	69.0[b]	67.8[b]
Crude protein	74.6[a]	70.5[b]	68.0[b]	62.8[c]
NDF	63.2[a]	56.0[b]	52.5[b]	52.3[b]
ADF	56.1[a]	46.2[b]	41.3[b]	40.5[b]

[1]The percent of the 'slimy' layer silage in the ration (DM basis).
[a,b,c]Means within a row differ (P<.05).

Steers consuming spoiled silage:

- Partially destroyed integrity of rumen mat
- Lower DMI and nutrient digestibility

Bolsen (2000) bookcoverfinal.qxd (cabidigitallibrary.org)

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What about Silage Additives?

Good silage management still critical!

- **Fermentation Stimulants (Inoculants)**
  a) Live, viable (inactive) bacteria introduced to freshly harvested forage
  b) Bacteria grow in the forage, producing acids and driving fermentation
  c) converts sugars to acids → accelerate pH drop
  d) Match type with feedout goals and type of silage

- **Silage Inhibitors**
  a) Propionic acid → aerobic inhibitors, suppress growth of undesirables
  b) Likely used during periods of slow feed-out or to close up a open pile/bag

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Feed-out: Face Management

- Secondary fermentation, heating, dry matter loss can occur again

- Face management
  a) Remove side to side or top to bottom
  b) Goal → minimize fissures to the pile
  c) Loader → high enough to reach top of pile to pull down and shave bunk face

- Safety!!!
  a) Watch overhang / avalanche

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Feed-out: Forage Dry Matter

Hey Bree: My cows intake dropped!

d) 34.5 ÷ 0.65 = 53.1 lb as fed

Never Leave Loose Silage For Next Day's Feeding

- Silage removal
  a) Ideally, 4-6 inches across whole face each day
  b) Only as much feed as you need for the day
  c) Don't stockpile on the ground!
  d) Watch for over mixing TMR
  e) What does it smell like? (sweet vs. putrid)

Don’t Remove Too Much Plastic at Feedout

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Feed-out: Forage Dry Matter

Hey Bree: My cows intake dropped!

d) 34.5 ÷ 0.65 = 53.1 lb as fed

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Thank you!

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